The thesis topic for my in-depth research is the impact that cash flows have on businesses of varying sizes. My research will have a primary focus on how cash flows of varying sized businesses are impact on their operations and stakeholders. This research will identify different limiting factors or advantages to having strong cash flows. I will also compare actual business and looking at their balance sheets, statements of retained earnings and other public financial statements to analyze how they retain and spend cash differently. Two (2) businesses being researched will be identified based on size as defined by annual revenues. One such business will be identified as a small business with annual revenues between $750,000 and $35,000,000; one large size business with annual revenues over $35,000,000. (sba.gov)

After making comparisons of these businesses’ financial statements, dividends and growth over the past couple years, the intent of this research is to identify the impact of having strong cash flows. Potentially determining whether having more cash on hand is better than having more debt on the books and furthermore how smaller businesses can increase cash flows.

In conclusion the impact that cash flows have on businesses is crucial, especially for smaller firms. Comparing the two companies really allows for a great example of what large companies do to achieve such cash flows, and shows what smaller companies have to do better to not only increase, but maintain strong cash flows.
Identity Politics in the Black Community: Living Life as a Political Statement

This research examines the ways in which identity politics affect the Black community in the United States. Its aim is to explain how and why members of the Black community are socialized to make political statements from their everyday decisions and actions. This research will also delve into how this politicization can in turn skew their identities as people of color. With historical and contemporary examples, this research will examine contested topics of debate in the Black community, most importantly debates surrounding cultural appropriation and assimilation. It will explore how these debates, when coupled with the effects of identity politics, contribute to political polarization within the Black community and ultimately within the larger American population.

The Amy Garveys: The UNIA, Community Feminism, and the Fight for Black Liberation

My research is an investigation of the contributions of both Amy Ashwood and Amy Jacques Garvey to the creation and advancement of the Universal Negro Improvement Association (UNIA). I intend to assess the vitality of these women’s contributions to the Garvey movement as well as their activism apart from Garvey himself. They were both self-proclaimed feminists, however they had different strategies of organizing and relating to women throughout the African Diaspora. Whereas most of the scholarly work on their individual contributions, I hope to highlight the connection they had to one another as well as other influential women throughout the African Diaspora. This study aims to add depth to the existing literature on Marcus Garvey, Amy Ashwood and Amy Jacques, and the UNIA by centering the conversation around how both women chose to display their agency as Black, Jamaican women in the 20th century.

It assesses the extent to which Ula Y. Taylor’s theory of community feminism was a framework that contributed to current Black feminist critical theory which emphasizes the importance of solidarity networks among Black women. I will also evaluate written correspondence that these women had with each other as well as other notable figures such as W.E.B Dubois. For this research, I will be consulting the DuBois Special Collections at the University of Massachusetts as well as the special collections at Fisk University, Duke University, and University of West Indies, St. Augustine.
Black women have been historically viewed as attractive not because of their strength but their beauty and “sexuality.” Vodou Black women practitioners to channel and generate strength from the very aspects of themselves which constitutes them as “subhuman.” Unlike traditional religion, voodoo can be considered an inclusive religion with regards to gender. There is an equal balance between male and female Vodou practitioners. This equal balance between gender is also present in the spiritual world of Vodou which encompasses various deities known as “lwas.” Vodou as it stands, is considered taboo and marginalized by not only other religious groups but in general. Likewise, the black female body has always been perceived by others as “subhuman” and animal like (Stein, 1996, p. 465). This classification in turn justifies the condemnation of black women and Vodou. However, when these two unite with one another, their dual marginalization becomes a catalyst for liberation. The liberation which black women find through utilizing voodoo is only possible because in using Vodou to liberate themselves, they also liberate the religion. Like “sankofa,” which is the idea that in order to move on in the present, one must revisit their past and accept it for what it is, vodou enables women to reclaim their root and weakness and utilize it as a torch for deliverance.
Behavior of Maiden Mare Prior to Foaling

This experiment looked at the pre-foaling behaviors portrayed by a maiden mare. Maiden mares do not show the same characteristics as an experienced mare because they have not yet had a foal. A 5-year-old Standardbred maiden mare was put under video surveillance 3 weeks before a due date of 342 days. Behaviors were recorded using focal animal sampling, then observations were switched to continuous sampling starting three hours before foaling. The data was analyzed through statistical analysis to determine the frequency of behaviors, duration of time spent in those behaviors, and typical sequence of behaviors. This study showed that as mares approach their foaling date, frequency and duration of behaviors change. This may be due to foal positioning and hormonal changes, as well as physical changes in the mare. Understanding behavioral changes can help equine professionals better predict when the mare is going to foal as normal horse gestation varies from 335 to 360 days.

Canine Tumor Research Project at UMass: Development of a Tumor Bank for Cancer Research

Mammary and mast cell tumors are among the most common tumors in dogs. Females that experience two or more heats have a high risk of developing mammary tumors, of which 50% are expected to be malignant. Mast cell tumors occur equally in male and female dogs, representing 20% of all canine skin cancers, and malignancy varies depending upon the grade of the tumor. A greater understanding of how mammary and mast cell tumors develop will facilitate treatment, and ultimately contribute to better prevention.

Students participating in The Canine Tumor Project at the University of Massachusetts Amherst are creating a canine tumor biobank to advance research on the causes and treatment of canine mammary and mast cell tumors. With the cooperation of local veterinarians and consent
of dog owners, students are present on the day of the dog’s surgery. Owners complete a short
questionnaire and provide contact information for long-term follow-up of their dog’s
health. Students collect a small portion of the tumor tissue and process it at UMass laboratories
where they prepare patient-derived cell lines and archive sections for later genetic and
epigenetic analyses. Tumor tissue, along with data from questionnaires, long-term follow-up,
and pathology reports will provide the basis for research addressing the causes and best
treatment for canine mammary and mast cell tumors. Finally, because of the similarities
between human breast cancers and canine mammary tumors, research with canine mammary
tissue could possibly contribute to finding new treatments for human breast cancer.

Room 809  3:45-4:30  Panel 7
Taylor Guertin
Kimberly D. Tremblay (Faculty Sponsor)
Department of Veterinary and Animal Sciences, UMass Amherst
The Role of Retinoic Acid Signaling in Liver Development

Although the naive hepatoblast (hepatic precursor) was thought to be homogenous our
lab found that FGF signaling is required for normal development the anterior hepatoblasts
while BMP signaling is required for the induction of the posterior hematoblast. Intriguingly when
both FGF and BMP signaling are inhibited, a small population of HNF4α-positive
hepatoblasts remain, suggesting that another signaling pathway may be involved in early liver
development. We hypothesize that retinoic acid (RA) signaling could be this other pathway. RA,
a metabolite of Vitamin A, is essential for the health of the adult organism and is important for
embryonic development. RA signaling is required for the development of other endoderm-
derived organs in mice, including the pancreas and lungs. RA signaling is required for liver
development in other vertebrates, but has not yet been shown in the mouse. If RA signaling is
involved in murine liver development, the key genes in the signaling pathway should be
expressed in the early liver bud. We confirmed such expression using RT-PCR and in situ
hybridization. To further assess the role RA signaling plays in liver development, mouse
embryos were cultured through the initial stages of liver development in the presence or
absence of the RA signaling inhibitor, BMS493. Immunofluorescence with the hepatic marker
HNF4α was performed to visualize nascent hepatoblasts. A dramatic loss of HNF4α positive
cells was observed in the anterior portion of the nascent liver, supporting a role for RA signaling
in early liver development.

4:45-5:30  Board 15
Hannah Lydotes
Cassandra Uricchio (Faculty Sponsor)
Department of Veterinary Science, UMass Amherst
Ammonia Absorption in Various Equine Stall Beddings

With current equine management practices, humans and horses are potentially exposed to
hazardous levels of ammonia on a daily basis. OSHA has declared over 50 ppm of ammonia
unsafe for workers; however, popular show barns have been discovered to have 450 ppm
Horses naturally eat on the ground where ammonia is concentrated. The average 1,000 pound horse produces 50 pounds of waste and 2.4 gallons of urine every day (Westendorf). Most domesticated horses are stalled indoors which creates a large ammonia build up. The type of bedding within the stall contributes to the ammonia levels both horse and human are exposed to. The most popular types of bedding are: coarse wood shavings, sawdust, pellet bedding, and straw. If the bedding does not absorb the ammonia, there will be a buildup of ammonia on the stall floor and walls, leading to increased health risk. Ammonia exposure for horses and humans was tracked using ChromAir Ammonia Badges. A horse wore the badge for sixteen hours within the stall, and the human wore the badge while cleaning the stall (on average 15 minutes). The 13-year-old gelding was chosen for the study due to his consistent high urine output. The study found a correlation between different types of bedding and level of ammonia exposure. The results of this study will help decrease ammonia exposure and in turn decrease the incidence of respiratory diseases in both horses and humans.

4:45-5:30  Board 16
Ashley E. Johnson
Cassandra Uricchio (Faculty Sponsor)
Department of Veterinary Science, UMass Amherst
Ammonia and Liquid Absorption of Different Types of Horse Bedding

Ammonia is a compound made up of a nitrogen atom bonded to three hydrogen atoms, often characterized by a strong, pungent smell. This compound can result in respiratory diseases such as Inflammatory Airway Disease and Recurrent Airway Obstruction in horses after long term, consistent exposure. Ammonia can go over 200 parts per million (ppm) in the average horse stall and humans can only withstand 15 minutes at 35 ppm (thehorse.com). In this research project, 4 different common bedding materials (Sawdust, coarse shavings, wood pellets, and straw) were selected and sealed in airtight containers, held in place by plastic grates. Equine urine samples were collected and separated into 20mL units to deposit into each of the 4 containers. Absorption was measured by the amount of residual urine at the bottom of the containers. Ammonia absorption was measured over a 16 hour interval using Hydrion Ammonia Meter test paper. Results showed how much ammonia and liquid can be absorbed by various bedding types. The aim of this research project is to explore different ways to minimize ammonia levels and maximize respiratory health in our equine companions, focusing primarily on bedding types.
ANTHROPOLOGY

8:30-9:15 Board 27
Shannon D. Nelson-Maney
Eric S. Johnson (Faculty Sponsor)
Department of Anthropology, UMass Amherst
Fishing Impacts from Pre-Contact to Present

In this presentation I examined the impact that fishing in Massachusetts has had on the environment from pre-contact to modern times. I looked at the fish landings from the National Oceanographic and Atmospheric Administration, NOAA, to find the numbers of fish being pulled from the sea from 1945 to 2018. I compared this, as well as the materials and equipment used to fish in modern time, to the interviews I conducted with Native Scholars from Massachusetts; I compared them as well to historical documents talking about the type of fish caught and the methods of fishing that were used in pre-contact Massachusetts. Throughout my research, I also took into account over-fishing as well as issues with by-catch and throw backs. I examined what effect those have on the population and health of the ocean. Using the information I gathered during my research, I discussed the environmental impact that fishing has had from pre-contact to the present in order to determine a more environmentally conscious and sustainable way to fish. With my research, I hope to find the best way to fish so it benefits Massachusetts environmentally and economically and use fishing methods and techniques that have the least impact on the environment around us.

8:30-9:15 Board 28
Paul M. Oberheim
Eric S. Johnson (Faculty Sponsor)
Department of Anthropology, UMass Amherst
Spatial Analysis of Ceramics at Emily Dickinson's Barn

The objective of this project was to examine the distribution of ceramics in the barn area of the Emily Dickinson homestead. The Homestead is the house of the famous poet in Amherst, Massachusetts and along with the neighboring Evergreens, comprises the Emily Dickinson Museum. Excavation in years past around the property have explored and identified various features, such as a tennis court and a conservatory. The barn location is known but the foundations of the structure have yet to be found. Using the information collected from 2015-2017 by the University of Massachusetts Archaeology Field School I was able to put the ceramic information into ArcGIS and identify concentrations in certain areas. This information will be useful not only to future excavations in determining the age of fill layers but also in helping to finally pinpoint the location of the barn.
Presentation Details

8:30-9:15    Board 29
Niki Bavar
Eric S. Johnson (Faculty Sponsor)
Department of Anthropology, UMass Amherst
Streamlining the Reconstruction Process

I explored different image matching and image analysis software in the hopes of streamlining the pottery reconstruction process. All of the software I found were free to download, something I found personally important because I want the technologies to be accessible. In order to test the efficiency of each software, I used images I had taken of the sherds in the Roxbury Collection, held by the UMass archaeology department. Once the software used those images to identify potential matches, I tested the results against the sherds in the collection. I hope my findings will allow researchers to spend less time reconstructing pottery, thus allowing them to dedicate their time to cultural analysis. Depending on the success of these software, it could have many other applications; it could be used for pattern sequencing and other kinds of visual analysis, as well as being a useful tool for organizing collections quickly and efficiently.

Room 163    8:30-9:15    Panel 1
Stephanie Lacerda Alves
Kathleen A. Brown-Perez (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Healthcare in the United States: Privilege or a Fundamental Right?

This paper examines the development of our current healthcare system. Considering recent political changes, the notion of an implementation of a universal healthcare system can revolutionize our health. Being one of the richest countries with one of the lowest ranking healthcare programs, the United States’ transition into universality is affordable and beneficial to the nation. This thesis presents a historical background of healthcare development in the United States and information on healthcare systems and reforms in ours as well as other countries. It also provides information on social structures affecting healthcare, such as violence and voting rights, alongside the current political positions on health reform. Chronic disease is among the costliest and most prevalent conditions suffered by people. The high incidence of these diseases can be managed, however, with preventative measures and a focus on primary care. By implementing Ham’s ten fundamental steps to universal health coverage on a federal level, we can successfully better our country’s health.

Room 163    8:30-9:15    Panel 1
Maxwell James Ball
Kathleen A. Brown-Perez (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Teaching across the Spectrum: How America’s Schools Can Do Better for Their LGBTQ Students

The LGBTQ community has seen great progress in equal rights and protections under the law in recent years. However, LGBTQ adolescents continue to experience hardships in school due to
bullying and victimization from their peers, sex education curricula that continue to be centered on heterosexuality, and lack of faculty role models and qualified counselors in which to confide. If one looks at private and parochial schools these problems seem to worsen.

These realities carry serious implications since LGBTQ youth are at a higher risk of depression, mental health problems, and suicidal thoughts or actions than their heterosexual and cisgender peers, and they are more likely to be bullied, which further increases such risks. This paper looks at the severity and breadth of this problem and proposes solutions to make education more equitable and safe for everyone.

Room 163  8:30-9:15  Panel 1
Meghan E. McCarthy
Kathleen A. Brown-Perez (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Equal Not Equitable: How the US Public School System Primes Some for Success and Others for Failure

The United States claims that its education system gives every student an equal opportunity to receive an education. This paper shows that students who are not successful in this system are considered at fault, not the system itself. Both laws and biases work to impede the success of certain students while ensuring the success of others. The system values certain cultures and learning styles, while completely disregarding others. Research clearly shows our school system is designed in such a way that it perpetuates racism and discrimination by marginalizing minority students. In this system, some students are primed for college, while others are primed for a prison cell. Schools are used as a way to oppress minority groups and as a way to keep them at a low rung in the societal ladder. I will prove that due to the current school system these marginalized groups do not receive an equitable education. This thesis presents detailed research that provides multiple perspectives on how this systematic marginalization has been created and how it is perpetuated. Perspectives include English language learners, school funding, school to prison pipeline, deficit thinking, and tracking/ability grouping. This paper uses scholarly journals and books to show how certain laws and policies hurt the United States’ most vulnerable and disadvantaged students. This paper also provides recommendations on how to make this system more equitable for minority students and the importance of changing this system.

Room 163  8:30-9:15  Panel 1
Cole Edward Stanley
Kathleen A. Brown-Perez (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Hell Instead of Help: The Overrepresentation of People with Mental Illness in American Prisons

This paper reviews various peer-reviewed research articles and books on the subject of the overrepresentation of people with mental illnesses in the United States prison and jail system. The paper will briefly overview the history of mass incarceration and deinstitutionalization in the
United States, and then delve into a detailed and methodical assessment of the current research on the amount of people with mental illnesses currently incarcerated, the conditions they face in the criminal justice system, the treatments available to them, and the effects of law enforcement bias and public stigma. Results reveal conflicting reports on the number of mentally ill people incarcerated, their recidivism rates, and the effects of police involvement, with more research necessary to make any causal connections. Among other transgressions by the justice system, people with mental illnesses were found to be subject to more punishment while incarcerated, get longer sentencing times, be misunderstood by prison correctional officers, and receive treatment that does not fit their needs and cultural backgrounds. In the end, several solutions to alleviate some of the problem are suggested, including specialized police training, mental health courts, and public education.

Room 163  10:45-11:30  Panel 2
Ashley Tatyanna Cabrera
Kathleen A. Brown-Perez (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
A Strike-Down on Monochromatism: The Reality of Institutionalized Colorism in the United States

The preferential treatment for lighter-skin is a global phenomenon that is known but is often ignored in academic settings or in literature. This honors thesis discusses the origins and social and legal complications of colorism that were present from the formation of the United States and through present day. To further illustrate the importance and implications of colorism, this thesis uses other countries as supplementary examples. Colorism needs to be addressed at federal and state levels in conjunction with laws that address racism to ensure equality and to include a more color conscious narrative in the legal system as well as in social settings.

Room 163  10:45-11:30  Panel 2
Elizabeth C. Donoghue
Kathleen A. Brown-Perez (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Shackled by Injustice: Incarcerated and Pregnant in the United States Penal System

In this thesis, I critically analyze the experiences and marginalization of incarcerated pregnant women in state and federal public and private prisons. My research provides contextualized analysis of research and historical context of their experiences. It includes the history of women’s relationship to imprisonment and mass incarceration, the experience of incarcerated pregnant women antepartum, intrapartum, and postpartum, and a look toward the future. Across the U.S., low-income women of color are disproportionately targeted by our criminal justice system and deprived of comprehensive and equitable healthcare. When they enter prison pregnant, they are denied prenatal care and subjected to inhumane conditions during childbirth like shackling. Following childbirth, they are allowed little time with their infant who is then either placed in relative’s care or foster care. After a certain period of time, many women lose their parental rights. The treatment incarcerated pregnant women experience demonstrates the glaring racialized-gendered disparities between white, non-incarcerated women’s constitutional
right to reproduce and parent one’s child. I draw from multidisciplinary sources from the social sciences and articulate the sociological, medical, psychological, legal, and ethical empirical findings that highlight the complications regarding medical care to which incarcerated pregnant women have access. This research serves as part of the larger body of scholarly research that shows the ways incarcerated pregnant women are marginalized by law, policy, the healthcare system, and the criminal justice system. It also serves to inform the public consciousness about the reality incarcerated pregnant mothers experience in the U.S. penal system and beyond.

Room 163  10:45-11:30  Panel 2
Rosario Naranjo-Zarate
Kathleen A. Brown-Perez (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Las Dos Caras de la Moneda: Assimilation Experienced by Mexican Immigrants in the United States

Immigration is a global phenomenon that has a long history in the United States. Many people have emigrated from their countries of origin all over the world in order to build a new life and future in the United States. Mexico is a country that has participated heavily in the immigration flows to the United States. Nowadays, the immigration dynamic between the two nation-states is a commonly discussed subject amongst distinct groups of people that may not always share the same ideals. Mexico and the United States are so close in geographical proximity that they share the southwestern border. Regardless of this fact, their approaches to handle immigration vary widely. In this work, I will examine and compare the Mexican approach to immigration, which is currently centered around human rights, against the American approach, which is based primarily on law enforcement and policies. Furthermore, I will analyze how these two fundamentally different perspectives on immigration cause a clash in ideologies that ultimately affect the assimilation process of Mexican immigrants in the United States.

Room 163  10:45-11:30  Panel 2
Jua Seo
Kathleen A. Brown-Perez (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Narrowing the Gender Wage Gap in Corporate America

Despite the number of years that have passed since Congress enacted the Equal Pay Act, Title VII of the Civil Rights Act, and the Equal Employment Opportunity Act, women in the United States continue to experience gender earnings disparity, even more so in private sector. After closely examining factors that contribute to the wage gap, I have found that traditional explanations such as education and labor force participation rate are no longer applicable. The modern-day explanations of the gender earnings disparity are the result of gender identity norms, also known as gender stereotyping. After identifying the root cause, I have provided effective family-friendly policies as a means to reshape gender identity norms in corporate America in addition to preventive measures related to already existing policies on gender equality.
Fatma G. Melara  
Ester Shapiro (Faculty Sponsor)  
Department of Psychology, UMass Boston  
Special Immigrant Awareness Initiative

The Special Immigrant Awareness Initiative research provides insight on undocumented immigrants who are able to apply for a Special Immigrant Justice Petition. This petition targets anyone who is under 21 and has been neglected, abused, or abandoned by one or both parents. This research will focus on understanding what cities are more prominent to child abuse in undocumented immigrants, how many eligible undocumented immigrants there are in the state of Massachusetts, and identifying possible solutions to the causes of the information gap (specifically targeting juveniles who are over 18, who do not require parental consent and appointment of guardian) in order to maximize the number of students who benefit from this petition. The ultimate goal of this research is to spread the knowledge that otherwise many would not be aware of for this specific pool of immigrant juveniles. This is specially critical to know in their teens because of the age and other eligibility restrictions: in many states 18 is the age for adult status, so New York only accepts applications initiated before age 18; MA presents some similar barriers due to child protective status not designated after age 18. We will explore some of the complexities of family disclosure, including the fact that the youth will not be able to sponsor either parent's documentation, and suggest appropriate educational/outreach strategies.

Arzef Sylaj  
Lisa Maya Knauer (Faculty Sponsor)  
Department of Sociology and Anthropology, UMass Dartmouth  
Comparative Study of Museums, Artifacts, and Indigenous Peoples

This past summer I interned at Robbins Museum of Archaeology in Middleborough Massachusetts. All of the artifacts, ethnographic and archaeological, evoked curiosity within me, and I asked myself, what stories are to be found here? What can these relics tell us about their past and present? How does that duality translate into understanding the perspective of the local indigenous populations? The purpose of this poster is to introduce my thesis research project, which focuses on the interrelationship between the museum and its acquisitions, and how the museum represents the indigenous people of Southeastern New England. I will explore questions such as: what cultural lens does the museum employ to portray these artifacts? How is the curatorial work conducted? My project is a work-in-progress and most of the research will be carried out in the summer and fall of 2019. The first part will encompass investigating past literature on the topic. The second part, interviews with staff, visitors, and Native communities will be conducted to acquire primary source information. I am currently focusing on the literature review and developing my research protocol for the ethnographic portion of the project. This is a case study for exploring the trinity of museums, artifacts, and the indigenous people, which are always constituted with each other. Is there another way to present culture and history in a museum? The answers to these questions will be empirically analyzed to uncover patterns, social paradigms, and ultimately understand how museums represent the Native American communities.
This research analyzes felon disenfranchisement and its impacts on ex-felons to determine whether it is a legal punishment under the Eighth Amendment. The Eighth Amendment will be defined, followed by a discussion on how judges have interpreted the language of the law. This discussion will include a description of how the Supreme Court has determined what punishments are legal to give to convicted felons under the Eighth Amendment. Felon disenfranchisement and mass incarceration both affect the lives of many in the United States. In this work, felon disenfranchisement is identified as a strategy used to continuously punish felons after they have completed their sentence. Felon disenfranchisement policies are also identified as highly racialized policies that disproportionately affect vulnerable communities in the United States. The various organizations working to reform felon disenfranchisement policies, as well as alternatives to the current criminal justice system, are introduced. United States citizens who have lost their right to vote and access to federal assistance because of felony convictions should be able to regain these privileges because punishing a person after they have served their sentence is cruel and unusual punishment in violation of the Eighth Amendment.

The US immigration system is under constant scrutiny from politicians and the public. The immigration system controls who is allowed to enter the United States. Under the Trump Administration, people are protesting the travel bans on certain Middle Eastern countries and violent enforcement along the US-Mexico border that aim to keep out Latinos and Muslims. However, many do not realize that this racist and xenophobic response from lawmakers to immigration existed since the creation of the immigration law. Though race can no longer explicitly be stated as an excuse, racism still heavily influences contemporary policy. This thesis focuses on the xenophobic history of the US immigration system and how immigration policies first aimed to marginalize Chinese immigrants, and then continued to target various ethnic groups such as Latinos. Racialization was a key factor in subjugating immigrants. By creating distinct racial groups deemed as inferior to whiteness, the US government labeled those races as immigrants and then immigrants as inferior. The government criminalized immigrants as illegal aliens establishing them as second class and undeserving. First by understanding the historical context of immigration, we can then question the system as a whole rather than blaming certain individuals.
The issue of undocumented immigration at the United States-Mexico border has reentered the American political discourse with renewed fervor. Calls for stricter border security and the construction of a wall come amid a decades-old trend in border militarization, warranting an exploration of the ways that undocumented individuals experience violence at the hands of U.S. law. Focusing on the concept of legal violence, which simultaneously produces and legitimizes harmful effects for undocumented immigrants, this paper provides an analysis of the law’s injurious effects at each stage of the border crossing experience, from the journey to settled life. It yields the conclusion that violence is in fact a central part of U.S. immigration policy. And though some characterize legal violence as an unfortunate and unintended byproduct of U.S. immigration policy, this analysis reveals that violence is actually an intentional part of it. In fact, immigration policy continues to be deliberately designed and implemented to inflict harm according to the failed strategy of deterrence. Thanks to the legal distinction between criminal and civil law and the plenary powers doctrine, this violence has been condoned by the U.S. court system, creating a due process deficit that denies immigrants equal treatment under the law. Only through the fundamental reimagining of our judicial approach to questions of immigration can we ensure that immigrants are fully protected. As the world becomes increasingly characterized by international migration, this task should be paramount.

Despite improvements in civil rights and shifting ethnic demographics, the United States continues to engineer a modern-day apparatus of segregation and racialized state control over its people of color, predominantly Black and Latinx communities, and over the undocumented Latinx immigrants within its borders. The United States of America is marred by its historical legacy and continued disenfranchisement of its diverse ethnic communities in order to maintain a white supremacist system of political, legal, and social control. With critical and intersectional analysis, this paper seeks to connect the similar ways in which punitive criminal justice and immigration policies deprive Black and Latinx communities of their humanity, right to due process, and right to democratic participation. Through peer-reviewed journal articles and quantitative research, this research paper seeks to contribute to the existing record of scholarly illegitimization of U.S. criminal justice and immigration policy. By adopting a restorative and prison abolitionist lens of transformative justice, this paper will conclude by offering evidence-based policy solutions that empower these affected communities rather than continue to enforce a U.S. surveillance state that institutionalizes white supremacy.
Many countries have nation-wide policies which regulate language use in one way or another. In Tanzania, these policies restrict the use of heritage languages in schools and official settings; establish the national language of Swahili as the language of instruction (LOI) in primary school; and establish the official language of English as the LOI in secondary and higher education. Kenya has similar policies except English is the LOI for all of primary through higher education. Likewise, in the United States, the language policies establish English as the LOI in all public schools from primary through higher education and all official settings. The dominant language ideologies of these states also reflect, support, and derive from these policies. My previous research involved fieldwork in Isele, Tanzania where I collected information about people’s language identity and their opinions about their language, its survival capacity, and the school language policies. This current study focuses on analyzing the impact of language ideologies and language-in-education policies of Tanzania, Kenya, and the United States. The target population of this study is US international students of Kenyan and Tanzanian heritage. The research asks participants about their experiences and opinions of the policies and ideologies in question to ascertain possible effects these formal and informal constructs have on an individual’s linguistic identity and their relationship with their heritage language(s). This comparative research will help in understanding the process of linguistic identity formation and evolution which may inform future language policy decisions and contribute to African, African-American, and immigration studies.
This project examines whether individuals from the Medieval town of Noli (Italy) experienced health disparities that led to high rates of child mortality. Previous research suggests that the Noli Medieval population experienced unusually high rates of childhood mortality. One problem with this research, however, lies with the fact that age at death was determined from bone length as proxy for stature. Stature is an important indicator of population health; stunted or abnormal growth suggests poor population health. I hypothesize that previous studies underestimate the age of Medieval children because the estimations of “height for age” tables are calibrated on 20th century skeletal samples. These individuals lived under better health conditions than Medieval populations.

In this study, I use dental eruption as an alternative means to determine age at death. Age can be accurately estimated from skeletal remains based on predictable patterns of dental eruption. The age estimates of the Noli Medieval sample were compared to three Pre-Industrial European samples, and a 20th century USA sample control group comprised of individuals from a relatively high socio-economic population. When compared to the Pre-Industrial samples, the Noli Medieval sample shows no significant height for age difference. Interestingly, all samples are significantly shorter than the control group, in keeping with expectations of better quality of life and health conditions for the contemporary group than for Medieval and Pre-Industrial samples. These results show that “height for age” methods that are calibrated on modern and “healthy” samples underestimate stature and age of pre-modern skeletal samples.

Noli is a maritime town on the northern coast of Italy. Historical records suggest that during the medieval era, offshore fishing involving net pulling was the predominant means of survival for the Nolesi population, as opposed to agriculture. Because bone remodels in response to mechanical loads produced by physical activity, patterns of bone structure vary in predictable ways across subsistence groups. By applying mechanical principles, and by comparing osteological patterns, anthropologists can begin to reconstruct the lives of ancient peoples. I investigate the impact of net fishing on arm bone robusticity by analyzing the upper limb bones of a Medieval population excavated in Liguria (Italy), from the graveyard of the San Paragorio church, in Noli. The collection is housed in Dr. Brigitte Holt’s lab (Department of Anthropology).

The skeletal remains are dated from 900-1400 CE. My sample consists of 15 adults (8 females and 7 males). Midshaft cross-sections of right and left humeri and radii were obtained from computerized tomography (CT) scans taken at the Worcester Polytechnic Institute. Cross-
sectional geometric properties (cortical area, second moments of area, and section modulus) were used to estimate bone strength. Means for the Noli sample will be compared to a sample of early and late medieval (500-1599 CE) skeletons from regions across Europe (N=455), using Analysis of Variance (ANOVA). The comparison with the other medieval populations will illustrate how the upper limb bones of the Nolesi were shaped by their maritime lifestyle, and further clarify the impact of physical activity on bone structure.
ARCHITECTURE

8:30-9:15  Board 30
Caroline Dolan
Erika Zekos (Faculty Sponsor)
Department of Architecture, UMass Amherst
Mutual Sustainability in Bee-Hive Design

My thesis explores biomimicry and how existing patterns, structures, and systems from the natural world can positively contribute to human-made designs. This concept was drawn from the process behind Antoni Gaudi’s architecture and inspired by his quote “Originality consists of returning to the origin. Thus, originality means returning, through one's resources, to the simplicity of the early solutions.” and the belief that nature is the origin of all art and what informs our designs. I intend to take this one step further by investigating mutualism and how the built environment will then positively impact its natural surroundings.

Using the research I have gathered in the past few months and focusing on the concepts of biomimicry and mutualism between species, I am redesigning a typical man-made bee hive. I will then construct the final design at 1:1 scale.

8:30-9:15  Board 31
Steven Raymond Paquette
Erika Zekos (Faculty Sponsor)
Department of Architecture, UMass Amherst
Reflect: Community and the Self

For my project I am focusing on creating a visual and experiential relationship between light in an architectural space and the interactions of people and light within that space. As a supplement, I am also combining my previous research of ancient monuments and their relationship with solar alignment with a modern program of a sanctuary space on Angel Island nearby San Francisco, CA. I will design a space, inspired by the programmatic requirements of the 2019 Lyceum Fellowship competition as well as my research, that serves as a space both contemplative and inspiring due to the architectural elements of form, light, and shadow.

Throughout the project I focus on themes of reflection and translation. The innovative design will combine individual and community space that consider the natural landscape, social culture, and history of the Angel Island site. This design will be the result of an iterative process of analysis (of both site conditions and culture), schematic designs and concept diagrams, as well as a development of sophisticated architectural drawings and renderings.
With an increase in student enrollment in higher education, there is a need for providing a healthy environment to enhance learning. There is excellent potential to improve our campus environment through information and access to healthy options. Some areas that could be improved include healthy college living, healthy consumption, and physical exercise.

Sustainable planning in campus infrastructure can enhance the experience of students through changes that enhance the health and well-being of students. This study proposes to develop campus additions to create a healthy environment for enhanced learning. It is proposed for information posters, healthy vending machines, and student engagement groups in the main locations of the campus. These are to be placed in locations with easy access, clear visibility, affordability, and great aesthetics for campus decor. It is also proposed to have an outdoor gym to encourage better health of the study body. Building two is the most multi-use building on campus, and these new improvements will help reach a higher percentage of students. Building 17 is a high traffic area and shall provide an awareness of healthier living due to the academic’s subjects placed in this building. Other campuses in Western Massachusetts can use this finding for more sustainable campuses.
why choose gloria? that’s like asking why zip your fly when you get dressed? why call your mom when something exciting happens to you? why sneak to the kitchen in the middle of the night to eat shredded cheese from the bag? some choices are just obvious. through a unique form of design-thinking that’s truly gloria-centric she tells the story of her clients without oversharing.
gloria’s work evokes a sense of nostalgia through a delicious cross of tasteful kitsch and purposeful naivety. she creates multi-faceted designs honing her focus on work with type, simple imagery, and advanced wit.
with work specializing in branding and promotion she is the go-to of industry leaders looking to tell a compelling, smirk-inducing story to connect with their audience. she designs with a deep-rooted sense of authenticity, taking the time to get to know her clients and their overall objectives. using a strong history in sales and communication gloria gets her clients ideas not only into the world, but into people’s minds and hearts. her clean designs catch attention, her writing keeps it, and her authenticity leaves something to remember. a wise sage once said, “there is no better way to connect than through a laugh, or telling someone their fly is unzipped.”

Thomas Champigny is a designer from Salem, Massachusetts. He holds a Bachelor’s degree in Art + Design with a concentration in Interactive Multimedia as well as a minor in Computer Science from Salem State University. Thomas’ strong background in information technology informs his design work. His portfolio includes logo design, branding and marketing campaigns focused primarily on the tech industry.

Hannah Patricia Mezzina is graduating in May of 2019 from Salem State University. Her portfolio includes an array of fashion illustrations, short animations, charcoal/pastel work and mixed media projects. She has special interest in rebranding makeup and beauty lines using bold colors and text, as well as detailed, elegant illustrations. She has done a number of poster
campaigns in support of organizations such as the American Wild Horse Campaign and RIAC. She aspires to create short animations for causes/organizations important to her, such as TED Ed and Vox animations.

11:45-12:30 Board 44
Erin N. Murray
Brian Alves (Faculty Sponsor)
Department of Art and Design, Salem State University
Multimedia Portfolio Presentation

Erin’s main goal as a developing artist and illustrator is to marry the classic traditional designs of the past with the new and innovative design aesthetics of today. Within her portfolio are modern twists on traditional painting designs and digital portraiture, as well as both graphic and web design that brings in modern and eye catching layouts. The designs are elegant but hold a little bit of spunk and oddness. Many of the color pallets used in her designs are more relaxed and well balanced. This is thanks to her background of both extensive traditional art courses and practice in portraiture painting. Combining these skills with a strange yet old-fashioned taste, the designs are clean but quirky, sophisticated but simple.

11:45-12:30 Board 45
David Edward Bishop
Brian Alves (Faculty Sponsor)
Department of Art and Design, Salem State University
Multimedia Portfolio Presentation

David Bishop is a graduating senior at Salem State University majoring in Art & Design with an Interactive Multimedia concentration. His portfolio has a diverse range of material and topics including instructional animation, branding campaigns and webpage design. With his design, he aims to inspire, entertain, and educate his audience.

11:45-12:30 Board 46
Brendan Michael Lees
Brian Alves (Faculty Sponsor)
Department of Art and Design, Salem State University
Multimedia Portfolio Presentation

Brendan M. Lees is a digital artist and designer studying Graphic Design and Interactive Multimedia at Salem State University. His work is inspired by minimalist and surrealist movements. His work includes poster design, album art, branding, responsive and mobile design. His artwork provokes feeling, curiosity, and intrigue through various means expression while also being able to provide the “pop” that clients desire in their brand to stand out amongst competitors. His unique approach to design allows him to apply his interest in surreal and dreamlike scapes with contemporary minimalist design elements.
11:45-12:30    Board 47
Ashley Viveiros
Brian Alves (Faculty Sponsor)
Department of Art and Design, Salem State University
Multimedia Portfolio Presentation

Ashley Viveiros is graduating in May of 2019 with a degree in Art - concentrating in Interactive Multimedia - from Salem State University. Her interests include animals, video games, illustrations, cartoons, anime, and colorful designs. Her affinity for animals has a huge impact on her work. Ashley focuses on minimalist, simple yet enticing design. Her portfolio includes personal illustrations, poster designs, short video animations, and website designs. She strives to show her fun, simple, and creative style to the world.

11:45-12:30    Board 48
Eriola Kapaj
Brian Alves (Faculty Sponsor)
Department of Art and Design, Salem State University
A Female Designer Connecting to the World through Design!

Eriola Kapaj is a young female designer specializing in Interactive Multimedia.

As a designer her mission is to connect with people using her creativity to make a positive impact on the lives of others.

Based in Boston but coming from Europe, Eriola has a deep understanding of current events. Her design addresses such complete issues such as immigration and endangered animals.

Her portfolio also includes a complete rebranding of the 2020 Winter Olympics. This design system includes logo, ticket and banner designs, animations and a responsive website.

1:30-2:15    Board 6
Bailey Rose Boutiette
Sam O'Connell (Faculty Sponsor)
Department of Visual and Performing Arts, Worcester State University
Ingenuity Opportunity

As a VPA studio arts major with a complementary marketing major, I have synthesized an interdisciplinary Thesis that utilizes business administration in the context of the cultural sector. I am curating a show, Ingenuity Opportunity, that targets student artists. Ingenuity Opportunity will provide regional student artists with an opportunity to exhibit their work in a professional level artists' space, our campus gallery. The goal is to use the physical space to engender social connections, interactions, and networking, as well as build the confidence of student artists. Several objectives flow from these goals: collaboration, education of the community, intercultural contact, innovation and growth. Exhibitions such as Ingenuity Opportunity foster collaboration between schools in Worcester county. There are very few opportunities for
students in the region to exhibit their work together. Student artists benefit from seeing multifaceted perspectives. The celebration of fresh and diverse ideas through art will help break down barriers between communities of students, artists, and cultural trail blazers in the region. At the opening reception which is free and open to the public, artists chosen to win prizes and honorable mentions will be invited to give short talks about their work to the attendees.

The presence of dynamic cultural institutions lays the groundwork for the growth of the creative economy. To support the work being done to curate the show, I am researching the role of art museums, galleries, and studios as engines for this expanding creative economy in Worcester county. This includes conducting informational interviews with seasoned art directors, visiting exhibitions in Worcester County, and gathering academic resources as references. These supporting goals contribute to the core of the Thesis. As part of my Thesis, I will be organizing my research into a final essay. The essay will summarize my findings about the role of cultural institutions in the area and their ability to transform communities.

1:30-2:15  Board 7
Ellen Catherine Schlosstein
Sam O'Connell (Faculty Sponsor)
Department of Visual and Performing Arts, Worcester State University
Observations in Nature

I have always found botanical art a fascinating subject because for hundreds of years, it was the only way for many people to examine plant life they wouldn't normally see; However for this project I want to take that idea but use flowers and leaves we see which are very common for the region. For my capstone project I am creating 3 to 4 large scale, close up drawings of leaves and flowers. These drawings would be 18X24 or larger and done in graphite drawing pencils. These drawings would feature a wide variety of textures, value changes and shading. I want these drawings to be on a larger scale because it forces the audience to look at the details that make up these often overlooked obscure plants. This project would hopefully give the viewer a new way of looking at plant life and may grow to appreciate and make a conscious effort to preserve it.

1:30-2:15  Board 8
Madeline Lindfors
Sam O'Connell (Faculty Sponsor)
Department of Visual and Performing Arts, Worcester State University
Recollect

Climate change, once only a studied phenomenon, has begun to cause noticeable changes felt by the majority of the earth’s population. In fact, the catastrophic effects are already being felt. Take, for example, the recent hurricanes that have left communities destroyed and lives lost. These events have caused me to contemplate humanity’s mark throughout history. I considered what it meant to be a human being and came to the following conclusion - To be human, we must live in a constant cycle of personal growth and decay. We grow, learn, absorb, release,
and wither. In other words, we are just as fragile as the ecosystems that we are destroying. With this project, I want to show society’s carcass and answer the question; what will remain of humankind once the earth finally rejects us?

My proposed projects explore different, typically disregarded materials and places them in a more venerate setting. My intention is not just to be subversive, but also cause my viewer to think about what they use everyday and what will be left of our modern society. I intend to emphasize memories or relics as an attempt to make sense of humanity and history. Tchotchtes, recycled objects, dead plants, and other detritus or trash will be collaged together to imply a memory, a hope, or even a feeling. I intend on starting somewhat of a subversive conversation by juxtaposing the detritus with the reverent. In a gallery setting, my hope is to leave my audience questioning what they think of as ugly and start to look at the world a bit more mindfully. With these projects, my intention is to show an examination of personal growth and ultimate decay. I want to explore humanity’s entropy and the relics of what we will leave behind, from tombs or bones to scraps of junk. In other words, I wish to explore what it means to be a human in a world that is, potentially, doomed.

2:45-3:30 Board 16
Emma Graham Johansen-Hewitt
Alain Blunt (Faculty Sponsor)
Department of Art & Art History, Bridgewater State University
Revision: An Artistic Exploration of Memory

What do our memories look like? Throughout our lives, we collect objects and photographs which become evidence of the life we have lived. They remind us of our memories, the places we have been, the things we have done. But eventually, our memories change, fade, and fail. The way that we remember, and what we remember, is of increasing relevancy in our current moment. We catalog events on social media and document everything with the cameras on our cell phones. Age-related memory loss is a major issue in the United States, where, according to the Alzheimer’s Association one in ten individuals over age 65 has Alzheimer’s dementia (2018). In the political and social realm, memory as evidence is being challenged in front of Congress as well as in the court of public opinion. I am creating a body of artistic work that explores the ways that we represent and catalog our own memories, as well as explores the fallacy of memory. The work incorporates photography and typography, working together to visually explore memory. These images are printed on to different materials, including silk, aluminum, vellum, and bamboo paper, and then the prints are altered in different ways, including embroidery and forced aging, in order to express memory in its different forms. This project continues the creative work that I began through the Adrian Tinsley Program Undergraduate Research Grant and have continued into my honors thesis.
Exposing My Insanity: An Exploration of Mental Illness

In this body of artwork, I investigated mental illness as subject matter. Mental illnesses are common in the United States, affecting tens of millions of people each year. Due to this, I set out to bring visual representation to mental illness, and to continue to bring awareness to mental illness. The body of artwork I created depicts my personal relationship with mental illness. These works have been made using a variety of mediums such as printmaking, bookbinding, embroidery, and ceramics. Each of these pieces focus on displaying my emotional and personal struggles related to mental illness though relevant subject matter. Through this collection of artwork I hope to help someone else struggling with his or her relationship with mental illness by exposing mine.

Heathen or Angel: An Examination of Two Women in Art

This paper compares two historical women whose respective legacies have been distorted to fit a comfortable narrative culture perpetuates for intrigue. Matoaka, a Powhatan Native is remembered as a traitor to her own people by being sexually and spiritually submissive to white conquerers in both film and art while she is actually a victim of sexual assault, abduction and forced assimilation into European society. This is to placate a caucasian viewer from the grim reality their ancestors are likely responsible for. Simultaneously Marie Duplessis is presented as the saintly, virginal Violetta Valery who dies of a tragic, star-crossed love affair in the sanitized opera La Traviata by Giuseppe Verdi, but in reality she was a scandalous courtesan, who turned to prostitution to escape a cruel childhood, and died young of consumption. The piece will discuss La Traviata, and how it relates to the reality of Marie's life and the legend of Pocahontas as told through paintings and contemporary art dramatizing her experiences.

I argue that the privilege of white women versus women of color transcend into art and thus culture has been conditioned accept it.

Empathizing with both women, this paper explores the historical circumstances that have formed these icons in specific narratives and why they are significant. Sources include Pocahontas: Medicine Woman, Spy, Entrepreneur, Diplomat by native writer Paula Gunn Allen and The Real Traviata: Song of Marie Duplessis by René Weis and several other articles discussing examples of sexualizing women of color while purifying white women in the process.
Late 19th century America saw a growth of wealth and prosperity in the upper-class elite, which greatly influenced the arts and culture. One of the most favored portrait artists of America’s *nouveaux riches* was John Singer Sargent, who was also well known in Europe and Great Britain. The powerful Vanderbilt family who vacationed at the Breakers in Newport, Rhode Island, commissioned Sargent to paint their portraits. The resulting images connect the Vanderbilts, particularly the young, unmarried women, to those of the European elite, which Sargent knew well. America’s newly wealthy families lacked the venerable heritage of the European aristocracy. Using art and various other cultural aids, families such as the Vanderbilts, together with Sargent, curated a gilded image of themselves to align with European ideals. Furthermore, the female *nouveaux riches* portraits painted by Sargent could then be considered marriage portraits in a time of arranged marriage with an intended ploy of gaining power and heritage. Sargent’s tactics looked back to old masters such as Thomas Gainsborough. These he synthesized with new methods of representation tailored to the Gilded Age in order to create a new type of portraiture inclusive of the constructed lineage so sought after by the new elite of American society.

This project examines the relationship between religious thought and material form in the visual culture of Japanese Zen sects during the Kamakura (1185-1333), Muromachi (1336-1573), Momoyama (1573-1603) and Edo periods (1603-1868). The purpose of this study was to investigate the Zen school’s denial of human sensory experience, despite the high importance placed upon the creation of realistic, life-like sculpture, visually arresting painting and expressive calligraphy as essential practices for Zen monastics. Buddhism rejects our reality as material, both in practice and in ideology. If nothing is substantial or essential, it follows that there is no self-nature and hence, all of existence is relative. If everything exists only momentarily, then nothing is durable and the notion of substance is lost. Without self-nature, there is nothing inherent within an object that determines what it is; only external appearance, or the form and color of things remain. I soon came to realize that art making was, within Zen, a form of meditational practice connected to an important creed known as emptiness. Only through this complete absence of mental activity can one properly meditate, the apex of Zen practice. The dualistic notions that surround the Zen conception of physical reality both inspired and stunted my research, but from my reading I soon came to understand the various concepts associated with the rich and paradoxical array of practices, including art making.
Room 163  3:45-4:30  Panel 7
Lara M. Dudley
Diane R. Scott (Faculty Sponsor)
Department of Fine & Performing Arts, Massachusetts College of Liberal Arts
Radical Quilts: The Historical and Contemporary Use of Quilts to Express and Support Political Causes

My presentation, Radical Quilts; the Historical and Contemporary Use of Quilts to Express and Support Political Causes, will summarize the scholarly research and the creative project that I've undertaken this year as a Commonwealth Honors Scholar at the Massachusetts College of Liberal Arts. The purpose of my presentation is to analyze the historical and contemporary uses of quilts as change agents and to evaluate the process of making a 21st-century quilt with a political message. I will review the research on the history of quilting that I have encountered, and I will describe the hands-on experience that I have gained through making my own political quilt which will create a deeper understanding of the project by comparing the two sources. My work builds on the study of quilts which began in the 1970s by scholars using either the lens of folklore or feminism. Yet, my thesis asks the larger question of why activists choose to use quilting for more than just warmth but to try to influence their worlds. This lens will reveal how perceptions about quilts have shaped the quilts themselves, the experience of the artists, and the messages they convey.

Room 163  3:45-4:30  Panel 7
Constance Alina Roberts
Timothy Martin Rohan (Faculty Sponsor)
Department of Art History, UMass Amherst
Crafting Scottish Womanhood: The 20th-Century Woman in Margaret Macdonald Mackintosh's Gesso Panels

During her lifetime, Margaret Macdonald Mackintosh (1864-1933) was one of Glasgow's and Scotland's most known artists. She worked in various materials, including beaten silver and textiles, and the unprecedented female forms in her early collaborative work done with her sister Frances attracted attention, earning them the name the "Spook School." Macdonald continued to work collaboratively after her marriage to the architect Charles Rennie Mackintosh, contributing the gesso panels O ye, all ye that walk in Willowwood and The May Queen to the tea rooms Mackintosh designed for the Glaswegian tea room proprietor Miss Catherine Cranston. Relying on gendered perceptions of the Scottish nation and contemporary circulating theories of female sexuality and referencing Celtic and pagan rituals, Macdonald's panels interacted with the decor and clientele of the predominantly female tea rooms to construct and spread an image of the 20th century Scottish woman, a woman for a new century. Tragically, early scholarship positioning Charles Rennie Mackintosh's architecture as the beginning of modernism dismissed Macdonald's contributions to their collaborative projects as decorative clutter, undermining her credibility as an artist in the 20th century. Modern scholarship such as this seeks to rectify that error, reviving and restoring the legacy of Macdonald and her contemporaries.
This paper seeks to explore the design of Sir William Chambers’ Great Pagoda, located at the Royal Botanical Gardens at Kew and designed for King George III. This building relies on two methodologies of design: (1) Chinese garden design, and the views those gardens shape for the beholder—as theorized by Chambers himself, and (2) Ming-Qing material culture techniques, and their atmospherics of sensuousness—as theorized by Professor Jonathan Hay. Chambers approaches the design of The Great Pagoda through these two modes of ‘Chineseness’ in order to construct a seemingly authentic Chinese garden experience for his Majesty. In doing so, Chambers provides a set upon which the King can theatrically personify the Qianlong Emperor—for both personal fetishization and heightened diplomatic strategizing.

The paper then offers a foil to The Great Pagoda, citing the European palaces at Yuanming Yuan in Beijing. This example serves to highlight the mutuality in appropriations between Europe and China during the 18th-century—the first truly global century. At Yuanming Yuan, the Qianlong Emperor requested a European viewing pavilion to be built upon which he could look out across Perspective Painting East of the Lake—a trompe l’oeil illusion depicting a European city street.
ASTRONOMY

12:40-1:25  Board 38
Silvana Carolina Delgado
Min S. Yun (Faculty Sponsor)
Department of Astronomy, UMass Amherst
Submillimeter Galaxies: Multi-Component Systems and Counterparts

This project aims to analyze massive dusty star-forming galaxies at $z > 2$ and their structure in different wavebands by doing multi-wavelength counterpart analysis. We characterize the mass distribution and overdensity of submillimeter galaxies and their optical companions within the 1 Mpc projected radius, identified by their rest frame far-IR luminosity (ULIRGs/SMGs). We derive astrometry and photometry of the IR sources using the archival ALMA data and analyze the stellar properties of companions using archival HST images and published multi-wavelength photometry catalog from the COSMOS field. Our previous study of 33 targets resulted in 82% of targets with an HST counterpart and 17% with a counterpart less than 2'' away from the center. The current study is extended to 138 targets to further analyze their optical counterpart characteristics and observe whether it is statistically uncommon to find HST companions that are directly on the ALMA position. We aim to characterize the environment and frequency of companion galaxies surrounding these massive starburst galaxies selected by their bright IR emission during the Cosmic Noon, which is the epoch when the cosmic star formation density reached its peak.

2:45-3:30  Board 19
Reed J. Hopkins
Frederic Peter Schloerb (Faculty Sponsor)
Department of Astronomy, UMass Amherst
Millimeter-Wavelength Observations of Comet 46P/Wirtanen with the Large Millimeter Telescope

From the 15th to the 21st of December 2018, observations were made of Comet 46P/Wirtanen using the Large Millimeter Telescope Alfonso Serrano (LMT) atop Sierra Negra in the Mexican state of Puebla. 46P/Wirtanen is a Jupiter-family comet with an orbital period of 5.4 years. At closest approach on Dec. 16th, 46P/Wirtanen was just 11.5 million km (0.0775 AU) from Earth. Using the LMT, we observed multiple millimeter-wavelength lines of three molecules: HCN, CH$_3$OH, and H$_2$CO. We observed two lines of HCN. A strong HCN J=3-2 line at 266 GHz was detected with the 1.3mm receiver, and the three HCN J=1-0 hyperfine lines at 89 GHz were detected with the SEQUOIA instrument. Comparing the HCN J=3-2 and J=1-0 lines will give insight to the excitation of HCN in 46P/Wirtanen. Thirteen lines of CH$_3$OH, arising from different energy levels, were detected with the 1.3mm receiver at around 241.7 GHz. Using these observations of CH$_3$OH, we will be able to derive the rotational temperature of the comet and estimate its gas temperature. Lastly, we observed the 225 GHz line of H$_2$CO with the 1.3mm receiver, although this line was much weaker than we had anticipated. With the observational data of these three molecules, we will be able to calculate the production rates of HCN, CH$_3$OH, and H$_2$CO in 46P/Wirtanen, as well as their abundance in the comet relative to water.
ToIITEC is a next generation millimeter camera for the Large Millimeter Telescope (LMT). It utilizes Lumped Element Kinetic Inductance Detectors (LEKIDs) with a base operating temperature of 100 mK. ToIITEC has arrays of LEKIDs at wavelengths of 1.1 mm, 1.4 mm and 2.0 mm, each featuring a few thousand detectors, resulting in the focal planes requiring a unique large-scale cryostat with multiple nested temperature stages. To cool the system, we rely on two cryogenic systems; an Auxiliary Pulse Tube Cooler (PTC) which extracts the heat at the 45K and 4K stages, and a Dilution Refrigerator which extracts the heat at the 1K and 100 mK stages. Implementing these coolers took careful designing, modeling and characterization of each component, from the flexible copper straps that we use to generate good thermal contact, to the busbar system that extracts heat from our detector arrays. The full cryogenic system is now installed in the laboratory at University of Massachusetts Amherst and is undergoing testing.
Perfluorinated compounds (PFAS) are a ubiquitous class of environmental toxicants associated with the pathogenesis of cancer, diabetes, and other life-threatening diseases. At high doses, PFAS are known to induce lipid accumulation in the liver, leading to non-alcoholic steatohepatitis. However, the effects of low dose PFAS exposure on different organ types are unknown. Here, we analyzed the low dose effects of two PFAS – perfluorooctane sulfonic acid (PFOS), and, its shorter chain replacement perfluorobutane sulfonic acid (PFBS) in vitro using cell lineages derived from three organs – COS7 (kidney), HepG2 (liver), and βTC6 (pancreas). We first assessed the cytotoxicity of PFOS using LIVE/DEAD staining, which differentially labels viable and non-viable cells. Upon PFOS exposure, βTC6 demonstrated 100% cell death at 32 µM PFOS followed by HepG2 cells, with cell death exceeding 30% at 16 µM and progressing to 40% at 160 µM (p<0.001). We characterized PFAS induced lipid accumulation in these cell lines using Oil Red O (ORO), a fat-soluble stain that labels lipid species. While βTC6 and COS7 cells exhibited slight increases in lipid accumulation both at 3.2 µM PFOS, HepG2 cells exhibited significant lipid accumulation, reaching maximal accumulation at 6.4 µM PFOS (p<0.0001). Upon PFBS exposure, the cell lines exhibited similar trends in lipid accumulation, with HepG2 and COS7 cells being more significantly sensitive to exposures (p<0.005). Our data indicate that low dose PFAS exposures are sufficient to induce toxicity in multiple organ lineages, demonstrating the need to better characterize these low dose effects.

Disrupted redox signaling during embryogenesis can lead to altered pancreas development with implications for susceptibility to metabolic diseases such as type II diabetes. Redox signaling pathways are modulated by Nuclear factor E2-related factor 2 (Nrf2), a transcription factor that regulates antioxidant responses. Recent mice studies suggested positive feedback loop between Nrf2 and Peroxisome Proliferator-Activated Receptors gamma (PPARg) that regulates lipid homeostasis. The goal of this study is to investigate this crosstalk during embryogenesis. We exposed homozygous Nrf2a wildtype and mutant zebrafish (Danio rerio) at 72 hours post-fertilization to Nrf2 activators (tBHQ & SFN), and PPARg agonist (Rosiglitazone) & antagonist (T0070907) for 4 hours, and measured changes in gene expression by qRT-PCR for nrf2a, its target gene gstp, pparg, and its target gene fabp1b1. Rosiglitazone exposure induced Nrf2a
expression in Nrf2a wildtype embryos, but this induction was diminished by 50% in Nrf2a mutant embryos. T0070907 suppressed Nrf2a expression in Nrf2a mutant embryos, indicating that Nrf2a is possibly a target gene of PPARg. This finding correlates with our previous finding of putative peroxisome proliferator responsive element in the Nrf2a promoter region. tBHQ induced GSTP expression in Nrf2a wildtype embryos only, and rosiglitazone elevated fabp1b1 expression in both Nrf2a wildtype and mutant embryos. These findings support the hypothesis of transcriptional crosstalk between Nrf2a and PPARg, but additional experiments are needed to confirm this. Understanding this crosstalk illuminate our understanding of cellular redox status regulation by Nrf2 and PPARg, which could give us new insight into development and diseases linked with disrupted redox signaling.

10:45-11:30 Board 21
Sergio Benavides
Sam A. Mattei
Changqing Chen (Faculty Sponsor)
Department of Chemistry and Physics, Salem State University
Investigation into the Responses of Fluorescent Probes to Amyloid-beta Polypeptides

Alzheimer’s disease (AD) is an irreversible, progressive brain disorder and is the most common cause of dementia in older adults. Unfortunately, diagnosis and drug development for the treatment of AD has mostly been unsuccessful due to the lack of a complete understanding about the progression of AD. Furthermore, while detection and monitoring modalities have been useful in developing therapeutic treatments, they are still inadequate for clinical, in-vivo monitoring and early onset detection. This research project focuses on different fluorescent probes, including CRANAD-3 and curcumin. By monitoring the fluorescence responses of the probes to various amyloid-beta species under different conditions (concentrations and operational parameters), we strive to provide more insight into the progression of Alzheimer’s Disease.

10:45-11:30 Board 22
Benjamin J. Greene
Mario Raya (Faculty Sponsor)
Department of Natural Sciences, Bristol Community College
Analysis of the Inflammatory Response of the Cell Line SH-SY5Y after Exposure to N-(3-Oxododecanoyl)-L-homoserine lactone

N-(3-Oxododecanoyl)-L-homoserine lactone is a widespread quorumone produced by several of the bacteria that interact with the nervous system of animals. In our experiment we measured the expression of inflammatory proteins TNF-a and COX-2 to monitor the response our model SH-SY5Y cell line had against the indicated quorumone.
Determining the Effect of Deamidation on Human γS – Crystallin, a Protein Involved in Cataract Formation

One of the world’s leading cause of blindness is caused by age-related cataract, a disease of the eye lens. Age-related cataract is thought to be caused by an accumulation of modifications that occur to proteins as they age. These modifications can lead to a loss of protein stability resulting in protein aggregation which causes a cloudiness in the lens affecting vision. Crystallin proteins are the most predominant structural proteins in the lens. There are two main crystallin families: alpha-crystallins and beta/gamma crystallins. Since the cells in the lens are enucleated, there is very little protein turnover in these cells and these proteins must remain stable and soluble throughout a lifetime. One type of protein modification is deamidation, a non-enzymatic modification that occurs to proteins over time. Deamidation occurs to asparagine and glutamine amino acids. One possible outcome of a deamidation is modification to these amino acids resulting in aspartic acid and glutamatic acid amino acids, respectively. This modification leads to a negative charge which could affect the protein's stability. For this project, site-directed mutagenesis will mimic deamidation at the 149th site between the interfaces of the two domains on human γS crystallin protein. This will change the glutamine at that position to glutamic acid (Q149E). The protein stability of both the normal protein and the deamidated mimetic (Q149E) will be compared using unfolding/refolding experiments to determine the ΔG of each protein. These studies will help us understand the effects of deamidation on the protein stability of a γS-crystallin.

Synthesis and In vitro Evaluation of an Exenatide Conjugate

Type 1 Diabetes Mellitus (T1DM), a chronic condition characterized by impaired insulin secretion, afflicts about three million Americans. Impaired insulin secretion, results in hyperglycemia and culminates in complications such as heart disease and kidney failure. T1DM is an autoimmune disorder, involving the destruction of insulin-secreting beta cells in the pancreas. Current treatments for T1DM, including insulin injections and pancreas transplantations, inadequately control blood glucose levels and are not durable treatments, respectively. Systemic immunosuppression used in pancreas transplantations has shown successful suppression of beta cell destruction but is not a viable treatment regimen due to the complications associated with chronic immunosuppression. My research proposes the use of a targeted drug delivery mechanism to derive the benefits of localized immunosuppression while limiting systemic effects and complications.
To achieve targeted immunosuppression of the diabetic islet microenvironment, we are adopting a conjugate-based approach for treating T1DM. The conjugate comprises three components: a targeting agent, a cleavable hydrophilic linker, and a clinically used immunosuppressive agent. Upon administration, the conjugate will bind to receptors on the surface of the beta cell. Subsequent activation of the immune system, results in inflammation, an increase in peroxides and proteases. This will cleave the hydrophilic linker, delivering the drug. The proposed mechanism will administer the FDA approved immunosuppressive agent (drug) only to the islet microenvironment, thereby minimizing complications associate with immunosuppressive therapy.

This research focuses on the synthesis of the targeting conjugate Exenatide, which binds to Glucagon-like peptide-1 Receptors located in the pancreas and in vitro evaluation of the conjugate.

11:45-12:30    Board 30
George James Gatter
Alejandro Heuck (Faculty Sponsor)
Department of Biochemistry and Molecular Biology, UMass Amherst
Studies on the Binding of Perfringolysin O to Cholesterol-Containing Membranes

Cholesterol-dependent cytolysins (CDCs) are a family of exotoxins that lyse mammalian cell membranes. Perfringolysin O (PFO), which is secreted by the bacterium Clostridium perfringens, is generally considered the prototypical model for the family. To lyse target cells, water-soluble monomers are first secreted by the bacterium and these monomers bind to cholesterol-containing membranes. Once bound, they oligomerize in a ring-like prepore complexes and insert themselves into the membrane forming a large β-barrel. Formation of the pore leads to lysis of the target cell. The exact mechanisms through which PFO recognizes cholesterol in the target membrane have not been determined and remain of great interest.

As cholesterol-binding occurs via the C-terminal domain 4 (D4) of PFO, it is proposed that certain amino acid residues in this domain participate in a hydrogen bonding network that rearranges to accept cholesterol in the protein’s binding pocket. Specifically, a salt bridge is formed between E458 and R468 that breaks and the movement of R468 creates a hydrophobic pocket. Then, E458 becomes protonated and forms a hydrogen bond with T460, providing stability to the cholesterol-binding pocket. To test this model, E458 and T460 residues have been substituted for various amino acids. It is expected that a perturbation to the hydrogen bond network will interfere with the formation of the cholesterol binding pocket and decrease the affinity of PFO for cholesterol.
Molecular chaperones are proteins found in virtually every organism and are essential to cell survival. When plants are heat stressed, they upregulate and downregulate multiple genes, many of which are associated with the heat shock response. Small heat shock proteins (sHSPs) are one class of molecular chaperones that are upregulated during heat shock. They are proposed to act as the first line of defense by binding to heat sensitive proteins and preventing their irreversible aggregation. Many details of sHSP function remain to be discovered, and exactly what proteins they protect is unresolved. In addition to cytosolic sHSPs found in other organisms, plants also produce sHSPs that are targeted to chloroplasts and mitochondria. The four sHSPs that are found in organelles in Arabidopsis thaliana are HSP23.5, HSP23.6, HSP25.3, and HSP26.5. In this study, the heat tolerance of knockout mutants of these different organelle-localized sHSPs, including single, double, triple, and quadruple knockouts, will be assessed through various heat stress assays. Additionally, the effects of these knockouts on the expression of other genes that might compensate for the lack of sHSPs such as HSP70 and HSP100 will be observed. Localization of the four different sHSPs in chloroplasts and mitochondria will be confirmed as well. Understanding the phenotypes and localization of these sHSPs will bring us closer to defining their mechanism of action.

Nitric oxide (NO) is an essential signaling molecule for almost all organisms. In plants specifically, NO was found to regulate many essential functions that affect plants' fertilization and growth such as induction of seed germination, reduction of seed dormancy, stomatal movement, photosynthesis, mitochondria functioning, flowering, apoptosis, and more. Despite the importance of NO as a signaling molecule, understanding of genes involved with NO homeostasis is limited. Screening for mutants with altered NO response, comparing their phenotypes to wildtype (WT) phenotypes under NO stress, and isolating the responsible genes through genome sequencing could reveal more information about NO homeostasis in plants. To identify suppressor mutation that allows the plants to survive in NO stress, ethyl methanesulfonate (EMS)-treated Arabidopsis thaliana Columbia-0 seeds were exposed to 1.0 mM diethylenetriamine/nitric oxide (DETA/NO) during elongation. Their root lengths were compared to WT A. thaliana Col-0 seedlings. Selected EMS-treated A. thaliana Col-0 with longer root length compared to WT were transferred to soil for next-generation DNA sequencing. Methods of conducting successful in vitro root elongation assay, establishing the environment where seeds can only be exposed of the effect of DETA/NO and no other environmental factors, transferring selected seedlings to the soil, and other logistics for carrying out this research were established and recorded.
12:40-1:25  Board 17  
Alden David Nichols  
Samuel Hazen (Faculty Sponsor)  
Department of Biology, UMass Amherst  
iCons: Connecting Genotype to Phenotype in the Model Grass *Brachypodium distachyon*

The model species *Brachypodium distachyon* allows for a simplification of a vast genetic system present in related monocot cereal crops like wheat and barley. Understanding genes in our *B. distachyon* model will help further the understanding of how these genes function in a more complex system. To do this, we used Genotyping-by-Sequencing (GBS) to identify genetic similarities among individuals within the genus *Brachypodium*. After obtaining sequence data, bioinformatic analysis was performed and individuals were classified in populations of interest using the Fast-GBS Pipeline and VCFtools. In the future, phenotypic analysis will be performed on individuals of interest to associate genotype with phenotypes.

12:40-1:25  Board 18  
Madaleine Niznikiewicz  
Anne Gershenson (Faculty Sponsor)  
Department of Biochemistry and Molecular Biology, UMass Amherst  
iCons: Refolding Kinetics as a Perspective on Alpha1-Antitrypsin’s Path to Metastability

Alpha-1 antitrypsin (AAT) is a protease inhibitor implicated in the human diseases liver cirrhosis and emphysema. Many of the mutations responsible for AAT dysfunction disrupt the protein’s folding mechanism, favoring misfolded forms over the native serpin structure. The serpin fold is key to serpin function because serpins take advantage of stored potential energy in the native metastable conformation to inhibit proteases—much like a mousetrap. In the case of AAT, this mousetrap works to inhibit the activity of proteases released by white blood cells that would otherwise uncontrollably break down their targets, leading to degradation of structural proteins such as elastin in the lungs. Understanding folding and misfolding mechanisms can open an avenue for rescuing AAT folding and generating active, stable proteins. One way to advance research about AAT’s folding mechanics is to examine its folding in real-time. The kinetic folding experiments for AAT involve monitoring the protein as it assumes the native, metastable structure. This task can be accomplished using circular dichroism and tryptophan fluorescence spectroscopy. The imaging techniques above account for the individual limitations of each technique in terms of experimental resolution. Thus, a more complete picture can be gleaned by using multiple techniques. Misfolding of members of the serpin superfamily, including AAT, is implicated in a variety of human diseases. Thus, gains in understanding of the folding mechanics of AAT can aid in the development of new treatments for these diseases.

Keywords: alpha1-antitrypsin, metastable, serpin, protein folding, tryptophan fluorescence spectroscopy, circular dichroism
12:40-1:25    Board 19
Miguel Angel Franco  
Greg Tew (Faculty Sponsor)  
Department of Polymer Science and Engineering, UMass Amherst  
iCons: Synthesis and Mitochondrial Localization of Polymer-Based Peptide Mimics in Neurons

The potential benefits of engineering synthetic materials to mimic and alter natural cellular processes has inspired a growing interest in the development for new therapeutics. Synthetic chemistry allows for rapid generation of novel materials with diverse functionalities. Our expanding capacity to challenge and improve upon the design rules elucidated from nature widens potential advancements for medicine and biotechnology. Inspired by the HIV-1 TAT protein’s unique cell-penetrating sequence, the Tew group has developed a library of guanidine-rich synthetic polymers, termed Cell-Penetrating Peptide Mimics (CPPMs), synthesized utilizing ring-opening metathesis polymerization. These non-covalent CPPMs have successfully delivered a variety of functional cargoes to a wide array of difficult-to-transfect cells, including neurons. In an effort to further expand the CPPM platform, mitochondrial penetrating peptide mimics (MPPMs) were developed to mimic the sequence of mitochondrial penetrating peptides for subcellular organelle targeting. Given its multifunctional role and its importance in proper neuronal function, the mitochondrion is an attractive candidate for delivery of exogenous molecules. This study evaluates the efficacy of fluorescently-labeled MPPMs to target the mitochondria and localize within the organelle following transfection. Provided that analysis through flow cytometry and confocal microscopy indicate mitochondrial localization, these MPPMs can further be utilized for cargo delivery. The ability to target specific organelles with such carriers will enable a new generation of delivery applications, ranging from fundamental cell biology research to novel therapeutic opportunities.

12:40-1:25    Board 2
Liam Fitzgerald  
Peter Chien (Faculty Sponsor)  
Department of Biochemistry and Molecular Biology, UMass Amherst  
Investigating a Novel Relationship between Inositol Catabolism and Lon Protease in Caulobacter crescentus

Lon is a homohexameric protease conserved across all three domains of life. Regulated proteolysis by Lon protease is necessary for the degradation of misfolded proteins, as well as cell cycle progression, pathogenicity, DNA damage repair, and cellular stress responses. A common model organism used to study Lon protease is the gram-negative alpha-proteobacteria Caulobacter crescentus. This microorganism has a dimorphic life cycle that requires rapid temporally and spatially controlled protein degradation. Chromosomal microarray analysis demonstrates that deleting Lon in C. crescentus results in transcriptional down-regulation of a regulon responsible for the import and catabolism of inositol. However, transcription of the repressor that regulates the regulon, iolR, remains stable. Beta-galactosidase kinetics assays confirm that all three iolR-regulated promoters, ibpA, idhA, and iolC, are down-regulated in ΔLon C. crescentus. In addition these assays demonstrate that in ΔLon C. crescentus, iolR has less affinity for the promoters it controls. The deletion of iolR and Lon from the C. crescentus
genome results in a cumulative growth defect and a synergistic filamentation defect, also suggesting that the iol regulon is regulated by Lon. However, chloramphenicol translational shutoffs of FLAG-tagged iolR illustrate that iolR is not a direct Lon substrate. Nevertheless, additional beta-galactosidase kinetics assays on wild type, ∆Lon, ∆iolR, and ∆Lon ∆iolR strains for the iolR-regulated gene iolC indicate that although iolR may not be a Lon substrate, the iol regulon is most likely indirectly regulated by Lon through an unknown alternative factor that is Lon substrate.

12:40-1:25 Board 3
Katheryn Santos
Ludmila Tyler (Faculty Sponsor)
Department of Biochemistry and Molecular Biology, UMass Amherst
Investigating the Effect of a Frameshift Mutation on the DNA Binding Capacity of KNOB7, a Transcriptional Regulator of Cell Wall Biosynthesis in the Model Grass Brachypodium distachyon

Brachypodium distachyon is a model grass species used to elucidate the mechanisms of various regulatory networks found in plant cell wall biosynthesis. One such regulator is KNOB7, a KNOX family transcription factor that is a proposed negative regulator of cell wall biosynthesis based on homology to characterized genes in other species. Three KNOB7 mutants alleles, knob7-1, knob7-2, and knob7-3, were tested for DNA binding capacity as compared to the wildtype allele. The knob7-1 mutant allele has a base pair insertion resulting in a frameshift mutation. These mutated fragments of K7 have been recombined and cloned into the pENTR/D-TOPO cloning vector. The fragments will then be moved from the cloning vector into the destination vector pLUC through LR clonase recombination. Once all cloning is complete, the construct will be introduced into yeast in order to compare the function of KNOB7 and the knob7-1 mutant. In a yeast one-hybrid assay, the interaction between a transcription factor (TF) of interest and a DNA sequence of interest are assayed by measuring the activation of a reporter gene in a heterologous yeast system. The reporter gene used in this assay encodes luciferase, which cleaves the substrate, resulting in a light byproduct. Thus, quantification of DNA binding is able to occur by analyzing the amount of enzyme made and how much light was produced. Ultimately, the knob7 mutants were tested to see how well they interact with the COMT lignin biosynthetic gene and whether these mutations affect KNOB7’s ability to bind to DNA.

12:40-1:25 Board 4
Zahra Fatehi
Alejandro Heuck (Faculty Sponsor)
Department of Biochemistry and Molecular Biology, UMass Amherst
Investigating the Role of Charges on the Binding of Perfringolysin O to Cell Membranes

Cholesterol is a molecule critical to the function of most tissues in the human body. It plays a large role in the fluidity of membranes, and is crucial in the proper transport of molecules in and out of the cell. Misregulation and maldistribution of cholesterol can result in a variety of diseases. These diseases are often hard to treat, and in order to change that, it is important that
cholesterol regulation is analyzed and understood. To address this, probes come into play, and they are designed to determine cholesterol levels in cell membranes. Cholesterol Dependent Cytolysins (CDCs) are a great candidate, because these proteins depend on the amount of cholesterol available in cell membranes to carry out their function. The CDC being used in this project Perfringolysin O (PFO) from the bacterium Clostridium perfringens. To investigate how the protein works, it is useful to determine the effect of charge on PFO binding rates. Specifically, this project will look at differences in environmental pH, lipid composition, and protein mutations on the affinity of the protein for the membrane through the performance of binding assays. Through this project, it was found that pH makes less of an impact on the protein mutants that lack the negative charge on the binding loop, and the project is ongoing to understand the impact of lipid composition on the binding of different protein mutants in different pH environments.

12:40-1:25  Board 5
Samuel H. Zelman
Elizabeth Vierling (Faculty Sponsor)
Department of Biochemistry and Molecular Biology, UMass Amherst
Mitochondrial ATPases and Plant Thermotolerance

In previous works from the Vierling Lab, a mutant of the mitochondrial transcriptional termination factor, SHOT1, was found to have better thermotolerance than wild-type Arabidopsis thaliana plants. Further research into this mTERF led to immunoprecipitation assays which showed that SHOT1 was bound to mitochondrial ATPases, leading to the discovery of the SHOT1-binding ATPase (SBA) protein family (Kim et al, 2012). Of the four SBA proteins, SBA1 has been identified as a homolog of the protein ATAD3a, found in mitochondria-ER contact sites in animals.

In knockdown models of the SBA1 homolog in animals, mitochondria showed malformed cristae, altered steroidogenesis, and dysregulation of the genome and nucleoid (Gilquin et al. 2010, Peralta et al. 2018, Gerhold et al. 2015, Issop et al 2015). Many of these symptoms mimic knockdown models of the mitochondrial inner membrane organizing system (MINOS). Since the existence of this complex has not been shown in plants, the SBA family of proteins may provide insight into a connection between plant thermotolerance and mitochondrial complexes.

The goal of this research is to express SBA1 and SBA3 recombinant proteins using chemically competent Escherichia coli. Once purified, the proteins can be used to measure biochemical properties such as oligomerization and ATPase activity, which may shed light on the connection between these mitochondrial ATPases and plant thermotolerance.
Diabetes, maldigestion, and other pancreatic-damage associated disorders are significant public health issues throughout the United States. Redox (reductive/oxidative) modulation during embryogenesis may be associated with pancreatic damage later in life and could play a role in these growing public health concerns. Disruption of exocrine pancreatic development can affect digestive enzyme secretion, significantly impacting the ability of the body to manage digestion and nutrient absorption. Due to the presence of pancreatic beta cells (traditionally associated with the endocrine pancreas) throughout the exocrine pancreas, physiological defects could also affect the body’s ability to manage blood glucose levels. The Nrf2 gene plays a crucial role in the regulation of redox response, and was also investigated alongside the impacts of redox modulation on exocrine pancreatic organogenesis.

Tert-butylhydroperoxide (tBOOH), a pro-oxidant, and n-acetyl cysteine (NAC), an antioxidant, were used as simple redox modulators to investigate the impact of oxidative and reductive stress on the developing pancreas. Tert-Butylhydroquinone (tBHQ) and sulforaphane (SFN) were also investigated as Nfr2 activators. To determine if the exocrine pancreas can recover from the impacts of redox modulation during early organogenesis, we followed these fish out for 7 days post fertilization (DPF) with repeated fluorescent imaging. NAC pre-treatment exposures were also performed to investigate the impact of anti-oxidant followed by oxidant exposure during organogenesis. The results of this study show that the exocrine pancreas is a sensitive target of redox modulation during early organogenesis, and that redox stressors can vary dramatically in their impacts on the developing exocrine pancreas.

The importance of agriculture and the production of food cannot be understated, and the need for efficient crop production has grown in parallel with the increase in global population. Nitrogen levels in the soil are often the limiting factor for plant growth, limiting the productivity of agricultural land. Prior to the invention of artificial nitrogen fixation, it has been theorized that bacterial nitrogenase enzymes have carried out this reaction for billions of years. These enzymes are still present in organisms such as rhizobia bacteria. Legumes, which include peanuts and soybeans, form symbiotic relationships with these bacteria through which they enter a legume’s root cells and are encapsulated within a membrane before maturing into a symbiosome. These symbiosomes are organelle-like structures that function as nitrogen generators which the plant houses in structures called nodules. In order to better understand the relationship between rhizobia and legumes, we will use CRISPR/Cas9 as a reverse genetics
tool to study the function of the early nodulin genes which were named due to their high levels of expression early in the nodulation process. This study was prompted by unpublished data from Wang Laboratory that suggest mutations in these genes prevent proper nodule formation. If we are able to fully understand the interactions behind this symbiosis, we hope to one day apply this biological process to other key crop species, greatly reducing the need for nitrogen fertilizers.

2:45-3:30   Board 22
Emily Nicole Lapinskas
Margaret Stratton (Faculty Sponsor)
Department of Biochemistry and Molecular Biology, UMass Amherst
Characterizing Substrate Binding and Stability of Ca^{2+}/Calmodulin Dependent Protein Kinase II

Ca^{2+}/Calmodulin dependent protein kinase II (CaMKII) is a serine/threonine kinase required for the induction of long-term potentiation (LTP), the cellular mechanism of learning and memory. Entry of Ca^{2+} current through the NMDA receptor (NMDAR) and subsequent activation of CaMKII are the first two steps of LTP induction in the dendritic spine. Active CaMKII is localized to the post synaptic density in the spine, where it phosphorylates several downstream effectors (including the NMDAR) resulting in widespread changes within the spine structure. T-lymphoma invasion and metastasis factor 1 (Tiam1) has been implicated in LTP. Activation of Tiam1 leads to actin cytoskeletal reorganization, which is a necessary step in formation of dendritic spines. It has been recently shown that Tiam1 interacts with CaMKII at the same site that CaMKII interacts with the NMDAR. What is special about this site is that interaction here results in persistent activation of CaMKII due to a conformational change within the protein structure. My main objective is to characterize both these interactions by solving co-crystal structures of the CaMKII kinase domain bound to peptides of Tiam1 and NMDAR. To facilitate these studies, we employ an inactive version of CaMKII, which is easier to work with. Tangential to the structural aspects of this work, I am also interested in looking at the effects of protein stability of various kinase domain mutants as well as the kinase domain bound to these 2 peptides. On completion of these studies, we will have an improved understanding of the structural and functional ramifications of these important protein-protein interactions and have a better sense of CaMKII activity within dendritic spines during LTP.

2:45-3:30   Board 23
Andrew Shpyrko
Sergey N. Savinov (Faculty Sponsor)
Department of Biochemistry and Molecular Biology, UMass Amherst
Discovery and Isolation of Plant Antibacterials: A Mulberry Case Study

Discovery of novel, alternative antibiotics that can overcome existing mechanisms of antimicrobial resistance must be urgently prioritized and implemented. Plant-derived secondary metabolites are a promising prospect for not only mitigating infections but also overcoming antimicrobial resistance prevalent among various human pathogenic bacteria. Benzo[...](Snip)
supported as potential antimicrobial agents for their role and presence in various therapeutic compounds. The utilization of plant cell cultures in particular is a novel, promising method of scaling, eliciting and harvesting readily accessible metabolite compounds such as benzofurans. Initial screening work, involving the format of a “co-culture” incubation between bacteria and de-differentiated plant cell cultures, indicated three Morus plant cell lines with potential antibiotic properties. The three cell lines Morus nigra, Morus alba and Morus rubra all exhibited antimicrobial activity against the Gram-positive bacterium Staphylococcus aureus. The following study focuses on the Morus rubra plant cell line, comparing side-by-side its callus culture-derived extracts and leaf extracts. Both leaf extracts and callus-derived extracts of Morus rubra were analyzed via bioautography technique, which combines thin layer chromatography (TLC) separation and viability assay to reveal bioactive constituents within the extract. We have optimized key bioautography conditions for effective, sensitive analysis of Morus rubra extracts, which was also used to compare, side by side, both the composition and respective bioactivities of constituents. We anticipate that successful bioautography trials will advance the research work into further deconvolution and characterization of antimicrobial metabolites in Morus rubra extracts.

2:45-3:30 Board 24
Colin Andrew Lemire
Sibongile Mafu (Faculty Sponsor)
Department of Biochemistry and Molecular Biology, UMass Amherst
Elucidation of the Biosynthetic Pathway of Nortetraditerpenoids in the Fungus Sclerotinia homoeocarpa

Terpenes are a class of specialized metabolites found in plant and fungus species that have been widely studied for their medicinal and cytotoxic properties. The fungus Sclerotinia homoeocarpa, the causal agent of dollar spot disease in turf grass, was previously shown to produce terpene compounds that are inhibitory against the parasite responsible for malaria as well as possess antifungal, insecticidal, and antitumor properties. The nortetraditerpenoids of S. homoeocarpa may be implicated in its antiplasmodial properties, making them a research target as resistance to traditional drugs increases. Our objective is to characterize the enzymatic steps involved in the biosynthesis of these unique compounds. Using genome mining, two terpene cyclases as well as multiple downstream cytochromes P450 were identified. We characterized the metabolic products of the genes in the terpene pathway through cloning and combinatorial expression in Escherichia coli and subsequent analysis by GC-MS. One cyclase, ShTPS1 produces the diterpene pimara-8,14-diene which is the likely precursor to be modified into nortetraditerpenes final products. Clustered near this gene are two downstream cytochromes P450 that are likely enzymes for decoration of the terpene scaffold. Interestingly, the second cyclase, ShTPS2 is a chimeric C25 sesterterpene synthase that yields six compounds. This research contributes to a greater understanding of the diversity of terpene biosynthesis in fungi and allows for directed synthesis of compounds of interest that are ordinarily produced at low levels, enabling future work to investigate their function.
Cataracts are mostly the result of protein aggregation in the lens of the eye, which can cause blindness if left untreated. Over a lifetime, the eye is exposed to several sources of damage, including oxidative damage and UV damage, which may have a role in the formation of cataract. Human γD crystallin is a major structural protein in the lens of the eye, which is thought to have photoprotective properties due to the presence of a tryptophan quenching mechanism. Site-directed mutagenesis will be used to imitate oxidative damage on tryptophan (W) 42, an important tryptophan in the quenching mechanism, by mutating it to glutamine (Q). Both normal and W42Q γD-crystallin will be isolated, and exposed to UV light for one hour. Spectrophotometric readings at 600nm will be taken every five minutes for one hour of both proteins to determine the rate of aggregation. Without the quenching mechanism tryptophan provides, it is predicted that the lack of photoprotective properties will lead to a faster rate of aggregation. These experiments will assist in understanding if γD-crystallin aggregation may be more likely to be induced by UV light after oxidative damage occurs to its tryptophan amino acids.

Type II Diabetes Mellitus is a metabolic disorder characterized by the inability to regulate blood sugar, resulting in high blood glucose. This disease has become an epidemic over recent years, and factors affecting its onset are yet to be fully understood. Studies indicate that phytochemicals isolated from plants may play a role in preventing the advancement of prediabetes to the diabetic state. Sirtuin-1 is a gene whose active expression is linked to the deacetylation of major metabolic components, playing a role in the regulation of oxidative stress, inflammation, and other pathways. It is known that there is a characteristic inflammation associated with the onset of diabetes, and that the Sirtuin-1 gene could potentially be regulated to modulate this inflammatory response. The regulation of this gene can be carried out through various mechanisms, including treatment by phytochemicals. In order to test this theory, strains of C. elegans containing the promoter of the Sirtuin-1 analog gene fused to green fluorescent protein (GFP) were treated with increasing concentrations of phytochemical extracts from palm fruit juice and measured for changes in fluorescence. Changes in the level of fluorescence are indicative of changes in the expression of the Sirtuin-1 gene. The experiment conducted determined that there is a dose-dependent increase in fluorescence, suggesting that phytochemicals in palm fruit juice can affect the expression of gene positively. These findings may be projected to predict that the response in humans would include an increase in insulin sensitivity as well as a decrease in inflammation.
**Presentation Details**

**3:45-4:30    Board 54**

Amanda Martin  
Steven Cok (Faculty Sponsor)  
Department of Chemistry and Food Science, Framingham State University  
The Effect of Palm Fruit Juice on Pmk-1 Gene Expression in Stress-Induced *Caenorhabditis elegans* as Related to the Development of Type 2 Diabetes

Type 2 diabetes is a chronic illness from which millions of people suffer due to developed insulin resistance or the inability to produce insulin. There are several treatments available to control type 2 diabetes, although these can become costly and cause adverse side effects. Altering gene expression is an under-researched area that provides another potential kind of treatment. Increased expression of the human p38 gene is known to be correlated with the oxidative stress and inflammation that occurs in the body and is characteristic of the transition from pre-diabetes to type 2 diabetes. The current research set out to determine if expression of p38 can be decreased using palm fruit juice (PFJ), a substance that has been analyzed for its anti-diabetogenic qualities, largely due to its polyphenol and phytochemical content. *Caenorhabditis elegans* containing the analogous p38 promoter called pmk-1 as well as a green fluorescent protein construct were plated and grown on agar under four different treatment conditions (normal nematode growth medium (NGM) agar, NGM agar with 0.9 mg/mL PFJ, NGM agar with 100 mM glucose, NGM agar with both 0.9 mg/mL PFJ and 100 mM glucose) and their subsequent fluorescence was quantified and analyzed. Preliminary results collected after treating the *C. elegans* with PFJ showed a slight decrease in p38 gene expression with increasing doses of PFJ. The goal of the current research is to analyze the effect of PFJ on worms with increased oxidative stress due to simultaneous treatment with glucose.

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**Room 909    3:45-4:30    Panel 7**

Emily Klier Nolton  
Patricia Wadsworth (Faculty Sponsor)  
Department of Biology, UMass Amherst  
Structure of the Mitotic Spindle during Mitosis in *Naegleria gruberi*

*Naegleria gruberi* is a form of amoeba that is often studied for its extremely quick differentiation time from its amoeba form to flagellate. One area that remains understudied is *Naegleria*’s unique mechanism of mitosis. Unlike many of the model organisms being studied, *Naegleria* engage in a closed mitosis, meaning that the nucleus does not break down during division. Additionally, structures that nucleate microtubules are not detected, leading us to hypothesize that there must be a novel mechanism of microtubule nucleation. Another interesting aspect of *Naegleria* mitosis is that the nucleolus remains persistent throughout division and therefore can be tracked. Determining the mechanism of mitosis in these novel organisms is important to further understanding components of eukaryotic divisions. We aim to quantify each of these stages based on their structure in order to better define the process. We also aim to determine how the nucleolus divides within the nucleus and how it aids the cell in the division process. Using widefield and confocal microscopy of fixed cells we have identified 5 stages of mitosis (Stage 1-Stage 5) based on the spindle size and organization of the
microtubules. Initial data has shown 19.2% of cells in stage 1, 42.2% of cells in stage 2, 26.5% of cells in stage 3, 1.2% of cells in stage 4 and 22.9% of cells in stage 5. We are currently using synchronized cells to increase the number of cells in mitosis in order to better analyze cell division in fixed and living cells.

**Room 909 3:45-4:30 Panel 7**

Erik M. Rizzo
Michelle Farkas (Faculty Sponsor)
Department of Chemistry, UMass Amherst

**Investigating Macrophage Polarization Responses to Breast Cancer Subtypes**

The immune system and cancer have a complex relationship that involves a vast number of components. Macrophages, plastic cells of the immune system, can play a critical role. Macrophage functioning is defined by phenotype, which depends upon environmental signals. M1 macrophages are involved in inflammation and engulf foreign pathogens, and M2 macrophages are involved in anti-inflammatory activity, and wound healing. In cancer, tumors recruit and convert macrophages into tumor associated macrophages (TAMs). These macrophages exhibit M2-like properties, and are involved in tumor growth promotion, angiogenesis, and metastasis. Several different types of cancer have been shown to be associated with macrophages, including prostate, lymphoma, breast, and lung cancer. Among these, breast cancer is the leading cause of cancer-related death in women. Breast cancer has multiple subtypes that vary in malignancy: Luminal A, Luminal B, HER2+ Basal-like, and Claudin-low. While known that macrophages play roles in breast cancer, the contribution of subtypes is not. In my research, I am exploring the impact of different breast cancer subtypes on macrophage polarization and characteristics. I have established a base-line for phenotypes through polarization with standard cytokines, assayed for markers associated with polarization, performed confocal microscopy for cell morphology changes, and evaluated nitric oxide production and phagocytic capacity. In parallel, I have exposed macrophages to media conditioned by breast cancer cells representing various subtypes and similarly assessed their influence. It is anticipated that gaining an improved understanding of the interplay between macrophages and different breast cancer subtypes will facilitate the development and usage of therapeutics.

**Room 909 3:45-4:30 Panel 7**

Kelly Love Robertson
Michelle Farkas (Faculty Sponsor)
Department of Chemistry, UMass Amherst

**Small Molecule Modulation of Circadian Rhythms**

Circadian rhythms are autonomous time-keeping systems that allow organisms to adapt to their environment. They are regulated throughout the body by the suprachiasmatic nucleus (SCN) or independently via additional environmental and chemical signals. Circadian rhythms are generated by core circadian proteins, such as BMAL1 and PER2, and they can be tracked by monitoring expression of these proteins. Alteration of circadian rhythms has been correlated
with an increased risk of cancer and cancer progression. Although the correlation between circadian disruption and cancer has been established, the mechanism(s) underlying this connection has yet to be elucidated. This research aims to study the connection between altered circadian rhythms and cancer progression through the use of small molecules known to modulate circadian rhythms. These various small molecules were dosed in three cancer cell lines, an osteosarcoma cell line previously used to study circadian rhythms and two breast cancer cell lines of varied aggression. After dosing the cells with the small molecules, their circadian effects were monitored via real-time luminometry, an assay that utilizes luciferase reporters for extended (7-10 day) tracking of the transcription levels of circadian proteins BMAL1 and PER2. The oncogenic features of the cells were assessed via wound healing and colony formation assays. Preliminarily, amplitude enhancement has shown induction of circadian rhythms in a typically arrhythmic breast cancer cell line. Additionally, increased alteration of circadian rhythms was associated with increased oncogenic effects. Overall, this thesis provides a comprehensive view of how alteration of circadian rhythms via small molecule modulation effects oncogenic features.

4:45-5:30    Board 19
Austin Morrissey
Ryan Quinn
Jennifer L. Ross (Faculty Sponsor)
Department of Physics, UMass Amherst
Microtubule Patterns through Growth and Crosslinking

Life is never static, and its propagation is possible due to the dynamic dance of continuous cellular motion. Microtubules are a fundamental and dynamic cellular component of eukaryotes. These microfilaments make up essential structures, such as the neuronal axon, and the mitotic spindle. In this study, we explore the self-organized polymerization patterns of microtubules using both macromolecular crowding agents and crosslinking microtubule-associated proteins. Previously, we have found that the phases and patterns depend very sensitively on the filament length and the percentage of MAP65 crosslinkers present. Specifically, there is a range of concentrations that result in spindle-like “tactoids” which could act as model mitotic spindles. Here, we investigate whether similar microtubule organizations are observed when changing the identity of and respective concentration of crowding agents used alongside MAP65. This work will allow further elucidation on self-organization of the mitotic spindle, using a systematically controlled in vitro reconstitution system.

4:45-5:30    Board 53
Kaitlyn Barrack
Li-Jun Ma (Faculty Sponsor)
Department of Biochemistry and Molecular Biology, UMass Amherst
Characterization and Analysis of Human-Fusarium oxysporum Interactions

Fusarium oxysporum is a cross-kingdom fungal pathogen capable of infecting a wide range of plant species and posing a threat to the public health. In severe cases of individuals with compromised immune systems, this eukaryotic pathogen can lead to disseminated infection and...
meningitis. Using a fungal strain isolated from the human temporal lobe of the brain, this project aims to examine the primary interaction between *Fusarium oxysporum* and the human blood-brain barrier (BBB) to have a greater understanding of the infection process. Through cell staining and confocal microscopy, methods of interaction, such as adhesion, internalization and migration, can be visualized in real time. Elucidation of such mechanisms further the understanding of human-fungal interactions and allow for the development of targeted, safe and effective treatment options.

**4:45-5:30 Board 54**
Doanna Minh Pham  
Li-Jun Ma (Faculty Sponsor)  
Department of Biochemistry and Molecular Biology, UMass Amherst  
CRISPR/Cas9-Mediated Knockout of an Enzyme-Encoding Gene in *Fusarium oxysporum* f. sp. *cubense*

*Fusarium oxysporum* (Fo) is a fungal pathogen known to cause disease in plants, nearly wiping out entire species of agriculturally important crops. The key contributors to the pathogenicity of Fo hide within its genome. In order to test specific genes which may contribute to the pathogen’s virulence, a system for producing knockouts was optimized. Here, we utilize CRISPR/Cas9 technology to target a gene essential for pyrimidine metabolism in fungi. Cleavage functionality of the designed guide RNA and enzyme complex was tested *in vitro*. The knockout was produced from the application of CRISPR/Cas9 in PEG-mediated transformation of protoplast. We observed the success rate of the knockout through its phenotypes and further confirmed with PCR. The immediate aim of this research is to develop a system that could target candidate genes within Fo, tackling its pathogenicity. However, these optimized techniques can be applied broadly for gene-editing in numerous organisms.

**4:45-5:30 Board 55**
Akaansha Rampal  
Li-Jun Ma (Faculty Sponsor)  
Department of Biochemistry and Molecular Biology, UMass Amherst  
Purifying Anti-*Fusarium* Compounds Present in *Helianthus ciliaris* Using Silica Gel Column Chromatography

Infections caused by opportunistic fungi have emerged as a significant cause of mortality in immunocompromised individuals. Limited by effective treatment options against this group of eukaryotic pathogens, as well as their resistance to the available antifungals, fungal infections pose an increasing threat to public health. This study utilizes the UMass Plant Cell Culture Library (PCCL), one of the largest plant cell culture collections, to identify novel phytochemicals that inhibit the growth of *Fusarium oxysporum*, a cross-kingdom fungal pathogen. Here we report the results on the identification of novel antifungals, focusing on the cell line *Helianthus ciliaris*. In the past, we have collected multiple lines of evidences: colony morphology, fungal growth inhibition and High Performance Liquid Chromatography that suggest the presence of compounds with antifungal property in *Helianthus ciliaris*. Using silica gel chromatography, we are further purifying the compounds for downstream deconvolution.
Bacterial Hsp70-proPhoA Interactions Elucidate Novel Binding Mechanisms with Full-Length Substrates

Full author list: Sashrika Saini, Wenli Meng, Eugenia Clerico, and Lila Gierasch

Department of Biochemistry and Molecular Biology
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Amherst, Ma 01003

Molecular chaperones play a key role in maintaining cell proteostasis by ensuring protein quality control and fidelity of the cellular proteome. Heat shock protein 70s (Hsp70s) are a diverse class of evolutionarily conserved chaperones that interact with nascent polypeptide chains, prevent proteins from misfolding, and aid in protein transport (Clericó et al., 2015). Despite extensive literature that reveals a selective promiscuity between the Hsp70 substrate binding domain (SBD) and aliphatic hydrophobes, there is a paucity of data on the mechanism of interaction with full-length substrates. In order to investigate this interaction, we chose to study the *E. coli* homolog of Hsp70, DnaK, in conjunction with the precursor of alkaline phosphatase (proPhoA). proPhoA has been shown to be a stable endogenous substrate of DnaK (Wild et al., 1992), and contains five predicted DnaK binding sites (Rudiger et al., 1997). We are presenting these binding sites to DnaK as large fragments (~100 residues long), to emulate interaction with a full-length substrate. Each fragment containing 1 to 2 binding sites is being studied using biophysical techniques and NMR spectroscopy to elucidate the consequence of chaperone binding to a full-length substrate, the mechanism of binding site selection on a substrate containing multiple potential sites, and the structural basis of interaction between the chaperone and its respective binding sites on a full-length substrate.

Structural Study of the Binding of Various Peptides to Molecular Chaperone DnaK

Hsp70s are a family of molecular chaperone proteins that help cells survive under stress conditions by aiding in the folding of other proteins. Chaperones prevent protein misfolding and aggregation, characteristic of many neurodegenerative diseases. Hsp70s perform their chaperoning functions through interactions between their substrate binding domain (SBD) and short hydrophobic sequences of their non-native protein clients that are exposed to solvent. The details of the interaction between the chaperone and a diverse peptides remain unknown. Much
of the work on the interaction between Hsp70s and client proteins has been done using DnaK, the *E. coli* homologue of Hsp70 and short peptides as surrogates for the client protein. In 1996, the 3D structure of the SBD of DnaK was determined using x-ray crystallography (Hendrickson et al., 1996), and more recently, the forward and reverse binding between the SBD and a few small peptides has been observed. (Zahn et al., 2013). However, interactions with longer substrates and full length proteins have yet to be studied in detail. ProPhoA, an endogenous substrate of DnaK has been shown to have five DnaK binding sites. Structures of the DnaK SBD bound at the five potential binding sites from ProPhoA are being determined using X-ray crystallography. Using this detailed atomic resolution information about the substrate/chaperone interactions, I am dissecting how the peptides fit in the SBD and if there are specific residues that are favored in different pockets on the SBD cleft. This information will shed light on the basis of Hsp70/substrate recognition.

**4:45-5:30  Board 58**  
Constantine Petridis  
Lila Gierasch (Faculty Sponsor)  
Department of Biochemistry and Molecular Biology, UMass Amherst  
The Interaction between Hsp70 Chaperone DnaK and Its Nucleotide Exchange Factor GrpE in Solution

70 kDa heat-shock proteins (Hsp70s) are a family of highly conserved proteins that assist in a large variety of protein folding processes. Hsp70s consist of a nucleotide-binding domain (NBD) and a substrate-binding domain (SBD) joined together by a flexible linker region. The ability of misfolded client proteins to bind to the SBD is determined by the nucleotide-bound state of the NBD. In cells, Hsp70s interact with nucleotide exchange factors (NEFs) to facilitate the exchange of ADP for ATP and substrate release.

The complex between the *E. coli* NEF, GrpE, and the NBD of its corresponding Hsp70 homolog DnaK has previously been crystallized (Harrison et al., 1997). However, there is some debate about whether this structure (PDB ID: 1DKG) represents the physiologically functional state of the complex. Therefore, our goal is to use a variety of solution-based techniques to determine the mode of interaction between GrpE and the NBD of DnaK and assess its functional significance.

We created single residue mutations in the NBD to observe their effect on its ability to bind GrpE. Interestingly, mutations made to a select few NBD crystallographic interface residues have no effect on the ability of the chaperone to interact in solution with its NEF. The failure to abrogate binding with GrpE suggests either a strong protein-protein interaction in the region surrounding these residues or that these residues do not reside on the NBD interface at all. Therefore, we are currently undertaking experiments to determine the exact role that these mutated residues have on the interaction between both proteins.
Bacteria are microorganisms that can be found in the billions in a single gram of soil. While in soil, most colonies stay relatively small and undetectable. Given the right circumstances, however, and new bacterial generation can form in just over 30 minutes. A serious issue, caused by this rapid reproduction of microbes, is the evolution of antibiotic resistance. While our use of known antibiotics is threatened by the evolution of resistance, microbes also generate new antibiotics in order to compete with other bacteria.

Bacteria were cultivated from a sample of local soil. 25 bacteria were chosen from single colonies based on various factors, and tested against safe relatives of pathogenic bacteria. Bacteria that exhibited antibiotic behavior were selected for further testing and specific bacteria were chosen to move forward. The bacteria were then characterized by various biochemical tests, Gram staining, and the sequencing of the 16s rRNA sub-unit. After Bacteria identification, efforts were made to extract and identify the active chemical from the organism.

The antibiotic crisis stems from the increasing prevalence of infectious organisms that fail to respond to treatment with conventional antibiotics. In collaboration with Small World Initiative and Tiny Earth, we performed a series of tests with the aim to discover soil bacteria that produced an antibiotic that fought against ESKAPE pathogens, in hopes of developing new medication to combat drug resistant organisms. The unknown isolate No.15, is a Gram positive rod-shaped bacteria with activity against ESKAPE safe relatives Acinetobacter baylyi and Staphylococcus epidermidis. Cultivated from a local soil sample collected from a lot in Springfield, MA, it was further characterized with biochemical tests. Tentative identification of the genus will be carried out by 16S rDNA PCR and sequencing, and the effectiveness of an organic extract from the isolate will be tested against prokaryotic and eukaryotic targets. A collected set of unknown isolates from a colleague will also be carried out through the same process.
The Role of Napping in Emotional Memory Consolidation in Preschool-Aged Children

Naps support emotional memory consolidation in young children, but this benefit only emerges the following morning. It is therefore unknown whether consolidation occurs during the nap itself, or if napping only prepares memories for subsequent overnight consolidation. To examine this process, we presented preschoolers (n=35, 33-61 months) with faces paired with negative or neutral descriptions. Following a nap or an equal interval awake (occurring on separate days), we presented half of these participants (n=17) with an interfering set of faces and descriptions, while the other half (n=18) did not receive interference. Recognition of the original faces was probed at three recall phases: after encoding, after the nap or wake interval, and after overnight sleep. To assess changes in memory across these phases, we performed 2 (valence: negative vs. neutral stimuli) x 2 (condition: nap vs. wake) repeated measures ANOVAs. Contrary to previous studies, preliminary data suggest that without interference, changes in emotional and neutral memory accuracy did not significantly differ following a nap compared to following an interval awake, even when probed the next morning. However, when exposed to interference, preliminary trends suggest that negative item recall may decline more following napping than following an interval awake (valence x condition interaction: $F(1,16)=2.668$, $p=0.122$). It is thus possible that naps may destabilize emotional memories in preparation for overnight consolidation, making them more susceptible to interference. Additional data collection is in progress, and future directions will explore whether children’s own nap habituability moderates the effects of napping and interference on emotional memory.

Fatty Acid Synthase Activity in Pre- and Post-migratory Birds

Long-distance migration is extremely costly for birds. In preparation for migratory flight, birds go through periods of hyperphagia leading to the accumulation of large fat stores which are then used to fuel flight. However, flight birds also use a varying amount of protein for fuel leading to reductions in organ and muscle mass after long flights. Prior studies have shown that liver mass can be reduced by as much as 40% of pre-flight levels, but whether this reduction in liver mass results in functional deficits in birds after flight has not previously been examined. Here, we investigated the activity of fatty acid synthase (FAS), a liver enzyme that is critical for migratory birds to refuel effectively after flight. We studied birds before flight (BF), after flight (AF), and through a 24 hour recovery period. Each bird was matched with a resting control bird (CB). We predict that total and mass-specific FAS activity will be reduced after flight, which would indicate a physiological constraint to fat synthesis immediately after flight. We also predict that FAS will recover quickly since it is critical for refueling. AF birds had significantly reduced fat mass along with total lean mass. The liver mass was also significantly reduced after flight, but
was recovered within 24h. The corresponding FAS activity will be presented. Understanding the
dynamics of FAS activity relative to organ mass changes will help us understand how birds
regulate protein breakdown in flight and then prepare for the next long-distance flight.

8:30-9:15    Board 51
Jiu Tseng
Alexander R. Gerson (Faculty Sponsor)
Department of Biology, UMass Amherst
Metabolism and Fuel Selection during Pupation in the Tobacco Hawkmoth Manduca Sexta: An
Investigation Using Magnetic Resonance and High-Resolution Respirometry

In the Tobacco Hawkmoth Manduca sexta, the animal transforms from a feeding larva to a
reproductive adult during metamorphosis. During this phase, most of the larva tissues die or are
remodeled, while new adult structures like the flight muscles and reproductive system form. The
pupa is a closed system that neither feeds nor excretes which allows us to monitor the utilization
of endogenous resources. I hypothesize that M. sexta metabolize fat as their primary energy
source during pupation. Additionally I sought to evaluate the suitability of Quantitative Magnetic
Resonance technology (QMR) for tracking changes in body composition. In addition, I employed
a high resolution custom respirometry system to non-invasively measure metabolism (VCO2) of
each individual continuously through pupation. I observed that there was an exponential
decrease in body fat content that was mirrored by an exponential increase in VCO2 as pupation
progressed. During development, lean mass fluctuated slightly during pupation, but didn’t
decrease dramatically the time of adult eclosion when the animals released meconium - stored
nitrogenous waste product of proteolysis. The changes in lean mass correspond to known
changes in the atrophy and growth of different muscle sets, an hypothesis that will be tested. I
found QMR accurately and precisely measures fat non-invasively in M sexta. Therefore, my
data suggests that QMR technology can be applied effectively to the study of invertebrates,
greatly expanding its utility as an investigative tool. Further, metabolic phenotyping provides an
accurate measure of metabolism with high temporal resolution through pupation in an insect.

8:30-9:15    Board 52
Caitlyn Glidden
Alexander R. Gerson (Faculty Sponsor)
Department of Biology, UMass Amherst
Potential Biomarkers for Kidney Damage in Birds

Birds migrate thousands of miles twice a year during nonstop flights, consuming no food or
water and traveling across ecological barriers to alternate between breeding and wintering
grounds. Their primary fuel source is fat, which they store prior to migration by increasing food
intake. In addition to fat, birds catabolize protein. Research shows that protein catabolism during
long-distance non-stop flight decreases the amount of lean tissue and size of essential organs
like the kidney by about 20%. The kidney plays a vital role in osmoregulation and waste
excretion. It is unknown whether decreases in mass size lead to kidney damage within
migratory birds. My goal is to evaluate several different molecules as potential biomarkers of
avian kidney damage. The protein neutrophil gelatinase associated lipocalin (NGAL) has been
studied as a potential biomarker for human kidney damage. However, NGAL has never been studied in birds. Due to the physiological similarities between avian and mammalian nephrons, I measured NGAL concentrations within several bird species at differing time points after long distance flight. Using an ELISA kit, I analyzed plasma from several species collected after migrating across the Gulf of Mexico including Blue Grosbeaks, Summer tanagers, and Ovenbirds, as well as from species flown in a wind tunnel to simulate migration, including Swanson’s Thrushes and Yellow-rumped Warblers. Using bioinformatics, I am comparing mouse and avian genetic sequences to find similarities in genes associated with kidney damage. My study will help promote further research regarding the diagnosis of kidney damage within birds and mammals.

8:30-9:15    Board 53
Bradley Pedro
Alexander R. Gerson (Faculty Sponsor)
Department of Biology, UMass Amherst
The Impact of Long-Duration Flight on the Oxidative Damage and Antioxidative Capacity of Migratory Yellow-Rumped Warblers

Biannually, many migratory bird species travel great distances between their wintering and breeding grounds by completing a series of long distance, non-stop flights which are extremely energetically expensive. Sustained, high-intensity aerobic activity, such as flight, is associated with an increased production of reactive oxidative species (ROS), which can negatively impact tissue function. The objective of my investigation is to understand if oxidative damage occurs during migratory flights in Yellow-rumped warblers (*Setophaga coronata*), and if different environmental conditions experienced during flight influence oxidative stress. Further, after flight I will examine how oxidative defenses change during recovery. I hypothesize that migratory birds should have high antioxidant capacity in preparation for flight, and those birds with high antioxidant capacity will have lower oxidative damage during flight. Further, birds will rapidly recover and enhance their oxidative defenses in preparation for the next flight. To assess antioxidative capacity, I measured two antioxidative enzymes, superoxide dismutase and catalase, in the heart of birds after a flight up to 6h, in a resting group, in a 24-hour recovery group and in an un-flown group. To assess oxidative damage, protein carbonyls will be quantified, as a marker of ROS formation. Additionally, glutathione activity will be measured, since the proportion of reduced glutathione (GSH) and oxidized glutathione (GSSG) molecules is an indicator of oxidative damage and antioxidative enzyme activity. This study will provide insight into how changing environmental conditions and extreme long duration, high intensity exercise may influence oxidative damage and defenses of the avian heart.
8:30-9:15    Board 54
Julia S. Cox
Allison H. Roy (Faculty Sponsor)
Department of Environmental Conservation, UMass Amherst
The Spatiotemporal Distribution of Parasitic Freshwater Mussel Larvae on River Herring of the Connecticut River

Freshwater mussels begin their lives as parasitic larvae that attach to the gills, fins, and scales of a variety of fishes. Mussel larvae, or glochidia, have been found attached to migratory alewives (Alosa pseudoharengus) and blueback herring (Alosa aestivalis), but the phenological relationship between river herring and freshwater mussels has yet to be described. This study focused on understanding the density and timing of mussel glochidia on adult river herring gills at several locations in the Connecticut River watershed and how this relates to river herring migration. Between the months of March and June of 2018 during the adult spawning run, alewives and blueback herring were collected from five Connecticut River tributaries via electrofishing. The most distal right gill of each fish was removed and frozen, and glochidia were later enumerated under a stereomicroscope. A subsample of glochidia were photographed and measured to help determine their species. At least four species of glochidia have been found on river herring gills. Preliminary results suggest a correlation between glochidia densities and peak herring densities in mid to late May, such that the highest glochidia infestation per individual river herring occurred during the peak river herring densities. A temporal relationship between glochidia attachment and river herring migration suggests that female freshwater mussels may time their larvae release based on river herring phenology, but analysis across multiple years is needed to determine whether mussels use cues to adjust timing of glochidia release.

8:30-9:15    Board 55
Benjamin Joseph Dookram
Paige Warren (Faculty Sponsor)
Department of Environmental Conservation, UMass Amherst
Documenting a Poorly Understood Alarm Call in the Northern House Wren

Even though a species is widely studied, we may still lack a significant understanding of many aspects of its behavior. The House Wren is a very common species that is present in many locations in which they coexist with humans. House Wrens tend to produce two main alarm calls during nesting, the lower amplitude call being only documented in the Southern subspecies. This call sounds like a rolling gurgle (churr), and preliminary observations suggested that it is much less conspicuous than the other call. We took recordings of wren alarm calls from seventeen locations throughout Massachusetts from June through August. We compared the acoustic structure of the “churr” call in the Northern populations to published information on the Southern House Wren subspecies. We found that the two regional versions of the call were largely similar, with a notable difference in the inter-note interval. We examined possible factors that may explain the function the call serves. None of these factors showed significant patterns. Our pilot data suggests that there may be a trend towards increased use of the call during incubation. Further studies should seek to test for and identify conditions under which the “churr” call is used during incubation in nesting House Wrens.
Stable Isotope Analysis to Compare the Trophic Overlap of Wood Thrush Nestlings in Continuous versus Fragmented Forests

With rising urbanization rates around the world, ecosystems are being drastically altered. When faced with a constantly transforming ecosystem in a short evolutionary time frame it is difficult for wildlife to evolve to be successful. Food availability for many species changes due to urbanization. For Hylocichla mustelina, commonly known as the Wood Thrush, food availability across different forested habitats varies, however it is unclear if the diets of nestlings is altered as a result. In order to answer this question, we compared the degree of trophic overlap between Wood Thrushes nestlings in suburban forest fragments with nestlings in a contiguous forest in western Massachusetts. Feather samples from nestlings were analyzed to determine their 13C and 15N stable isotope ratios, which were then used to identify the degree of trophic overlap. These data will be used to compare trophic structure in order to test for distinctions between the diets of the two populations. The two tested environments contain varying ratios of known Wood Thrush diet components such as insects and other arthropods. For this reason, we predict that that the two populations will have distinct C and N signals. If the C and N signals were to overlap, it would suggest that Wood Thrush have adapted to eat similar diets regardless of prey availability by changing their foraging habits. By understanding the trophic overlap of different populations of Wood Thrush, we hope to determine potential fitness effects of urbanization on this declining species and their behavioral responses.

Spider Cognition: Portia fimbriata

How does Portia fimbriata's araneophagic diet and unique hunting behaviors demonstrate their cognitive abilities?

Portia fimbriata, a member of the salticidae family, is unique among its 4000 family members. Although P.fimbriata shares hallmark characteristics of other salticids-- the arrangement of the eyes, jumping movements, and complex mating rituals-- there are some important differences when it comes to diet and hunting behavior. Even when insects are available prey, P. fimbriata prefers an araneophagic diet; they consume other spiders. How has this dietary preference shaped how P. fimbriata hunts?

Salticids, or jumping spiders, are well known as successful hunters despite their tiny size. Scientists have observed several complex hunting strategies in salticids, including aggressive mimicry, nest probing, and cryptic stalking. It is common to see one of these behaviors in others of the Portia genus, but P. fimbriata exhibits all three. These hunting methods are...
meaning they are tailored to the type of prey *P. fimbriata* is pursuing, and, unlike other salticids, *P. fimbriata* is known to use cryptic stalking specifically for hunting other salticids.

*P. fimbriata* has also been shown to demonstrate problem solving behaviors and planning strategies in unfamiliar environments. In an experiment testing the cognitive abilities of *P. fimbriata*, researchers determined that these spiders are able to execute planned detours in order to successfully reach prey, even if they are unable to see the prey. Research hypothesizes that *P. fimbriata* has developed these complex hunting strategies because they prefer to hunt other predators.

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**Room 803  8:30-9:15  Panel 1**

Edridge Kevin D’Souza  
Michele Markstein (Faculty Sponsor)  
Department of Biology, UMass Amherst  

*GA- Repeats on Mammalian X Chromosomes Support Ohno’s Hypothesis of Dosage Compensation by Transcriptional Upregulation*

Over 50 years ago, Susumo Ohno proposed that dosage compensation in mammals would require upregulation of gene expression on the single active X chromosome, a mechanism which to date is best understood in the fruit fly Drosophila melanogaster. Here, we report that the GA-repeat sequences that recruit the conserved MSL dosage compensation complex to the Drosophila X chromosome are also enriched across mammalian X chromosomes, providing genomic support for the Ohno hypothesis. We show that mammalian GA-repeats derive in part from transposable elements, suggesting a mechanism whereby unrelated X chromosomes from dipterans to mammals accumulate binding sites for the MSL dosage compensation complex through convergent evolution, driven by their propensity to accumulate transposable elements.

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**Room 803  8:30-9:15  Panel 1**

Kyle Francis Hofer  
Eric Owen Williams (Faculty Sponsor)  
Department of Biology and Chemistry, Fitchburg State University  

*Analysis of Stress Resistance in Nematodes to Model Radiation Therapy in Cancer*

Cytotoxic chemotherapy and radiation therapies are the top two forms of cancer treatment in this moment. These treatments have a higher efficacy on mitotically active cell and tissue types (like cancer) but can damage the healthy tissue and even the cells that grow at much slower speeds, causing them to undergo apoptosis, thereby killing them. Certain organisms have the ability to resist such genetic damage to various degrees.

*C. Elegans* are a species of nematode that can enter a hibernative-like state, Dauer, that provides a degree of “stress resistance”. Using these organisms, I have developed a series of experiments to observe this resistance and measure its quality/limits. By irradiating worms at with varying levels of UV light, we can experimentally cause apoptosis to occur. Viewing CED-1 GFP worms will allow us to observe these occurrences of apoptosis underneath a fluorescent...
microscope. This lets us count how many spots of cell death are visible, measuring the effect of the UV in contrast to stress resistant variables.

The importance of this research is by understanding genetic causes of stress resistance, and how certain chemicals and treatments can be enhanced/inhibited by this innate resistance, we can enhance current cancer treatments. Isolating and possibly transferring genes that confer stress resistance (or take it away) could make treatments more specific to the cancer whilst also becoming less hostile to healthy tissues. My preliminary research suggests that Dauer confers a visible change in the organism’s ability to resist DNA damage.

**10:45-11:30 Board 23**
Jacqueline Michelle Kamins
Brandi Silver (Faculty Sponsor)
Department of Psychology, Worcester State University
**The Effects of Stress on Spatial Memory in Adult Male Mice**

The goal of this study is to determine how stress influences the memory formation and recall abilities of mice. Evidence suggests that chronic stress tends to inhibit these abilities. One method used in the past to induce stress in mice was to simply handle them. However, recent research suggests that consistent handling may result in less stress on the individual over time.

This study will test the learning capabilities of mice after chronic stress. There will be two groups of mice, one that will be handled regularly, and the other that will have no handling. It is expected that the handled group will become less stressed due to the social interaction and physical comfort. The un-handled group will have no interaction and therefore will be more stressed and anxious. After 5 days of handling and non-handling, the memory making abilities of these mice will be tested through a 3-day series of water maze trials. The time to find a hidden platform will be recorded for each mouse for each of the three trials, per mouse, per day. An ELISA fecal corticosterone kit will be used to give numeric values for the stress levels of each mouse throughout the phases of this study.

It is predicted that the test group, the less handled mice, will have higher levels of corticosteroids due to the chronic stress of sudden handling during the water maze trials, and will have higher latencies to find the platform in these water maze trials.

**10:45-11:30 Board 24**
Sarah E. Olson
Anthony J. Manganaro
Eric Owen Williams (Faculty Sponsor)
Department of Biology and Chemistry, Fitchburg State University
**GPR89A Rescues Dysferlin Degradation in a Cell Culture Model of Muscular Dystrophy**

The goal of this research project is to identify possible treatment options for dysferlinopathies. Dysferlinopathy is a rare form of muscular dystrophy caused by mutations in the human gene, DYSF, which codes for the protein dysferlin. Dysferlin is a calcium-dependent membrane fusion
protein expressed in human muscles that promotes membrane repair. We used a roundworm, *Caenorhabditis elegans*, as a model for this disease. The *C. elegans* gene, *fer-1*, is closely related to human DYSF, and is expressed in the sperm of *C. elegans*. *Fer-1* mutations cause infertility by preventing the spermatozoa from creating fully developed tails. A genetic suppressor screen revealed a dominant missense mutation in the *C. elegans* Y75B8A.16 gene that could rescue infertility of the mutant *fer-1* worms. Bioinformatic analysis revealed that Y75B8A.16 was closely related to a human gene known as GPR89A. We hypothesize that if the mutation in Y75B8A.16 can rescue infertility in *C. elegans* (caused by mutant *fer-1*), then mutations in GPR89A may rescue muscular dystrophy (caused by mutant human DYSF). To test this hypothesis, we cloned both the wild type GPR89A and the mutated GPR89A into mammalian expression vectors. The vectors were co-transfected into human embryonic kidney cells with mutant dysferlin. Our preliminary results indicate that the GPR89A protein partially rescues the degradation of mutated dysferlin. These results indicate that activation of human GPR89A might be a possible therapeutic strategy for dysferlinopathies.

**10:45-11:30 Board 25**
Irune Beltran Aparicio
Gwen Scottgale (Faculty Sponsor)
Department of Biology, Salem State University
How Immune Cells Help Defend and Fight against Acute Lymphoblastic Leukemia: A Book to Help Children Understand

Acute Lymphoblastic Leukemia (ALL) is the most common type of childhood cancer. According to the American Cancer Society 3 out of 4 childhood leukemia cases are ALL, and the main treatment for these patients is chemotherapy. There are various tools that doctors and nurses use in order to effectively communicate with these young patients and their families about what this type of leukemia is, and what chemotherapy will do in order to help. There are children’s books on cancer, but they are mostly coping aids or answer general questions. My children’s book however invites the young reader (6 to 14-year-olds) into the world of immune cells, by following the life of a T-cell as he learns about his environment and how to interact with other immune cells to fight against ALL and protect their human. The reader also witnesses how the cells react to the chemotherapy, and their journey to recover after treatment. My goal for this creative project is that it will serve as another educational tool for patients with ALL. Also, I hope that it inspires its audience and gets them excited about science. Even though this children’s book is written with scientific detail, the concepts are presented in a simple and attainable way, enabling my young audience to comprehend what ALL is, unlocking their perception towards the disease with this new approach.

**10:45-11:30 Board 27**
Manal Jellal
Suman Mukherjee (Faculty Sponsor)
Department of Biology and Chemistry, Bunker Hill Community College
Swainsonine, a Potential Alkaloid with Anti-viral Therapy
Swainsonine is an indolizidine alkaloid with α-mannosidase and mannosidase II inhibitor activity that alters glycoprotein processing. Swainsonine, produced by specific fungal species, is present in a number of plant species worldwide and causes severe toxicosis in livestock grazing these plants. Consumption of these plants by grazing animals leads to a chronic neurological disease, locoism which is characterized by weight loss, depression, altered behavior, decreased libido, infertility, and death. Alternaria Oxytropis (Phylum: Ascomycota; Family: Pleosporaceae) is a slow-growing endophytic fungus that produces, swainsonine within the legume host plants, locoweeds. Swainsonine has been demonstrated to be effective in treating certain types of cancer or for lessening the toxic effects of chemotherapy. As a potent biomolecule, there may be certain unexplored avenues where swainsonine can have a major impact. In this study, we hypothesize that swainsonine will exhibit anti-viral therapeutic capacity. We will use various concentrations of swainsonine to test for antiviral activity on a range of RNA viruses such as Zika, Dengue, influenza, and HIV. We hypothesize that the alkaloid will target the virus exit pathway, specifically post-assembly. We will use mammalian cell culture method to study the growth of virus particles in the presence and absence of swainsonine doses. Mammalian cell culture, qRT-PCR, binding assays, and ELISA methods will be used to determine the effect of the alkaloid on viruses. Our long-term goals are to determine the appropriate concentration of swainsonine in an animal study and non-human primates and work towards understanding the potential therapeutic effects of swainsonine.

**10:45-11:30 Board 43**
Jacob Michael Vieira
Michele Markstein (Faculty Sponsor)
Department of Biology, UMass Amherst

**Saving Researchers from the Tyranny of the *Drosophila* Life Cycle - Cold Tolerance Genes in *Drosophila melanogaster***

The short life cycle of *Drosophila melanogaster* fruit flies gives them a great deal of utility for rapid experiments that require a high throughput. However, this short life cycle also poses a unique challenge in that the short progression leaves scientists tethered to their flies every day of the week. Our lab has explored a novel experimental technique utilizing cold storage at 4°C to delay the eclosion of flies in the late pupal stage. My thesis has explored the application of this technique to flies from the *Drosophila* Genetic Reference Panel to explore the genetic underpinnings responsible for differences in the flies’ cold tolerance rates. Genome-wide Association Study of these approximately isogenic fly lines has allowed the identification of several genes underpinning this phenotype. These genes are in turn candidate genes for being bred onto common lab stocks to improve the viability of this technique and grant researchers a much finer control over this crucial stage of the *Drosophila* life cycle, even for flies with normally poor tolerance.
This presentation focuses on “Aging,” a progressive deterioration of one’s psychological and physiological health which reduces one’s chance of survival and increases vulnerability. Many people have a setback on reaching this stage of life while others make a goal towards it. Why do many fear aging? If it’s a natural trend of life, can people alter changes into aging through DNA methylation? How can the knowledge of epigenetics transform or increase one’s chances of living long? Can one maintain their strength and not become weak? How does the world refer to the aged? These are a few of the questions this presentation seeks to answer. Aging is a process of change in life where by an individual transforms from their youthful age through adulthood, old age and to death. Scientific findings prove that the aging process can be slowed down by considering various measures such as diet control, exercising, changes in DNA epigenetic modification patterns and so on. With the accuracy of ongoing findings, if people are to keep up, old age would last longer than expected in the next fifty years. The aging process from the past, present and the future are explained with knowledge gained from history of old age, and ongoing research.

Epigenetics is an emerging discipline of genetics that will change our current understanding of the molecular segments of life. This will create opportunities for advancements in medicine. Epigenetics serves to explain how heritable genetic traits can be modified through DNA methylation rather than the overall resequencing of DNA molecules. It will lead to further comprehension of our own genetic information. With an emphasis of previous epigenetic experiments, this presentation will explore how this new emerging area of study may change the lives of cancer patients and how an individual’s environment or lifestyle can impact genetic transformation. The future of medicine will demonstrate how one can achieve a healthier lifestyle regardless of their genetic information.
Previous studies have shown environmental conditions such as salinity, light, pH, and nutrients have significant effects on algal growth. The purpose of this experiment was to test the effects of salinity and nutrient enrichment on population growth in the microscopic green alga, *Tetraselmis chuii*. This was accomplished by (1) culturing algae at four different salinity concentrations ranging from 15 ppt to 50 ppt and (2) culturing algae in nutrient enriched seawater and non-nutrient enriched seawater. Each experiment consisted of three replicates per experimental group. Population growth was estimated by counting algal cells on hemocytometer slides, as well as using absorbance measurements as a proxy for population size. The results indicated significant decreases in population growth at salinities of 15 ppt and 50 ppt. There was also a significant increase in population growth in nutrient-enriched conditions. These experiments demonstrate the potential impacts of changing salinities in local marine environments due to freshwater runoff, salty runoff from roads in the winter, or evaporation in high temperatures, as well as the possibility of algal blooms due to nutrient enrichment from agricultural and municipal sources.

11:45-12:30  Board 2
Michelle M. Heeney
Madelaine E. Bartlett (Faculty Sponsor)
Department of Biology, UMass Amherst
Awn Development and Function in the Grass *Brachypodium distachyon*

Ability to exploit naturally occurring processes in grain development has the potential to allow for increased production per plant, leading to a decrease in required acreage, and increased projected profit per land area. Grain development starts at grass flowers, which are contained within specialized branching structures called spikelets. Many grass spikelets have a bristle on each of the outer sheathing leaves, called an awn. Awns contribute photosynthate to seeds in wheat and barley (Schrager-Lavelle et al., 2017). This function is difficult to explore in wheat and barley. Thus, we are using the model system *Brachypodium distachyon*, which is a close relative of wheat and barley. I performed manual awn clipping experiments analyzing whether awns contribute to grain loading in *B. distachyon* and mapped the presence and function of awns within the Pooideae. I determined that awn presence may have an effect on both seed number and weight, that brownian motion best fits awn length, and that the genes control awn development have pleiotropic effects. I also characterized a previously documented awnless mutant, *awl1*, determining the breadth of traits affected by this mutation in an awn developmental gene. This may impact grain weight, seed nutritional content, and the number of seeds produced per plant. This data also suggests that there is a signal controlling carpic dominance originating in the awn. Manipulation of this signal could have profound effects on seed number per plant. Globally, the optimization of grain production would have effects in every major nation due to grain consumption.
11:45-12:30  Board 32  
Bryanna Lea Bernard  
Christine MacTaylor (Faculty Sponsor)  
Department of Chemistry and Physics, Salem State University  
The Search for a Cure: Collection and Data Processing of Elder Marsh to Find Novel Antibiotics

Due to the increase in antibiotic resistant bacteria, scientists are now on a race to find useful antibacterial medicines. Using salt marsh plants, both fungal and bacterial extractions were used to analyze the different compounds found within the plant itself. Those samples were tested against four pathogens of interest in head to head contact along with the use of an LC-MS to identify specific compounds found within the extract. The Elder Marsh shows numerous promising medicinal characteristics including strong antibacterial properties towards certain pathogens.

11:45-12:30  Board 34  
Isam Adam  
Jill A. Macoska (Faculty Sponsor)  
Department of Center for Personalized Cancer Therapy, UMass Boston  
Stearoyl CoA Desaturase is an Essential Regulator of Fatty-Acid-Induced ER Stress and a Therapeutic Target in Glioblastoma

Glioblastoma (GBM), the most common form of primary central nervous system tumors, has long been inherently difficult to treat and impossible to cure. These difficulties can be attributed to the presence of Glioma stem cells (GSCs) within the tumor and their innate ability to drive tumor progression, growth, and recurrence. Examining the metabolic activity of fatty acids (FAs) in GSCs serves as a novel therapeutic approach to establishing new treatment methods.

Stearoyl CoA Desaturase I (SCD1) is a crucial enzyme in FA metabolism through which conversion of saturated FAs into their unsaturated counterparts takes place. We have identified SCD1 as a critical enzyme essential in maintenance and tumor-initiation in GSCs. After knockdown of SCD1, it was found that tumor propagation was halted altogether, reinforcing GSC dependability on lipid synthesis. Pharmacological inhibition of SCD1 using a potent small-molecule inhibitor of SCD1 achieved a strong therapeutic outcome in two GSCs mouse models and was able to cure several mice bearing brain tumors. SCD1 is primarily localized in the endoplasmic reticulum (ER), and the known impact of FAs on ER stress hints at a direct link between SCD1 activity and ER stress. We report that the inhibition of SCD1 activity causes a toxic accumulation of SFAs which cause an overwhelming ER stress response, promoting apoptosis in GSCs.

Our study demonstrates an essential role for FAs in GSC maintenance and tumor initiation. We provide preclinical evidence for targeting lipid synthesis pathways in GSCs using potent inhibitors of SCD1 as a therapeutic treatment for GBM.
**11:45-12:30  Board 35**  
Sean Patrick VanDoren  
Luis F. De León (Faculty Sponsor)  
Department of Biology, UMass Boston  
Divergence of Electric Signals in the Weakly-Electric Fish *Brachyhypopomus*

*Brachyhypopomus* is a genus of weakly-electric Neotropical fish that is part of the Gymnotiforme order. Although much is known about the behavior and ecology of these fish, there remains much to learn about the details of how and why they evolved in the way we have observed. My research will analyze the variation of electric signals in three species from the Gymnotiforme order, with further in-depth analysis of *B. occidentalis* signals. Electric signaling represents a novel trait, used for both communication and electro-location, making it ideal for studying how and why this species has evolved. Characteristics of the electric signal waveforms, specifically frequency and duration, will be extracted using Matlab and Python. These parameters will then be compared between fish from populations occupying different geographic locations across Panama. Mantel tests and ANOVA will be used to analyze whether signal parameters are correlated to genetic and morphological distances between populations. This will determine if electric signals are helping to facilitate speciation within the *Brachyhypopomus* genus. Confirmation of electric signals as an important phenotype in the evolution of *Brachyhypopomus* will assist the future study of specific sexual and environmental pressures that have shaped the evolution of this genus.

**11:45-12:30  Board 36**  
Chang Yu  
Samuel Hazen (Faculty Sponsor)  
Department of Biology, UMass Amherst  
Exploring Diurnal Rhythmic Gene Expression in *Brachypodium distachyon*

Plants are continuously exposed to varying environmental conditions; some anticipated diurnal changes in light and temperature and others far less predictable. Key to adaptation to a diurnal environment is the anticipation provided by the circadian clock, which coordinates broad changes in gene expression with a period of about 24 h. Here we present the analysis of RNA sequencing to measure transcript abundance in time courses from Brachypodium distachyon entrained in photo- and thermocycles and then transferred to photocycles or thermocycles alone, or constant light and temperature conditions. We found 2.8% of the transcripts exhibited circadian changes in transcript abundance, far fewer than what has been reported in comparable datasets from Arabidopsish thaliana, maize, Setaria, and cotton. A similar proportion of genes cycled under diurnal conditions. We also examined the changes in alternative splicing that occurred between conditions, and quantified the shifts that resulted in a secondary transcript superseding the primary transcript. The timing of peak expression, phase, for individual genes was fairly consistent across all conditions with the exception of free-run where we observed a lengthening of period and a resulting shift in the phase of the cycling transcripts. Exploring the rhythmic transcripts by phase we found conserved gene ontology terms associated with particular times of the day. Many of the known circadian clock genes appear to remain rhythmic under all four conditions, with several also demonstrating a period change.
Morgan Powell
Madeline E. Bartlett (Faculty Sponsor)
Department of Biology, UMass Amherst
iCons: Using MoClo to Test the Functionality of Plant Growth Suppressors

Molecular cloning is a section of biology focused on assembling DNA and replicating it within a lab organism like E.coli. One type of molecular cloning is modular cloning (MoClo), a method used to construct complex, multigene constructs easily. MoClo relies on Golden Gate assembly, a method that assembles DNA fragments into a single construct with the help of restriction enzymes and ligase. The connection of various fragments is achieved by a specific 4 base pair overhang that distinguishes the order the fragments will bind in. Using MoClo, I will test the hypothesis that the genes GRASSY TILLERS1 (GT1) and RAMOSA3 (RA3) are general suppressors of growth in plants. In maize, GT1 and RA3 suppress growth in flowers. To determine if GT1 and RA3 can suppress growth in other plants and in new expression domains, I will express GT1 and RA3 in Arabidopsis thaliana flowers. Using MoClo, I have developed constructs that allow for tissue-specific expression of GT1 and RA3 in A. thaliana using the APETALA3 promoter (pAP3). AP3 regulates stamen and petal development in A. thaliana, and has a specific expression pattern in those tissues. With the MoClo system, I will fuse pAP3 to the GT1 or RA3 coding sequences. This will express GT1 or RA3 exclusively in the stamens and petals, allowing me to assess whether GT1 and RA3 can suppress stamen and petal growth. In my presentation I will outline the MoClo system and discuss the steps involved in transforming A. thaliana.

Gabrielle Victoria Carroll
Kathleen Arcaro (Faculty Sponsor)
Department of Animal Sciences, UMass Amherst
iCons: Dietary Intervention to Determine Breast Cancer Risk: Assessing CpG Sites across the Genome

The extent to which diets rich in fruits and vegetables (FVs) reduces breast cancer risk is unclear. Diet intervention studies measuring intermediate breast cancer markers, such as DNA methylation, directly in breast tissue are needed to assess the effects of FV consumption on breast cancer risk. Therefore, we conducted a pilot study with lactating women randomized to either a control group (n=5), or a diet intervention group (n=5), in which for ten weeks, women received boxes of FVs and counseling aimed at helping them consume 8-10 daily servings of nutrient dense FVs. Breastmilk and dietary data were collected at baseline and the end of week 10. Previous analysis showed that by week 10 women in the intervention group ate significantly
more FVs, and had a reduced inflammatory profile in their breastmilk as compared to women in the control group. Here we report on changes in breastmilk DNA methylation.

DNA was extracted from 40 breastmilk samples (bilateral samples at baseline and week 10 from 5 women per group), and an equal amount of DNA from each of 10 samples was pooled into 4 analysis samples; control-pre, control-post, diet-pre, and diet-post. DNA methylation was assessed using Illumina’s MethylationEPIC Array, which measures over 850,000 CpG sites. Comparison of pre and post mean methylation scores showed greater changes in the diet group than the control group: 866 versus 302 CpGs, respectively with mean methylation scores greater than 0.2 and >2-fold change. Continuing analysis is examining the role of these altered CpGs in breast health.

12:40-1:25  Board 6
Jesús Mallol Díaz
Elizabeth Jakob (Faculty Sponsor)
Department of Biology, UMass Amherst
Do Secondary Eyes Play a Role in Directing Principal Eyes Towards Indirect Visual Stimuli? An Interfamily Study with Arachnids

Recent research on the interactions between the principal and secondary eyes in jumping spiders suggests that the moveable principal eyes are responsible for capturing visual detail, while secondary eyes collect motion information and direct the principal eyes to newly appearing or moving stimuli. Studies on the interactions between the secondary and principal eyes among other families of spiders are scarce. There is a vast diversity of hunting behaviors across spider families, ranging from active hunting or ambushing prey, to web-building. These differences between life histories are also reflected in morphological features in spider visual systems. Some notable variations are in the size of principal eye retinas, the number of muscles responsible for moving principal eyes, and the size of the field of view of secondary eyes and its overlap with that of the principal eyes. With the purpose of unraveling the interactions between secondary and principal eyes in arachnids, I am collecting visual stimulus data on a selection of spiders with diverse backgrounds and hunting strategies. The spiders will be exposed to a lateral visual stimulus with their secondary eyes unmasked, and then masked. With these data I will be able to determine if secondary eyes are necessary for directing principal eyes towards indirect visual stimuli as in jumping spiders, or if this association does not occur in spider families with different visual systems.

12:40-1:25  Board 7
Ana Carolina Dolan
Gerald Brian Downes (Faculty Sponsor)
Department of Biology, UMass Amherst
Localization of the GABA_A Receptor A Subunits in Developing Zebrafish

GABA_A receptors are critical for regulating locomotor behavior among vertebrates. However, despite their importance, the diversity of GABA_A receptors and the complexities of mammalian
systems has hindered efforts to determine how these receptors regulate locomotor networks. In mammals, these heteropentameric receptors exhibit extreme diversity, as there are 19 different subunits (α1-α6, β1-β3, γ1-γ3, δ, ε, θ, π, and ρ1-ρ3) that can combine to form receptors. Developing zebrafish have more simple locomotor networks compared to mammalian systems, which makes them an excellent system to investigate how GABA<sub>α</sub> receptors regulate swimming behavior. In related work, our lab has determined that zebrafish contain at least 22 different subunits and that the α3 subunit plays a prominent role in regulating swimming behavior. To understand how α3 subunits regulate swimming behavior we aim to resolve its spatial and temporal expression in the hindbrain and spinal cord during zebrafish development. We are using whole-mount in situ hybridization, immunohistochemistry with cell type-specific antibodies, and confocal microscopy to identify the cells that express α3. The identity of these cells will provide information about their function, which will help us determine how GABA<sub>α</sub> receptors regulate locomotion. Given that several aspects of locomotor network organization and function are conserved across vertebrates, our results may have implications for mammalian systems. Additionally, mutations of the human α3 subunit have been found to cause an epileptic syndrome, therefore our work helps establish a zebrafish model of this disorder.

Approximately 25% of epilepsy cases are marked by resistance to anti-epileptic drugs as a form of treatment. Several of these drug resistant forms of epilepsy are caused by disruption of the mTOR (Mammalian/mechanistic target of rapamycin) pathway, which is a central regulator of cell growth and proliferation. All of these disorders are caused by mutations that increase mTOR signaling. Recently, mutations in the gene that encodes the TBC1 domain containing kinase (TBCK) have been shown to decrease mTOR signaling and cause a severe human condition, TBCK deficiency disorder (TBCK-DD), with symptoms that include intellectual disability, coarse facial features, motor problems, and seizures. Little is known about TBCK and there are no published reports that describe an animal model of TBCK-DD. Zebrafish are an established system, used by hundreds of laboratories around the world, to model human disease. We have identified a single zebrafish TBCK gene and are using both CRISPR-Cas 9 genome editing and fish available from the Zebrafish Mutation Project to establish mutant lines. To date, one TBCK mutant line has been established and we will present the results of our quantitative morphological and behavioral analysis of this line. Future studies will establish a zebrafish model of TBCK-DD to determine how mutations in TBCK decrease mTOR signaling and whether these decreases can be used therapeutically in the several disorders that increase mTOR signaling.
1:30-2:15 Board 1
Riya Jayantibhai Patel
Daniel Arthur Soucy (Faculty Sponsor)
Department of Philosophy, Mount Wachusett Community College
The Affect of Hindu Teachings on End-of-Life Care

Spiritual pain is the pain caused by extinction of the being and meaning of the self. In this presentation, the psychological decentering provided by various Hindu teachings will be explored as a possible coping mechanism for believers and non-believers alike as a form of palliative care. It will be explored how psychological decentering impacts spiritual pain, and how it alleviates this pain.

1:30-2:15 Board 13
Kelsey Lynn Raposa
Krista J. Randall
Katie Lyn Ruggieri (Faculty Sponsor)
Department of Biology, Bristol Community College
Examination of the Effects of Tomatillo (Physalis philadelphica) Coating Extract on the Cyclooxygenase-2 Activity in HeLa Cells

The tomatillo is a popular culinary fruit that expresses a sticky material on its surface, consumed as part of the fruit. Chemical characterization of this sticky material on tomatillo fruits yielded five new sucrose esters, as confirmed by spectroscopic methods. The solvent extract of the sticky material from the whole fresh fruit and pure isolates shows anti-inflammatory activity as confirmed by in vitro cyclooxygenase enzymes inhibitory assays. Five sucrose esters isolated inhibited cyclooxygenase-1 and -2 enzymes by 50%.

In this study, we will be preparing tomatillo extract from the sticky outer coating (as detailed in https://www.ncbi.nlm.nih.gov/pubmed/26593547), treating the HeLa cells with various concentrations of extract, and then assaying the activity and total RNA and protein expression of cyclooxygenase-1 and -2 enzymes (COX-1 and COX-2).

1:30-2:15 Board 14
Robbie John Pearson
Katie Lyn Ruggieri (Faculty Sponsor)
Department of Biology, Bristol Community College
Isolation and Sequencing of DNA from Woolly Mammoth Vertebra and Hair

I am an avid meteorite collector and belong to a Facebook club with some of the most respected scientists in the field. One such member is Jose Garcia, the curator of the Canaria Meteorite Museum and Education Center in Santa Maria Spain. In addition to meteorites, they also study various, rare fossil specimens.
Jose is in possession of some very interesting samples. When I told him I was a Biotechnology/Forensic DNA major, he enthusiastically agreed to donate some samples in the hope that Bristol Community College could use them as a learning experience for our program.

Throughout the semester, we will be attempting to extract DNA from 50,000-year-old hair and vertebrae samples from *Mammuthus primigenius*, taken directly from the permafrost in Yakutia, Siberia.

1:30-2:15    Board 20
Maddison Lee Lamonda
Justin L. Golub (Faculty Sponsor)
Department of Biology, Massachusetts College of Liberal Arts
Genetic Patterning of Alpaca Coat Colors

Alpacas (*Vicugna pacos*) are a South American species of camelid farmed for their fleece (e.g. fiber). Alpaca fiber is softer than wool, and less prone to skin irritation, while providing equal warmth. Natural fiber colors are often preferred, and unique variants can be highly favored. Therefore, farmers chose to breed animals to yield desired colors, and any information that can be used to determine the coat colors produced would be beneficial. The genes that determine coat color can be identified in two ways, first using genomic sequencing, and the second using methods derived from Gregor Mendel’s research, to track the inheritance of traits through pedigrees, and predict outcomes using Punnett squares. In this project, we selected two animals from Tybush Mountain Alpaca Farm (Brunswick, NY), predicted their coat color genotype for the *Asip* gene (primary coal color characteristics), and predicted the probability of breeding outcomes. Information found through this project provide farmers to make decisions about animal breeding to yield desired natural coat colors, and opens the door for further testing.

1:30-2:15    Board 21
Marshall Keith Muma
Keenan Marcus Benton
Tess Killpack (Faculty Sponsor)
Department of Biology, Salem State University
Effects of Environmental Toxicants on *Daphnia* Mortality

We were interested in the effects that environmental toxins can have on aquatic organisms. Previous studies of *Daphnia* have shown increased mortality and reduced size with chronic toxicant exposure (Ferrando, et al., 1995) (Braush and Salice, 2010). In our experiment we aimed to test the effects that road salt (NaCl) and commercial pesticide (Triazicide) would have on *Daphnia* mortality. We exposed *Daphnia* to a range of concentrations of toxins, and recorded *Daphnia* mortality in 5 minute intervals for 20 minutes. In our NaCl experiment we observed no significant difference in mortality in *Daphnia* exposed to 0mg/L to 500mg/L, but mortality significantly increased at 1000mg/L and further increased at higher concentrations. In our pesticide experiment we found that mortality was significantly higher than control with
Pesticide exposure from 20% to 100% of working concentration. Future studies could be performed to investigate the precise concentration of NaCl, pesticide, or other toxins needed to kill *Daphnia*, and to investigate the ecologically-relevant levels of toxins in contaminated water to determine what wild invertebrates are exposed to. Future experiments could also be performed to test the other effects such as sublethal effects on *Daphnia* physiology.

1:30-2:15   Board 22
Tecla I. Hrycaj
Alympia Scott Boudreau
Brittany May Polanco
Tess Killpack (Faculty Sponsor)
Department of Biology, Salem State University
Lettuce Seed Toxicology with Varying Herbicide and NaCl Concentrations

We used lettuce seed bioassays to examine the effects of environmental toxins on germination and root growth. Different soil-soluble elements affect root elongation, germination, and root necrosis in lettuce seeds (Valerio, M. et al, 2007). Additionally, lettuce is not resistant to glyphosate (the active ingredient in Round-Up herbicide), and therefore can be negatively impacted as an unintended target of the herbicide (Nagata, et al., 2000). We hypothesized that germination and root length of lettuce seeds will decrease as the amount of herbicide (glyphosate) or road salt (NaCl) increases. We prepared 100% herbicide, 75% herbicide, 50% herbicide, 25% herbicide, and a 0% herbicide (the control) concentrations and also 0 M NaCl, 0.025 M NaCl, 0.05 M NaCl, 0.075 M NaCl, 0.1 M NaCl, and 0.2 M NaCl concentrations. Each concentration was tested using three replicate dishes with five lettuce seeds per dish and left to germinate in the same conditions for eight days. The average number of seeds germinated in 0% herbicide dishes was 3 seeds, yet no seeds germinated in the herbicide treatments. There was a significant difference in germination between 0M NaCl (control) and 0.2M NaCl, but no difference at lower concentrations. There was a significant decrease in root length (compared to control) at all NaCl concentrations except for 0.025M NaCl. We concluded that higher concentrations NaCl decreased the germination and the root growth. Future studies should examine lettuce seed toxicology at ecologically relevant concentrations of herbicide.

Room 809   1:30-2:15   Panel 5
Faith Angella Boyd-Mutinga
Kimberly Ann Stieglitz (Faculty Sponsor)
Department of Science and Engineering, Roxbury Community College
Effects of Commercially-Available Green Tea Extract on Monoamine Oxidase A and Monoamine Oxidase B Activity

Green tea presents many health benefits including reducing the risk of cancer, obesity depression, and various neurodegenerative diseases such as Parkinson’s diseases and Alzheimer. Green tea is derived from the plant Camellia sinensis. Extraction and recrystallization of green tea was performed to investigate inhibition of an enzyme target for
Alzheimer’s Disease. Tea was steeped for 2.5 hours, stored for 7 days after which centrifugation and separation were performed to isolate catechins from commercially available Bigelow decaffeinated green tea- the results of which were compared with caffeinated commercially available green tea from the same brand. Isolated green tea catechins inhibited monoamine oxidase A (MAO-A) and monoamine oxidase B (MAO-B). Results showed that catechins were abundant in the decaffeinated green tea product and that the retention factor of the isolated catechins of caffeinated green tea extracts were similar to previously reported. The retention factor for decaffeinated green tea was found to be significantly higher when compared to historically reported values. This may have been due to a variety of experimental factors such as solvent used, low polarity of catechins, and caffeinated versus decaffeinated samples. Current studies include evaluating the effect of the isolated catechins on MAO-A and MAO-B enzyme activity by evaluating the IC50s (50 percent inhibitory concentration of catechin) between caffeinated and decaffeinated varieties of green tea. Preliminary results show that decaffeinated green tea inhibits MAO-A 10 times more effectively than the green tea containing caffeine. MAO-B did not show significant differences in inhibition between caffeinated and decaffeinated green tea.

2:45-3:30    Board 2
Leslie Welker
Joseph A. Bruseo (Faculty Sponsor)
Department of Biology, Holyoke Community College
An Observation of Foraging Behavior in Two Species of Peromyscus

In this study, we observed the foraging behavior of mice over the course of eight years to understand the relationship between canopy cover and mouse activity as well as acorn density and mouse activity. We accomplished this through analysis of the frequency of trappings on a trapping grid, in addition to a survey of the area surrounding each trapping station. Ultimately, we found that neither canopy cover or acorn density are significant factors in mouse foraging activity, suggesting that there may be other important factors to consider when examining the foraging behavior of Peromyscus.

2:45-3:30    Board 25
Hoang Duc Vo
Aleel K. Grennan (Faculty Sponsor)
Department of Biology, Worcester State University
Validation of a Shade Plant Model

The ability to survive and thrive in the shade is not limited to just those plants found in deep woods. Shade plants are also found in your garden, agricultural fields, as well as in meadows. There are still gaps in knowledge about how these plants develop in shade conditions due to the lack of a strong model system. One possible model to study this developmental process is to use plants with artificially enlarged chloroplasts, one of the major traits of shade leaves. Arabidopsis thaliana plants with a mutation in a key protein in chloroplast division, is a possible model to study this response to low growth light. The mutant and wild type Arabidopsis
*thaliana* plants were grown under different light conditions to confirm that larger chloroplasts plant are indeed representative of a shade plant. Their phenotype, leaf anatomy, and protein content could help us better understand how plants grown in the shade.

### 2:45-3:30 Board 26

Christopher Jean Louis  
Amanda Simons (Faculty Sponsor)  
Department of Biology, Framingham State University  
**Effect of Biologically Relevant Doses of Resveratrol on Carbohydrate Metabolism**

Resveratrol is a molecule produced by plants commonly found in grapes and red wine. Resveratrol has anti-carcinogenic properties, antioxidative properties, is beneficial to cardiovascular health and has been shown to alter biological pathways such as the DNA damage response. Resveratrol studies in cells often use excess amounts that would be impossible to replicate physiologically. Due to these restrictions in vitro results are not a good predictor for the results in vivo. Resveratrol has low bioavailability which is another challenge for in vivo studies.

To mimic use of resveratrol in vivo we aim to culture human cells in the presence of resveratrol with physiologically appropriate doses over a span of weeks. Using cell-based assays such as Western Blotting we will compare treated cells with non-treated cells with a focus on changes in glucose metabolism.

### 2:45-3:30 Board 27

Prakrit Subba  
Craig Albertson (Faculty Sponsor)  
Department of Biology, UMass Amherst  
**Muscle Size is Associated with Craniofacial Bone Geometry in Cichlid Fishes**

Numerous bony fish (i.e., teleost) groups possess two sets of jaws. The oral jaws (OJs) are homologous to the upper and lower jaws of other vertebrates and are used to capture prey. The pharyngeal jaws (PJs) are modified gill arch bones located in the throat, and are mostly used in the processing of food. This functional decoupling has enabled the evolution of elaborate prey capturing mechanisms in fishes. While the development and growth of muscles and bones are intrinsically linked at the molecular and kinematic levels, the extent to which the growth of one tissue influences that of the other is less understood. Here we examined this question using the PJs and associated musculature in an F5 hybrid population of cichlids (n=140). Specifically, we extracted the lower pharyngeal jaw bone, and two pharyngeal jaw muscles from micro-CT data to characterize the strength and types of associations between bones and muscles. We characterized bone shape using 3D geometric morphometrics, and gained volumetric measurements from muscles. We then performed linear regressions to document any correlations between bone shape and muscle volume. We find evidence for strong associations between pharyngeal jaw shape and pharyngeal jaw muscle volume. Further, we note that the association between bone and muscles extends beyond this functional unit, such that bones of one unit (e.g., PJ) are correlated with the muscles from another (e.g., OJ). These data suggests that muscles play an important and ubiquitous role in regulating bone homeostasis through ontogeny.
2:45-3:30    Board 28
Emily Brady
Craig Albertson (Faculty Sponsor)
Department of Biology, UMass Amherst
The Muscular Structure of the Iris of the Little Skate, *Leucoraja erinacea*

The iris of a skate has a complex morphology. The iris itself is made up of a dilatory membrane and an appendage, unique to skates, called the operculum pupillare (OP). The OP is a hand shaped appendage that closes over the pupil as a curtain in bright light conditions, while being fully retracted in low light. It can take up to 40 minutes for a skate’s pupil to fully dilate and the operculum to fully extend and regulate the amount of light striking the retina. The muscular mechanism behind this system has yet to be fully understood. This project uses the Little Skate, *Leucoraja erinacea*, as a model organism to determine the musculature of the skate iris, including the operculum its surrounding anchoring region. Advanced histologic and microscopic techniques are utilized to elucidate the muscular arrangement. Preliminary data show the presence of putative efferent motor nerves, both myelinated and unmyelinated. They were found to be present throughout the iris and operculum, which suggests a high degree of muscular innervation occurring throughout the iris. Potential muscle structures have also been identified in tissue sections of pigment epithelium taken from all areas of the iris. However, further identification and analysis of these structures is necessary to verify their causative association with iris functioning. Immunocytochemical techniques are currently being used toward this purpose. Understanding the muscular mechanism of this system will help to understand how this highly modified adaptation is used, and perhaps why it evolved.

2:45-3:30    Board 29
Jamie Meehan
Gina Mineo Foley (Faculty Sponsor)
Department of Biology, Berkshire Community College
A Pilot Study Investigating Bleach Degradation

In this experiment, I looked at the effectiveness of a ten percent bleach solution on bacteria over a course of a two weeks. I executed this experiment using the Kirby Bauer method to determine the sensitivity of the bacteria to the bleach solution. Based on the results of a research study I previously performed I was interested in the shelf life of bleach. We use a ten percent bleach solution to decontaminate the microbiology lab benches. My main experimental focus was to determine the proper shelf life of bleach before degradation causes the bleach to be ineffective. As a student in microbiology, I was concerned for my fellow students across the Commonwealth as to the safety of the labs we learn in. I surveyed lab technicians at the 15 community colleges to determine methods used to decontaminate lab benches.

Bleach uses a chemical called sodium hypochlorite. This chemical works in a similar way as heat stress does. Our immune cells produce hypochlorite to kill microbes as well. Based on the protocol released by Mika Ono in the article *Everything You Always Wanted to Know About*
Bleach but Were to Afraid to Ask a 10 percent bleach solution is potent for approximately 24 hours. Also, bleach is more unstable in its diluted form. My research is testing the hypothesis that after 24 hours of preparation, a ten percent bleach solution will be less effective on commonly used bacteria such as *Escherichia coli* and *Staphylococcus aureus*.

2:45-3:30  Board 3
Jacob Paul Munafo
Mary K. Rapien (Faculty Sponsor)
Department of Biology, Bristol Community College
Decapods of the Genus *Gennadas* in the Oxygen Minimum Zone of the Eastern Tropical North Pacific

In 2017 Dr. Karen Wishner and Dr. Chris Roman (University of Rhode Island), and Dr. Brad Seibel (University of South Florida) conducted a study aboard the research vessel Sikuliaq, collecting samples from the oxygen minimum zone (OMZ) of the North Eastern Tropical Pacific. Dr. Wishner collected samples using the MOCNESS (Multiple Opening Closing Net and Environmental Sensing System). Zooplankton were collected at various depths, in order to associate organism distributions with oxygen concentrations. The Wire Flyer oscillator was used by Dr. Roman to collect large scale physical data in-situ. The respiration rates and oxygen tolerances of live samples were measured by Dr. Seibel. Preliminary data show that changes in oxygen concentrations smaller than 1% can effect the distributions of OMZ organisms (Wishner et al., 2017). Using preserved organism samples from this study, provided by Dr. Wishner, the goal of this research is to resolve the taxonomy and distribution of decapods of the genus *Gennadas* as they relate to in-situ oxygen data. Specimens from vertical and horizontal tows will be identified and enumerated. The OMZ is expected to expand as a result of climate change, threatening to alter the distributions and food web dynamics of these regions. This study will help to clarify the potential responses of these organisms to the effects of climate change on the OMZ.

2:45-3:30  Board 30
Kia Yang
Gina Mineo Foley (Faculty Sponsor)
Department of Biology, Berkshire Community College
Silencing Genetic Mutations

A study of illuminating RNA interference in *C. elegans* (Caenorhabditis elegans) with an egg-laying defect vulva-deficiency.

Proposal

In this experiment, the genetic mutation found in egl-1 Caenorhabditis elegans will be suppressed by turning off another gene pos-1 with the use of RNA interference, or RNAi, by feeding. Egl-1 is one of the egg-laying defects where the worms express a genetic mutation in which they do not develop a vulva structure necessary for proper egg-laying. The embryos continue to develop inside the uterus of the adult worm, eventually consuming its
internal organs and ultimately killing the adult worm. They are released as a “bag of worms”. Pos-1, posterior segregation, encodes for a protein that suppresses the formation and development of embryos. If the egl-1 C. elegans ingest the pos-1 RNAi by feeding, the adult worms themselves are not affected but will result in the production of non-developing embryos that are retained in the uterus. With green-fluorescent protein being transformed in their E. coli feed, their bodies will fluoresce providing visual evidence of experimental results.

Material: OP50 E. coli, Petri dishes, NGM-lite, Ampicillin, IPTG, GFP protein, Egl-1 c. elegans, Pos-1 RNAi

2:45-3:30 Board 31
Iain Kuttner
Gina Mineo Foley (Faculty Sponsor)
Department of Biology, Berkshire Community College
The Unique Ecology of Halophilic Archaebacteria

An extremophile is an organism that thrives in conditions that are hostile to most forms of life. Some extremophiles, such as halobacteria, thrive in environments that are ten times as salty as the ocean. These creatures are found in salt mines, salt lakes, and seasonal bodies of water that are too salty to sustain life. Large blooms of halobacteria can turn salty bodies of water a characteristic pink color. While halobacteria may thrive in high salinity, and UV irradiated environments, they cannot survive in “normal” conditions such as fresh water. Conversely, common bacteria such as E. coli can be found almost anywhere, but not in environments with incredibly high salt concentrations. This experiment will compare the growth of extremophile Halobacterium sp. NRC-1 to the growth of omnipresent E. coli in a variety of conditions that will test each species’ ability to survive in saline environments, environments exposed to UV radiation, and acidic environments. Each organism’s respective rate of growth will be measured in order to find the optimal conditions for halobacteria to succeed. This experiment will examine the specific differences in optimal environment that distinguish halobacteria from other single-celled organisms.

2:45-3:30 Board 32
Christopher James Manley
Gina Mineo Foley (Faculty Sponsor)
Department of Biology, Berkshire Community College
Training Caenorhabditis elegans using Chemotaxis

Caenorhabditis elegans are microscopic nematodes and one of the most widely used model organisms in biological research. This experiment will explore the ability of C. elegans to learn via chemotaxis, the ability to sense a chemical stimulus in the environment and move toward it. Wild type worms will be trained to learn and associate salt with their food supply, the bacteria Escherichia coli. Wild type C. elegans are able to learn while worms that contain the daf-18 mutation are not able to learn and therefore cannot chemotax toward the salt in search of food.
Data will be collected on the number of worms (wild type vs mutant) that are able to associate salt with their food supply and how far the worms will chemotax. The worms will also be trained on sugar to determine if the worms can be trained on a variety of solutes. Humans have a homologous gene to daf-18 gene called PTEN. PTEN has been linked to autism spectrum disorders and learning disabilities.

2:45-3:30  Board 33
Michael Thomas Goyette
Kristen A. Porter (Faculty Sponsor)
Department of Biology, Westfield State University
Characterization of Macrophage Growth, Maturation and Polarization: Best Practices for the THP-1 Cell Line

Macrophages are a vital piece of the innate immune system, which can be divided into different subtypes with a broad spectrum of functions. M1 (classically activated) macrophages are involved in clearance of infection, while M2 (alternative macrophages) and M2 subtypes (alternatively activated macrophages) are linked to Th2-like responses, chronic inflammation, and wound healing. While there is copious information on phenotypes and effector functions of these macrophage cell types, the data is conflicting at best, in both cell lines and in vivo systems. We posit that different methods for growth conditions, monocyte maturation, and differentiation between laboratories is responsible for the conflicting literature. Thus, using the laboratory standard THP-1 monocytic cell line, common culturing and maturation conditions were used and subsequent macrophage phenotypes were compared to each condition and primary macrophage data. Differences in morphology, cytokine and protein expression, HIV susceptibility and wound healing capabilities clearly demonstrate the dramatic difference culture and treatment conditions make toward macrophage polarization. These results may provide standardization of protocols for macrophage plasticity studies, in order to reduce conflicts in the literature and provide an in vitro model that reflects what has been observed among in vivo systems.

2:45-3:30  Board 34
Olivia Rose Ringham
Mark S. Miller (Faculty Sponsor)
Department of Kinesiology, UMass Amherst
Effect of Influenza (flu) on Cellular and Molecular Skeletal Muscle Function in Older Mice

Muscle soreness and weakness is a symptom that is highly pronounced in older adults infected with influenza (flu) and results in functional declines and decreased independence. The aim of this study was to examine how flu infection affects muscle function at the cellular (force production) and molecular (myofilament properties including myosin-actin cross-bridge kinetics) levels in skeletal muscle fibers from older mice. Soleus (slow-contracting) and extensor digitorum longus (fast-contracting) muscles were examined from older (20 month) mice that
were either healthy (controls) or infected with influenza for 7- or 12-days post-infection (DPI). Single muscle fibers (n=265) were collected from 14 mice (control = 5; 7-DPI = 4; 12-DPI = 5). SDS-PAGE protocols were developed and implemented to determine the myosin heavy chain (MHC) isoform for each fiber in order to allow for comparisons within MHC isoforms across groups. The distinction between MHC isoforms is important, as each possesses a different capability for contractile force and velocity (MHC I < IIA < IIX < IIB). There was no difference in force production between healthy mice and those with the flu in MHC I, IIA or IIX fibers (all P > 0.05). However, force production of MHC IIB fibers was 17% lower at 12-DPI compared with 7-DPI (P < 0.05). We are currently analyzing the myofilament mechanics data, which should be completed for the Undergraduate Research Conference. Our results should provide important information on how the flu affects the underlying mechanisms that govern skeletal muscle contractile performance.

2:45-3:30 Board 35
Colleen Marie Castellani
Thomas J. Maresca (Faculty Sponsor)
Department of Biology, UMass Amherst
Applying Live-Cell Fluorescent Lifetime Imaging Microscopy (FLIM) to Probe Spatio-temporal Properties of Cdk1 Activity throughout the Cell Cycle

Understanding protein function has significant implications for mechanistic research and biomedical applications. Garnering a thorough understanding of protein activity has been hindered by technological limitations. Prior research in kinase activity has been limited to methods such as bulk in vitro phosphorylation assays and western blotting, which often restrict quantification to single time-point measurements. More recently, advances in live-cell imaging and fluorescent protein technology have allowed kinase activity to be investigated in living cells thereby allowing phosphorylation states to be tracked in real time. This is not without restraints: prior experiments using standard technology are limited by fluorophore concentration and photobleaching. The research presented here uses improved imaging technology, FLIM microscopy, with a FRET-based kinase activity sensor to assess Cdk1 kinase activity in live Drosophila S2 cells. Changes in phosphorylation state of Cdk1 were determined by changes in fluorescence lifetime of the fluorescent donor in the sensor. Quantification methods were used to calculate efficiency of the sensor in both interphase and dividing cells. A non-phosphorylatable mutant sensor was generated as a negative control to confirm that phosphorylation was being measured by the non-mutant sensor. This research confirms that using FLIM microscopy is a viable technique to investigate kinase activity in real time.

3:45-4:30 Board 20
Samuel S. Germann
Kimberly Berman (Faculty Sponsor)
Department of Biology, Westfield State University
Influence of Cortisol on Inflammatory Cytokine IL-1β under Hyperglycemic Conditions
Cortisol is a stress hormone produced by your adrenal glands and plays an important role in managing blood pressure, blood sugar levels, and inflammation. Its synthetic counterpart hydrocortisone is used medically, either as an injection or topically, in the treatment of inflammation, allergy, collagen diseases, asthma, adrenocortical deficiency, shock, and some neoplastic conditions. Patients with Elevated cortisol levels are observed in patients with Type 2 diabetes which may contributes to their disease. Type 2 diabetes is associated with chronically elevated blood glucose levels, which can significantly impact cellular responses. Previous studies have shown that immune cells exposed to elevated glucose levels are in a hyper-inflammatory state. Macrophages are immune cells necessary for an immune response to pathogens. The purpose of this study was to test if macrophages will be affected by increased cortisol concentrations by testing IL-1 beta levels. THP-1 macrophages grown under normal glucose or elevated glucose conditions were pretreated with cortisol and were then stimulated with LPS. IL-1 beta levels were then tested by ELISA.

3:45-4:30  Board 21
Michael Olson
Kimberly Berman (Faculty Sponsor)
Department of Biology, Westfield State University
**Quercetin Effects on THP-1 Macrophages Grown under Hyperglycemia**

Hyperglycemia is a defining characteristic of Type 2 diabetes, in which blood glucose levels are too high in response to the body’s inability to respond to insulin. Patients with Type 2 diabetes exhibit a chronic pro-inflammatory state. In their adipose tissue, macrophages are the main immune cell responsible for pro-inflammatory cytokine release. Macrophages are large, phagocytic cells found in stationary form in tissues, or in mobile form as white blood cells at sites of infection. THP-1 is a monocytic cell line useful for testing macrophage function in vitro. Quercetin is a flavonoid shown to have antioxidant and anti-inflammatory effects in vitro. In general, antioxidants aid in the reduction of inflammation, controlling blood sugar, killing cancer cells, and preventing heart disease. The role of quercetin in inflammation has been demonstrated in vitro under normal glycemic conditions. Previous studies have shown that quercetin inhibits pro-inflammatory cytokine release from bone marrow-derived mouse macrophages stimulated with microbes and their related molecules. In this study, we investigated the effects of quercetin treatment on inflammasome activation in THP-1-derived macrophages grown under hyperglycemic conditions. After three days of hyperglycemic conditions, differentiated THP-1 cells were pretreated with quercetin and then stimulated with microbial molecules. Cytokine release was assayed by ELISA.

3:45-4:30  Board 22
Nadeen Waleed
Kimberly Berman (Faculty Sponsor)
Department of Biology, Westfield State University
**The Effect of Zinc and Vitamin D on Cytokine Release**
Macrophages are immune cells that engulf and digest unwanted cellular organisms and respond to microorganisms such as bacteria and viruses producing cytokines. The action results in the production of inflammatory cytokines such as interleukin-1, interleukin-6, and tumor necrosis factor or TNF. The immunity system requires essential micronutrients such as Zinc and vitamin D to boost immunological functions. The two components contribute to supporting the three main lines of immune defense comprising of epithelial barriers, cellular protection, and antibiotic applications. Zinc functions during inflammatory condition induced by macrophages and its deficiency can result in impaired immunity. Vitamin D influences the functions of cytokine responses such as IL-6, IL-1, and IL-8 from the monocytes of diabetic patients. Macrophages contribute to the production of a vitamin D metabolite whose presence modulate the immunological responses, cell differentiation, and cell proliferation. Moreover, this particular vitamin enhances the modulation of IL-10 responsible for therapies and increases expression of IL-17. Since both Zinc and vitamin D play a role in the functioning of macrophages, there is a possibility that if incorporated together, they will lead to increased effects of macrophages. This study aims to test the effects of Zinc and vitamin D when applied together on the function of macrophages THP-1 macrophages will be differentiated in the presence of zinc and vitamin D together and then stimulated with LPS. Cytokine responses will be measured by ELISA.

3:45-4:30    Board 23
Sarah E. Eugenio
Tanner J. Deegan
Savanna L. Lamas
Jovan J. Ortiz
Kimberly Berman (Faculty Sponsor)
Department of Biology, Westfield State University
The Effects of Garlic Extract on THP-1 Macrophages and Cytokine Release

Allicin is a compound found in garlic that is activated when garlic is crushed or minced. It is known as a homeopathic compound that possesses anti-inflammatory properties. Garlic supplements are often taken to help various health issues ranging from heart disease to cancer. Previous work has shown the biological effects of different types of garlic. These previous studies have shown garlic to have antioxidant properties. Clinical studies have shown that taking a daily supplement of garlic can lower cholesterol. Macrophages are immune cells that are responsible for producing inflammatory cytokines such as TNF in response to pathogens and their related molecules. In this study, we analyzed the effects of garlic extract on cytokine release from human-derived macrophages. THP-1 macrophages were exposed with increasing concentrations of garlic extract, and then stimulated with LPS for six hours. Cytokine release was tested by ELISA.
Quercetin is a dietary flavonoid, found in many fruits and vegetables, that exhibits anti-inflammatory properties. Quercetin has been observed to weaken inflammatory responses to microbial molecules in vitro in mouse macrophages. Macrophages are white blood cells essential to the innate immune response. Macrophages are phagocytic and they serve as antigen-presenting cells that activate lymphocytes, they also produce cytokines, such as TNF and IL-1 during an immune response. To further test quercetin's ability to influence bacterial infection of phagocytic cells, human derived THP-1 macrophages will be infected with *Salmonella bongori* and will then be treated with different concentrations of quercetin. Bacterial infection and cytokines release of the THP-1 macrophages will be observed through an ELISA.

Sixty-six *Vanessa cardui* (painted lady) butterfly larvae were separated into cool, warm and room temperature treatments. Weight (g) and length (cm) of the larvae were obtained once a week, and behaviors were observed twice a week. It was hypothesized that larvae would grow faster and larger at higher temperatures. It was predicted that larvae kept in warmer temperatures would spend more time moving around. The original hypothesis was accepted as the warmer temperature larvae were significantly larger than larvae in the other treatments (Figure 2, ANOVA; F=3.995, DF=2, p-value=.011). Warmer temperature larvae pupated and emerged significantly faster than the other larvae (Figure 4, ANOVA; F= 66.5, DF= 2, p-value= 6.75x10^-15), (Figure 4, ANOVA; F= 38.4, DF= 2, p-value= 1.00x10^-10). However, there was no significant difference in time spent resting or time spent moving among larvae in the three treatments (Figure 7, ANOVA; F= 0.972, DF=2, p-value= 0.1908), (Figure 8, ANOVA; F= 0.972, DF= 2, p-value= 0.1908).
Harvester ants play a critical role in the environment. This study compared harvester ant foraging preference among four types of food (fennel seeds, raisins, jelly beans, and grapes). The hypothesis tested was that the ants would choose fennel seeds over the other food types due to their size. It was found that the ants had a significantly high foraging preference for the grapes than the other food types. After grapes, jelly beans were the next preferred food, then raisins. Fennel seeds were the least preferred food type.

The chemical mechanism in which alcohol gets people drunk isn't fully understood. The purpose of this study was to see if a social environment would affect the way alcohol induces behavioral changes in crayfish. Crayfish were used because they respond to similar concentrations of substances as humans. Also, their nerve cells respond analogously to humans when exposed to similar chemicals. The hypothesis tested was that crayfish in a social environment would respond faster to the effects of alcohol than isolated ones. This is because the group environment would lower their inhibitions and trigger a nerve response that would cause their nerve cells to be more susceptible to the effects of alcohol.

This hypothesis was tested by setting up isolation and community trial tanks. The same amount of alcohol was added to each tank. Community and Isolation tanks that were exposed to...
alcohol were also set up to act as a control. Times of abnormal behavior were monitored with a stopwatch and recorded until crayfish reached the “final” supine position.

According to our results, community crayfish responded almost twice as fast to alcohol compared to isolated ones. In conclusion, social environments suggest to have an impact on the effect of alcohol on the brain.

3:45-4:30 Board 51
Omer Gabriel
Reena Randhir (Faculty Sponsor)
Department of Biology, Springfield Technical Community College
Urban Food Sustainability through Community Gardens

With increase in urbanization in many regions, urban poverty and food insecurity continue to be a major problem. This is exacerbated by rising food prices, growing dependence on food imports, and climate change. There is a need for new approaches to tackle this problem. Urban gardening through community participation is gaining recognition to supply local communities with fresh, healthy, and low-cost produce. Such local food systems can improve availability of nutrient-rich and high quality food, but also have a direct impact on public health. We review literature and case studies on urban gardens and evaluate impacts of these practices on food sustainability. Some of the criteria used in evaluation are economic benefits, low environmental impacts, and increased social activities that increase food sustainability in cities and urbanizing areas. Specific case studies in major cities of the USA show that urban gardening is a viable option; in increasing the variety of food types, participation by communities can grow in their neighborhoods, support ethnic crops, and also enhance knowledge about soil and plants among urban communities, especially among children and youth. We observe that urban gardens could be developed in abandoned lots, reclaimed old parking lots, backyards, and in restored common areas. Some challenges include community participation, availability of land, initial cost of investment, poor soils, and water availability to sustain such gardens. We propose that carefully planned gardens that are community-initiated can succeed with government support through incentives. Urban gardens can be a part of an overall food strategy to complement rural food production.

3:45-4:30 Board 55
Edgar Kalinda
Steven Cok (Faculty Sponsor)
Department of Chemistry and Food Science, Framingham State University
Measuring the Effect of Phenolic Compounds in Green Tea on Sirtuin-1 Gene Expression in C. elegans using a Green Fluorescent Protein (GFP) Reporter Gene

Measuring the effect of phenolic compounds in green tea on Sirtuin-1 gene expression in C. elegans using a Green Fluorescent Protein (GFP) reporter gene.
Type II diabetes mellitus is the most common type of diabetes that is characterized by chronic hyperglycemia. The catechins found within green tea have been associated with various biological activities that improve cellular lipid, protein breakdown, and antioxidation. Long-term consumption has been found to be beneficial for the reduction of inflammation in various diseases, including type II diabetes. Sirtuin-1 is a gene that is associated with changes in the rate of metabolic functions and regulation of insulin secretion. Regulating the Sirtuin-1 gene may lead to decreases in the inflammatory signaling pathways attributed to consumption of catechins found in green tea. This study uses C. elegans as a model organism to test whether phenolic compounds isolated from green tea can regulate the expression of the Sirtuin-1 gene. Strains of C. elegans containing green fluorescent protein (GFP) under the control of the Sirtuin-1 promoter were fed varying concentrations of green tea extracts and measured for total fluorescence. Changes in fluorescence are correlated to changes in Sirtuin-1 expression. Observed changes in the level of fluorescence suggest that catechins within green tea can increase the expression of Sirtuin-1. Further research is needed to fully understand how Sirtuin-1 expression can be included in the prediction of gene expression in humans.

3:45-4:30 Board 57
Rachel Joy Begley
Timothy O. Randhir (Faculty Sponsor)
Department of Environmental Conservation, Springfield Technical Community College
Economic and Environmental Impacts of Droughts

Drought can cause devastating impacts worldwide on the environment, economy, and society. During times of drought, vegetation is visibly dry, stream and river flows decline, water levels in lakes and reservoirs fall, and the depth to water in wells increases. As drought persists, longer-term impacts can emerge, such as land subsidence, and damage to ecosystems. There is a need for understanding the nature and impacts of drought. This is the focus of this study. General objectives of this study are to assess the nature and impacts of droughts. It is hypothesized that human efforts to control and mitigate the impacts of drought have produced positive results in California. A case study approach is used to research into nature and impacts of drought using recent drought in California. Data from government studies and reports is used. Impacts are evaluated using other studies on drought. Temperature and precipitation are major factors contributing to the drought in California. The drought in California had a significant impact on tree populations, which rapidly declined. The California Drought was at its peak during the years 2012–15 period, which was the driest in at least 1200 years. Causing a major impact on the Californian environment, ecosystem, agriculture, soil quality, and natural resources. The total economic loss of $2.2 billion in crop revenue, livestock and dairy revenue, additional pumping cost, surface water reduction and net water shortage. Since drought is a reoccurring feature of California’s climate, drought preparedness and mitigation are key. Some approaches to mitigate drought are planting trees, conservation, emission control, landscaping and irrigation.
Urban Restoration through Best Management Practices

Increasing urbanization has become a major problem on ecosystems and cities. Increased impervious surface leads to high storm-water runoff, polluted water that eventually finds its way into rivers and streams. Urban Restoration aims to bring back the structure and function of ecosystems to an earlier, better state. This study aims to assess the impact of BMPs in mitigating the loss of ecosystem services in urban ecosystems.

The study area is in the STCC Campus. The baseline conditions are first mapped using land cover to evaluate restoration needs. BMPs included rain gardens and rooftop gardens using the design of these structures. Runoff is estimated and used to assess the benefits of best management practices. This research was able to look through a multitude of different design options for BMPs that could very easily and viably fit into the previously mentioned areas. Rooftop gardens are a great way to make use of otherwise unused and barren space, giving an opportunity to reduce runoff and bring more ecological diversity to the campus without using the small remaining space left on the campus itself. Not only does it bring more plants onto the campus, but it also offers a stunning space where students and faculty could have lunch, study, or socialize while being surrounded by beautiful scenery. Better rain gardens will lower cost in the long run on landscaping and sidewalk while slowing the pooling of water on walkways and sidewalks.

Crocc2 - A Prospective Window into Vertebrate Craniofacial Morphogenesis

Researchers are constantly discovering new complexities in how genotypes are translated to phenotype over development, with implications for both adaptation and disease. In particular, a more robust understanding of how genetics influence craniofacial development will enable researchers and clinicians alike to better predict and treat various human birth defects. The ciliary rootlet coiled-coil 2 (crocc2) gene encodes a protein which is implicated in the structural integrity of the ciliary rootlet. While the cilia itself is known to play critical roles in craniofacial development, the rootlet itself is an understudied component of this organelle. Here, we explore the role of crocc2 on cartilage patterning, development, and homeostasis in the zebrafish (Danio rerio). We also examine the expression of crocc2 over development via rtPCR. Ultimately, our results help establish a foundation for understanding the role of ciliary rootlets in vertebrate craniofacial morphogenesis.
4:45-5:30    Board 24
Lily Coppinger
Lynn S. Adler (Faculty Sponsor)
Department of Biology, UMass Amherst
A Study on the Role of Fatty Acids in the Medicinal Properties of Sunflower Pollen When Administered to Bombus impatiens Infected with Crithidia bombi

Bumble bees are important pollinators that play a significant role in both temperate and cool climates across the world (Schmid-Hempel et al. 2018). Unfortunately, it is no secret that some bumble bee species are currently declining, with one main cause being parasites. In this study, the common eastern bumble bee, Bombus impatiens, was infected with the intestinal parasite Crithidia bombi. Past research has shown that B. impatiens infected with C. bombi that are then fed sunflower pollen have reduced loads of parasites after a week-long treatment period compared to infected bees that are fed other pollen types. Sunflower pollen is high in fatty acids, which is why this is proposed to potentially be the factor behind its observed medicinal properties. Five fatty acids (lauric, caprylic, decanoic, linoleic, and palmitic) were isolated and mixed with buckwheat pollen, then fed to B. impatiens in this experiment to determine which, if any, fatty acids or fatty acid combinations are responsible for fighting off C. bombi in B. impatiens.

4:45-5:30    Board 51
Meagan Llewellyn
Robin Elaine White (Faculty Sponsor)
Department of Biology, Westfield State University
Modeling a Ketogenic Diet Using Cell Culture: The Effects of Ketone Body Beta-hydroxybutyrate on Neuronal Cells

A ketogenic diet is a diet high in fat and low in carbohydrates. This study analyzed how a ketogenic diet affects neuronal cells. Specifically, we examined how the ketone body most predominantly found in the brain, beta-hydroxybutyrate, affects the survival and differentiation of Neuro-2A cells. Neuro-2a cells are a commonly used neuronal model due to their capacity to differentiate into mature neuronal cells. It is important to examine if these cells are developing differently when on a ketogenic diet because it could be harmful for women to be on it while pregnant. If significant differences are observed at a cellular level than a fetus’s neuronal cells could also be developing differently. Previous studies in pregnant mice on a ketogenic diet have shown changes to the fetal brain, but cellular changes have not been examined. Cell culture was used to mimic the ketogenic diet, with regular and no glucose diets being tested as well to examine the differences in cell count and differentiation. There was a control media, no glucose media, and two medias containing different concentrations of beta-hydroxybutyrate (1mM and 5mM). Cell count was measured by counting cells in ImageJ, and differentiation was evaluated by measuring processes length of the cells. Our results showed a statistically significant higher cell count in the control group than with the different diets, but no significant differences in differentiation. Future research could include investigating the cause of the significant differences in cell count, looking at whether it is due to cell death or proliferation.
**4:45-5:30    Board 59**  

Katherine Jane Moffat  
Joseph S. Elkinton (Faculty Sponsor)  
Department of Environmental Conservation, UMass Amherst  

**Effects of Inquilines on Zapatella davisae Larvae Mortality in the North East**

The black oak gall wasp, Zapatella davisae, has been damaging and killing black oak trees in Long Island, Nantucket, Cape Cod, and Martha’s Vineyard. These galls, which are produced to feed and protect the larvae, can also be infiltrated by other insects which can kill the developing larvae of the black oak gall wasps. The two main types of insects that have been found to potentially kill the larvae are parasitoids -- insects whose larvae consume the black oak gall wasp larvae -- and inquilines -- insects related to gall wasps, but cannot form galls themselves. Previous work has shown that there is a diversity of parasitoids associated with Z. davisae, however; little is known about the inquilines. Therefore, I used non-invasive DNA extractions, PCR amplification, and DNA sequence analysis to provide preliminary identifications for inquiline samples. I then compared these results to the morphological identification of the samples. I found evidence of at least three species of inquilines associated with Z. davisae, as well as a second species of potential gall former. Analyzing records of percent parasitism and the presence of inquilines at each location, I found that the percent inquilnilism was lowest on Nantucket. This location also has the highest reported densities of Z. davisase, suggesting that inquilines might play an important role in regulating populations of Z. davisae in the Northeast. Through this work, we hope to gain knowledge on what inquilines invade black oak gall wasps’ galls and have been killing the larvae in the process.

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**4:45-5:30    Board 60**  

Robert Allen Daly  
Joseph S. Elkinton (Faculty Sponsor)  
Department of Environmental Conservation, UMass Amherst  

**Winter Moth Multilocus Phylogenetic Analyses**

The invasive species winter moth, Operophtera brumata, has been introduced to several locations in the United States and has caused serious damage to native trees. A recent introduction to the northeastern United States has caused serious economic damage to apple, cranberry, and blueberry crops. While winter moth is an important pest in Europe (it’s native range), little is known about its relationship to other species of Operophtera. Therefore, our goal is to use phylogenetic analysis to reconstruct the historical relationships of species of Operophtera. Using a global sample of Operophtera moths, we have used standard PCR amplification to sequence fragments of three nuclear (28S, EF1α, and Wingless) and one mitochondrial locus (COI) from 39 different specimens from seven putative species. Two of these loci (COI and Wingless) support the classification of collected samples into their respective species groups, while two other loci (28S and EF1α) are less definitive. We are currently exploring multilocus species delimitation techniques clarify the species diversity of Operophtera moths. Our results also indicate that winter moth is more closely related to Asian
species of Operophtera than it is to European species, suggesting that it might have been introduced to Europe prior to its introductions to North America. We also find that a North American species, Bruce spanworm, that has previously been described as two separate species, is in fact a single species with two distinct subspecies.

4:45-5:30 Board 61
Jordan E. Dermody
Belinda Boateng
Rebecca Hoynoski
Karlyn Stevens
Kimberly Berman (Faculty Sponsor)
Department of Biology, Westfield State University
The Effect of THC on the Response of Differentiated THP-1 Macrophages

*trans* Δ⁹-tetrahydrocannabinol (THC) is the main psychoactive ingredient of cannabis. This cannabinoid interacts with the CB₂ receptor that is expressed on peripheral cells of the immune system, which could suggest an important function in the immune response. The CB₂ receptor is primarily found on white blood cells and aids in the regulation of cytokine release. Recent studies suggest that THC can reduce the inflammatory response to HIV-1 infection in human immune cells *in vitro*. As THC is now commercially available for recreational use, more studies to understand its mechanism of action on different cell types would aid in understanding its effect on specific cell types. Macrophages are immune cells that are necessary for the recognition and response to foreign pathogens and their related molecules; therefore, by analyzing the cytokine release a reduced response should occur. The purpose of this study was to evaluate the overall inflammatory response produced by THC on THP-1 differentiated macrophages, which were treated with lipopolysaccharide (LPS) to stimulate cytokine release.

4:45-5:30 Board 62
Chelsea Lynn Budd
Taryn Elizabeth Carr
Rachel Elizabeth Dunphy
Jonathan Lafrenaye
Kimberly Berman (Faculty Sponsor)
Department of Biology, Westfield State University
The Effects of Cannabidiol on TNF and IL-1 Production in THP-1 Macrophages

Cannabinoids have been shown to exert anti-inflammatory responses and activities both in vivo and in vitro. Cannabidiol (CBD) is the main biologically active cannabinoid compound derived from the hemp plant, the male form of Cannabis sativa. The effects of CBD on the endocannabinoid system, which is composed of various CB1 and CB2 receptors located throughout the body, is the focus of our research. Although, CBD does not bind directly to CB1 or CB2, but instead acts on the endocannabinoid system indirectly by binding to various ion channels such as TRPV1 which can exhibit anti-inflammatory properties.
Previous studies have tested different concentrations of CBD in stimulated LPS microglial cells and observed anti-inflammatory properties. The optimal amount to treat the stimulated cells was 10μM CBD. This concentration of CBD resulted in a decrease of cytokine release.

The goal of this study is to test the potential anti-inflammatory properties of CBD on THP-1 macrophages. THP-1 macrophages will be used to create an inflammatory response and then will be treated with: 5μM, 10μM, 25μM, and 50μM CBD. Cells will then be stimulated with LPS or mock treated. After exposing the macrophages to the varying concentrations of CBD we will compare the inflammatory responses of macrophages by measuring the levels of TNF and IL-1β produced by the cells. The levels of TNF and IL-1β will be quantified using an ELISA.

4:45-5:30 Board 63
Courtney Capitan
Melita Gavel
Kimberly Berman (Faculty Sponsor)
Department of Biology, Westfield State University
Effect of Cortisol on TNF Release from THP-1 Cells Grown in Hyperglycemic Conditions

Cortisol is a hormone produced in response to stress; cortisol in circulation plays a role in bodily processes from inflammation to obesity. Several studies have shown that cortisol has an inhibitory effect on the production of pro-inflammatory cytokines. However, it has also been shown that cortisol can increase the amount of glucose in circulation and even contribute to hyperglycemia. In previous studies, macrophages grown in high-glucose conditions have been shown to release higher levels of the inflammatory cytokine TNF. Concluding that in hyperglycemic conditions macrophages are exposed to high levels of glucose and cortisol, thus receiving both pro- and anti-inflammatory signals. The effect of simultaneous exposure to both cortisol and hyperglycemia is not known. In this study we investigated the role of cortisol on the inflammatory response of THP-1 macrophages grown under hyperglycemic conditions.

4:45-5:30 Board 64
Emily Lynne Loughman
Kimberly Berman (Faculty Sponsor)
Department of Biology, Westfield State University
Effect of Quercetin on Pro-inflammatory Cytokine Release, Cellular Activity, and Cellular Viability in Human-Derived Macrophages

Quercetin is a flavonoid found in various fruits, vegetables, and herbs. Like many flavonoids and polyphenols, quercetin acts like an antioxidant with anti-inflammatory and anti-allergy properties on multiple immune cell types. In bone marrow-derived macrophages, treatment of quercetin resulted in significantly decreased cytokine release. Quercetin-treated macrophages primed with LPS and then treated with ATP, Nigericin, or Alum released significantly less IL-1β than untreated cells; though TNF levels were not affected. The goal of this study was to quantify the in vitro effects of quercetin treatment of human-derived macrophages on TNF and IL-1β release.
Macrophages were stimulated with LPS in the presence or absence quercetin and cytokine release was tested by ELISA. Few studies have evaluated the toxicity of quercetin on cells in vitro. Therefore, this study will also investigate the possible toxicity of quercetin in our cell line, THP-1. Cells were grown in the presence or absence of quercetin at a range of concentrations. Cell death was assayed by Propidium Iodide (PI)/Hoescht stain and viewed by fluorescent microscopy. Based on past research, quercetin may be used as a treatment for IL-1 mediated inflammatory conditions by altering the signals that stimulate the inflammatory process. IL-1 mediated conditions include Kawasaki disease, Type II diabetes and gout.

4:45-5:30 Board 65
Cephas Yaw Owusu
Cassidy Love Collazo
Jiancarlo Montanez
Henry Dongha Seo
Kimberly Berman (Faculty Sponsor)
Department of Biology, Westfield State University
Effect of Vitamin C and Thiamine on Macrophages

Macrophages are white blood cells which are important in an immune response. They are essential to the innate immune system because they provide the first line of defense against microorganisms. In vitro, Vitamin C has been shown to enhance the effector function of macrophages by supporting various cellular functions of the innate and adaptive immune response. Thiamine is a vitamin of the B complex that supports the immune system by strengthening the body’s ability to withstand stress. It has a crucial role in metabolic reactions as it works in the form of a co-enzyme in reactions that produce energy in our bodies. In recent clinical studies, patients with bacterial sepsis were treated with a combination of vitamin c and thiamine and had a significantly improved survival rate. This study tested the effects of vitamin C and thiamine on macrophage function. Macrophages were pretreated for 24 hours with the combination of vitamin C and thiamine and then stimulated with LPS. Cytokines release was quantified by ELISA.

4:45-5:30 Board 66
Alena Naritsin
Lillian Fritz-Laylin (Faculty Sponsor)
Department of Biology, UMass Amherst
Collagen Fibril Movement Correlates with Dynamic Actin Intensity in Migrating Neutrophils

Neutrophils crawl through their environment through cycles of extension and retraction that deform the cell body by producing actin-filled pseudopods at the leading edge of the cell. This study tested if dynamic actin networks of migrating neutrophils can move their external environment. We used lattice light-sheet microscopy to image twenty neutrophils migrating through an external collagen matrix. We collected raw data to analyze and render using UCSF Chimera, UCSF ChimeraX, and ImageJ, and selected six cells to further analyze that demonstrated great movement, bright actin rings, and/or interaction with collagen fibrils.
tracked collagen movement, averaged distances between fibrils, and calculated velocities. To see its correlation with fibril movement, we compared the velocities to the cells’ actin intensity. Our analysis showed that collagen fibril movement correlates with neutrophils’ dynamic actin. We interpret this to mean that while moving through the matrix, neutrophils push fibrils from their native positions until they reach their threshold and slow movement. When the cell migrates to a new area, the fibrils snap back to their original location with high movement. Cells inhibited with CK666, an actin assembly inhibitor, experienced very little fibril movement, which is similar to fibril movement in areas of the collagen matrix that do not interact with the neutrophil. Collagen fibril movement correlates with dynamic actin in migrating neutrophils. As the actin intensity increases, the fibril movement decreases. We interpret this as the cell’s surface interacting with fibrils in the collagen matrix, pushing or pulling them out of the way when needed.

4:45-5:30  Board 67
Sarah Marie Prostak
Lillian Fritz-Laylin (Faculty Sponsor)
Department of Biology, UMass Amherst
Identification and Inhibition of Actin Nucleators Arp2/3 and Formins in the Chytrid Fungus Batrachochytrium dendrobatidis

The chytrid fungus Batrachochytrium dendrobatidis (Bd) causes a deadly skin infection in frogs and other amphibians, but the mechanism of infection remains unclear. Our previous work shows that Bd has the ability to move across surfaces using branched-actin-filled pseudopods. This movement may be important in infection. Actin networks are polymerized through two major pathways: Arp2/3, which creates branched polymer networks; and the formins, which create unbranched polymer networks. These two pathways are thought to interact to form many structures, including pseudopods. To understand cell movement and formation of pseudopods and other actin structures in Bd, we used BLAST searches to identify Arp2/3 complex and formin homologs in various chytrid fungal species. Additionally, we used small molecule inhibitors SMIFH2 and CK666 to begin to unravel the functional role of formins and Arp2/3 in Bd. We found several formin proteins in each chytrid species with a variety of domain architectures and a complex phylogenetic relationship. We also show that inhibiting Arp2/3 or formin proteins does not significantly reduce the number of pseudopods compared to control cells, suggesting two protein families do not play large roles in pseudopod formation in Bd. However, inhibition of Arp2/3 significantly decreased formation of actin patches. Further studies of the molecular pathways of actin structure formation in Bd need to be done to fully understand these processes.
CHEMICAL ENGINEERING

Room 808    8:30-9:15    Panel 1
Natasha Bitar
Jungwoo Lee (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Developing an In Vitro Subchondral Bone Interface Model to Mimic the Disease Progression of Osteoarthritis

Osteoarthritis is an age-related degenerative disease affecting 27 million Americans. While local inflammation and increased bone resorption activity have been identified as common pathological features, the detailed mechanism of disease progression remains uncertain and currently, no cure exists. A model demonstrating the disease progression is imperative to understand the mechanism and to exploit therapeutic strategies. Natural cartilage extracellular matrix (ECM) functions as a favorable substrate for hydroxyapatite mineral deposition via osteoblasts, which can occur after cartilage is vascularized following osteochondral defects and lesions during which subchondral osteoblasts are introduced. We hypothesize that articular cartilage ECM is mineralized by osteoblasts introduced post-vascularization and becomes a target for osteoclast-mediated degradation.

We have developed a novel biomaterial using a bone paper and cartilage paper processing technique that retains intrinsic biochemical and biophysical complexity of the bone and cartilage interface while allowing optical observation of cellular processes using genetically labeled mouse primary mesenchymal stem cells (MSCs). By introducing MSCs isolated from mouse bone, we have reconstructed the bone interface and demonstrated the mineralization process. These cells are cultured on cartilage paper to induce chondrocyte-like phenotypes. By stacking these two types of biomaterials with cells, we have reconstructed bone-cartilage interface. We expect that bone-forming osteoblast activity will be significantly lower in cartilage and mineral deposition activity will decrease, and that the mineral deposition on cartilage paper will be proportional to the calcium and phosphate content in the media. These results would indicate our in vitro model can simulate vascular penetration into the cartilage matrix and subsequent mineralization process. We further introduce bone-resorbing osteoclasts to demonstrate reduction of cartilage mass. We envision this can serve as a valuable model for understanding how osteoarthritis progression and cartilage loss occurs.

Room 808    8:30-9:15    Panel 1
Matthew Fernez
Jungwoo Lee (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Alginate-Mucin Biopolymer Microcapsules for Intestinal Tissue Engineering

Fundamental biological transport takes place along the gastrointestinal (GI) tract. Nutrients diffuse outwards while waste exits, and these processes are highly tied to the complicated microenvironment consisting of bacterial colonies separated from the mammalian cells by the mucus layer. The dynamic behavior of this membrane is responsive to chemical stimuli: ion concentration and pH. Mucin behaves like a hydrogel, becoming more gelatinous in higher ion concentrations and pHs outside of physiological range. While this functionality is important, it
can also become dangerous, as the gelation creates pores for bacterial penetration. This is often the case in many disease states. It would be useful to have a model of this disease state for biological study. Interactions between aerobic and anaerobic cells are not well understood; co-culture of these organisms has proven rigorous. We sought to model the mucus layer through encapsulation of human epithelial cells in microparticles to study these interactions. The structural properties of ordinary mucin do not provide enough support for encapsulation. Alginate, however, is a more sturdy natural hydrogel that's proven to have biomedical capabilities. By blending alginate and mucin into a single biopolymer, it was rationalized that this disease state could be recapitulated in a core-shell structure. This work characterizes this innovative biopolymer of different compositions by studying diffusion and tensile strength. The compositions were then optimized, and core-shell droplets were made with cell media using a centered-flow microfluidic device. Here, we characterize the core-shell structures and assess their encapsulation and modeling capabilities.

Room 808  8:30-9:15  Panel 1
Grace Sooyun Yi
Jungwoo Lee (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Bone Marrow Microfluidic Chip to Study Breast Cancer Metastasis

The bone marrow is the prime site for cancer metastasis. Many circulating tumor cells shed from a primary tumor end up metastasizing to the bone marrow. However, more often than not, these cells do not immediately continue their growth in their new microenvironment and stay dormant for years or decades instead. The high frequency of tumor cell dissemination and unpredictable dormancy have been critically challenging to manage cancer survivors from metastatic relapse. One difficulty in studying the interplay between cancer cells and bone tissues is their relative inaccessibility in vivo. Here we describe a bone marrow-on-a-chip model that represents the bone marrow and associated vascular components using a compartmentalized microfluidic chamber separated by a porous membrane. Inside of the bone marrow chamber, we inserted a demineralized trabecular bone matrix to capture the microarchitecture and microphysiology of the bone marrow niche. This chamber was subsequently repopulated with osteoblasts to form mineralized ectopic bone tissue. A microporous membrane with 10-micrometer hexagonal pores was fabricated and subsequently seeded with human endothelial cells to recapitulate the interface between the bone marrow and sinusoid blood vessels in the body. Human breast cancer cells were introduced, where a few were observed to stick and migrate to the bone marrow chamber and was observed using confocal microscopy. Our current study includes modulating bone marrow cellular activity by introducing vitamin D that stimulates osteoblast and osteoclast activity under the hypothesis that increased bone remodeling activity will increase the attraction of circulating tumor cells.
Presentation Details

10:45-11:30 Board 44
Chee Meng Eugene Cheong
Jungwoo Lee (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Fabrication and Application of Demineralized Bone Sheets to Create Accurate Bone Microenvironment

Hidden within the dense and opaque structure of the bone, osteocytes form an extensive network of cellular processes throughout the entire bone, much like the neuronal network in the brain. These cells are primary mechanosensory cells in the body and play a central role in mechanical homeostasis and adaptation process of bone tissues. Despite indisputable physiological importance, osteocytes remain the most poorly understood cell types in the bone tissue.

Currently, osteocytes are studied in vitro without much consideration for the bone microenvironment. One important consideration in recapitulating osteocytes biology outside of the body is the in situ anatomical location and surrounding biomaterials environments. Osteocytes reside beneath the bone surface while sandwiching between lamellar bone, thus creating a nutrient and oxygen gradient within the bone structure.

In this study, bovine femur bone was demineralized in hydrochloric acid and freeze sectioned into thin sheets. These sheets can then be modified using a plot cutter, cutting the bone sheets into specific shapes allowing the bone sheets to be linked together to create a long strip. By creating a long strip of demineralized bone paper and seed cells and rolling, we recreate anatomical, cells and tissue complexity. In addition, this approach allows controlling the thickness of bone models as a function of the length of the strip.

We envision that a rolled strip of demineralized bone paper with osteogenic progenitors will be a promising route to recreate bone tissue complexity and function, which can serve as a valuable tool to understand bone tissue biology.

10:45-11:30 Board 45
Jun-Goo Kwak
Jungwoo Lee (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Thermosensitive Inverted Colloidal Crystal Hydrogel Scaffolds for the Biomanufacturing of Hematopoietic Cells

Ex vivo manipulation and expansion of hematopoietic cells (HSC) are important bioengineering goals to realize the promising potential of blood cell-based therapeutics in the clinic. For example, (i) T-cell expansion for cancer immunotherapy, (ii) memory B-cell expansion for antibody production, (iii) HSC expansion for bone marrow transplantation, (iv) red blood cells for transfusion, and (v) platelets derived from megakaryocytes have been already been demonstrated to show utility and success within the clinic. Inverted colloidal crystal (ICC), a class of porous biomaterials which enable unprecedented control at the micron scale, capitalize on the unique spatial organization and structure of lattices made from monodispersed microspheres. ICC scaffolds are isotropic, fully interconnected spherical pore cavities made with hydrogel matrix that closely represents lymphoid tissue architecture and physical
properties. Here we report the development of a thermosensitive ICC hydrogel scaffold that can facilitate HSC and HSC progenitor cell manufacturing. By employing recently introduced nanogel based chemistry, we have developed ICC hydrogel scaffolds that undergo rapid (<20 min) and substantial (>20-fold) volume change in the physiological temperature range of cells. Without surface functionalization, bone nodules of defined diameter were engineered to be geometrically entrapped during the cell retrieval process by exploiting the unique cavity geometry of the scaffolds. Notably, significant number of model hematopoietic cells (Nalm-6) adhered on the surface of the bone nodules even after floating cell retrieval. Resultantly our ex vivo culture system demonstrated the sustained expansion of floating cells. We envision this model system can be used to enable for HSC expansion.

10:45-11:30   Board 66
Andrew Mark Sarkis
Jungwoo Lee (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
3-D Modeling of the Demineralized Bone Matrix with Biomaterials: A Potential Bioink

Recent studies in tissue engineering have developed viable methods for 3D printing complex living tissues with biomaterials. 3D printing using natural biomaterials allows opportunity to create customized and better functional tissue analogs for studying basic biology and clinical application. Current 3D printing with living cells typically uses polymer-based bioinks that only allow for cells to bind to the surface. One proven biomaterial that has been widely used in the clinic is the demineralized bone matrix (DBM) that retains osteoinductivity and can fit into the various shape of bone defects. This study focuses on whether 3D printing of the DBM with natural biomaterials is a viable option. Demineralized bone has been successfully ground into fine fragments, and the size classification for the DBM particles by weight distribution is approximately 63% > 500 microns (in diameter), 3.9% 425-500 microns, 0.93% 300-425 microns, 0.37% 212-300 microns, and 1.8% 75-212 microns. The remainder that was < 75 microns or lost during product acquisition was approximately 30% of the initial mass. Our current study involves using collagen as a binding material to build free-standing 3D geometry of demineralized bone tissues in the culture media. Alternatively, we will also intend to use osteoblasts as a cellular binding component to build a 3D structure. Our proof of concept study will serve as a foundation to move forward 3D printing bone using demineralized bone powder, which is expected to make a significant contribution to the clinical bone engraftment.

10:45-11:30   Board 67
Julia Singh
Jungwoo Lee (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Layering of Perforated Demineralized Bone Paper to Improve Cellular Communication

The study of bone can help give insight into curing diseases such as osteoarthritis and osteoporosis. However, bone is extremely dense, making it difficult to study in vivo. Additionally, studying osteoprogenitor and bone marrow stromal cells in a culture flask does not mimic the environment found inside the body. Consequently, bone paper can be used to seed cells onto
and observe the behavior of osteoprogenitor and bone marrow stromal cells more accurately. Stacking demineralized bone paper has demonstrated promising results to recapitulate cellular and extracellular complexities of the lamellar bone tissue. However, demineralized cortical bone has limited interaction between bone cells in each lamella layer. In this study, we studied an alternative method to overcome this limited cellular communication issue by creating microscale pores which provide a large area through which osteoblasts can communicate with each other.

Small holes of three different diameters will be punched into a cortical bone paper to mimic Haversian canals in cancellous bone. A demineralized bone paper was cut to create 20-micrometer pieces. Three different sized needles will be used to punch holes into bone paper to determine how pore size impacts cell differentiation and communication between layers. 25 holes will be punched into each sheet of bone paper, and four sheets of bone paper will be layered in each well of a 12-well plate. A connection of cellular processes will be observed and be compared to that of bone paper without pores. We envision that this work will provide insight on how to cause osteocytes within the lamellar bone to communicate with each other.

10:45-11:30    Board 68
Gintaras Paradie
Jungwoo Lee (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Stacking Patterned Demineralized Bone Paper for Bone Tissue Engineering

It is often difficult to find a suitable replacement for human bone grafts which is needed to repair injury or orthopedic defects. The current gold standard is autologous bone graft but this is a painful and time consuming procedure. Alternatively, various biomaterials and tissue-engineering strategies have been exploited to meet the ever-increasing need for bone grafts. One attractive biomaterial is demineralized bone matrix which retains essential growth factors for osteoinductivity with high processability. The demineralized bone matrix, however, does not appropriately mimic the lamellar structure of vascularized bone that is critical to provide necessary mechanical strength. To overcome this issue, our lab has developed a new method to process demineralized bone into 20-um thick slices that emulate an individual lamellar bone. This biomaterial is called "demineralized bone paper (DBP)". We have developed a technique to trim DBP by applying easily removable and water-soluble polyvinylalcohol (PVA). PVA reinforced DBP can be processed using a conventional plot cutting machine to pattern 1 to 1.5 mm perforations with 2 mm separation to facilitate medium perfusion, mitigation of the diffusion limit, and alignment for multilayer stacking. After trimming, the PVA will be removed with warm sterile water and each DBP can be seeded with osteoblasts. A total of 250 pieces will be stacked to produce the final thickness of 5mm. This process is scalable and reproducible and may allow for quick creation of clinically viable bone grafts with enhanced cell viability and increased mechanical properties.
Bacterial Cancer Therapy (BCT) uses motile bacteria, Salmonella, to transport the therapeutic product to cancer cells in order to kill or revert them back to the non-cancerous stage. Many experiments have demonstrated intratumoral injection of shRNA specific to the oncogene could suppress tumor cell growth, however, one of the biggest challenges faced by the gene silencing-based therapy is the limitations with active cell membrane crossing of RNAi molecules. However, this problem can be overcome by coupling cancer epigenetics and BCT in a way that allows the therapeutics to effectively cross the barrier with the help of bacteria. The aim of the project is to deliver plasmid encoding shRNA to the cancer cells, where the shRNA would target and degrade the mRNA product of EZH2, an oncogene known to control the activity of tumor suppressor genes in mammalian cells. We hypothesized that effective delivery of EZH2 specific shRNA encoded plasmid via Salmonella would induce MCF7 tumor growth suppression and ultimately reduce tumor cells or revert them back to G1 phase. In order to test our hypotheses we want to track a) intracellular invasion of Salmonella carrying plasmid in tumor cells, b) specificity of tumor colonization by bacteria, and c) the efficacy of plasmid delivery within mammalian cells. The designed experiments provide a novel and deeper insight into the mechanism and actual efficacy of Salmonella-mediated EZH2 specific shRNA delivery into mammalian cancer cells.
clear and precipitated droplets. This device will increase ease of testing, and can help to increase the success in crystallography and expand the breadth of known protein structures and the structure-based advances in therapeutics.

**12:40-1:25 Board 21**
Kavya Ramachandran  
Neil Forbes (Faculty Sponsor)  
Department of Chemical Engineering, UMass Amherst  
**iCons: Replicating a 3-D Tumor Microenvironment via Automation of a High-Throughput Microfluidic Device**

A high throughput microfluidic device has been designed to mimic the three-dimensional tumor microenvironment found in patients and serves as a “lap-on-a-chip” platform for drug diffusion and efficacy tests. It is intended to emulate the delivery mechanism and systemic clearance of chemotherapeutic drugs from blood vessels and tissues as seen in the body. LS174-T tumor spheroids are to be grown in suspension cultures and sorted by size using a spiral microfluidic device that implements inertial focusing. Spheroids of the 500 μm size range are then to be selected and auto-loaded into the tumor chambers of the drug-testing device, the primary purpose of this project. An automation program will enable a hands-free method of reproducibility, where manual injection and placement of the spheroids will be made unnecessary. A computerized system will communicate with the pneumatic valves to open and close appropriately when inserting these spheroids into each chamber, wherein they will be exposed to medium and drug perfusion on one side to create a linear gradient. Time-lapse microscopy will show the presence of a combination of viable, apoptotic, and acidic regions in the packed chamber, in addition to changes in fluorescence seen as Doxorubicin, a fluorescent chemotherapeutic drug, diffuses across the layers of the tumor spheroid and induces cell death. This microfluidic device, a combination of glass and PDMS, is a promising innovation in terms of prospective high-throughput drug efficacy tests, due to its close resemblance to a tumor microenvironment, the accurate drug penetration and diffusional models, and its simple reproducibility.

**12:40-1:25 Board 39**
Aiste Balciunaite  
Maria Santore (Faculty Sponsor)  
Department of Polymer Science and Engineering, UMass Amherst  
**The Effect of Particle Shape on Adhesion to Surfaces in Shear Flow**

The behavior of microparticles in flow and their adhesion to surfaces is a topic of key interest within the medical field, specifically due to the applications for drug delivery. Recent research suggests advantages to using non-spherical particles for targeted drug delivery rather than spherical particles, but little is known about the behavior of non-spherical particles in flow, as a result of the paucity of well-characterized uniform particle systems. This work address the near-surface flow behavior and adhesion of rod-shaped microparticles. Silica rod microparticles with varying aspect ratios but similar diameters were synthesized, and their near-surface flow behavior and adhesion was compared to silica microspheres of comparable hydrodynamic
The microparticles were flowed through a laterally mounted microfluidic device, and electrostatic attractions were exploited to adhere particles to a poly-l-lysine covered glass surface. The surface capture rates of spheres and rods were studied and compared. The Leveque equation was used to model the capture rate of spherical particles as a function of shear rate and size, and extended to rod-shaped microparticles. Preliminary data at a shear rate of 22 s⁻¹ suggests that rod-shaped particles may adhere more efficiently to surfaces than spheres of equivalent volume, and this phenomena is further investigated at a higher, still physiologically relevant, shear rate of 110 s⁻¹. The applicability of the Leveque model for rods is also investigated.

Adoptive cell therapies have become a promising therapy due to their ability to target and kill cancer. However, there are still many limitations in using this type of therapy. For example, these cells can lose their viability over time and will not function properly. Cellular therapies can be improved by coupling them with nanoparticle systems. It is known that many immune cells naturally express surface thiol groups. This surface chemistry can be utilized for therapeutic gain. Specifically, surface thiols can be stably conjugated to maleimide head groups to connect nanoparticles and cells. This linkage forms a stable nanoparticle-immune cell system and allows for the pseudo-autocrine delivery of immunomodulators and drugs. This allows cells to have increased viability over time and better functionality in the immune-suppressive tumor microenvironment.

The nanoparticle system under study consists of a liposome constructed from cholesterol hemisuccinate, L-α-phosphatidylcholine, and maleimide-functionalized DSPE. The maleimide-functionalized DSPE will be used to connect the nanoparticles to the free thiols on immune cells. This system will initially be applied to T cells, since they are known to have high thiol expression levels. The system will also be implemented with NK cells which are less studied. The nanoparticle formulation will be optimized so that each cell type gets a maximal level of nanoparticle loading on its surface.

In breast cancer metastasis, the most common area of tumor formation is the lung parenchyma where the breast cancer cells attach to the extracellular matrix (ECM) through interactions with integrin and other components of the ECM. My research project focuses on breast cancer cells
and the way they influence different cell types in the lungs. I would like to continue to explore the role of human fibroblast cells in the restructuring of the extracellular matrix of the lung allowing for improved breast cancer metastasis to the region. Through the analysis of fibroblast protein production and matrix degradation, I hope to better understand the ways in which breast cancer cells influence fibroblasts to reshape the extracellular matrix to allow for additional growth and migration cancer. Research on this topic in our lab has identified two important proteins that encourage breast cancer growth in fibronectin and collagen-I that improve the ability of breast cancer cells to adhere to the lung parenchyma. My main experimental goal is to quantify the ECM proteins fibronectin and collagen-I produced by human lung fibroblasts when exposed to aggressively metastatic breast cancer conditioned media versus non-aggressively metastatic breast cancer condition media. By looking at the changes from fibroblast in typical fibroblast media versus media conditioned with cancer cells, I hope to see the differences in protein production and matrix composition. From this, I hope to better understand the role changes in fibroblast protein and matrix metalloproteinase production affect breast cancer adhesion and movement through the lung extracellular matrix.

Room 909  1:30-2:15  Panel 5
Armando Carvalho
Friederike C. Jentoft (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Chemoselectivity toward Fission Products in Aldol Reactions

Aldol reactions are carbon-carbon bond forming reactions that occur between two carbonyl compounds. The reactions are used in bulk and fine chemical syntheses; for example, to produce ingredients in the flavor and fragrance industry. There has been recent interest in aldol reactions because of their importance in conversion of biomass to biofuels and chemicals. In aldol condensations, the enolate or enol form of an aldehyde or a ketone serves as a nucleophile and reacts at the α-carbon with another carbonyl compound, and a β-hydroxy carbonyl compound is obtained, which dehydrates to form an enone. The focus of this project is on a largely unknown, competing pathway, in which the intermediate aldol undergoes fission to produce two products in 1:1 stoichiometry. This pathway could be useful to synthesize certain alkenes and carboxylic acids. Chemoselectivity toward the fission products in the acid-catalyzed aldol reaction of benzaldehyde and 3-pentanone was investigated. The acid catalyst was a mesoporous material, propylsulfonic acid-functionalized MCM-41. Reactions were performed in a batch reactor at temperatures between 100 and 180 °C for varying lengths of time in excess 3-pentanone at autogenous pressure. Detected products were the intermediate product, 1-hydroxy-2-methyl-1-phenyl-3-pentanone, the condensation product 2-methyl-1-phenyl-1-penten-3-one, and the fission products propionic acid and β-methylstyrene. The reaction rates obtained at different temperatures were used to construct an Arrhenius plot and calculate activation energies for the two pathways. Activation energies of 86 kJ/mol for the fission reaction, and 35 kJ/mol for the condensation reaction were calculated, implying that higher temperatures should promote fission.
A Novel Platform for Identifying and Quantifying Unique Breast Cancer Cell Phenotypes

Breast cancer occurs when healthy breast epithelial cells begin to grow out of control and form a solid tumor. Breast tumor cells can invade surrounding tissues and spread to other parts of the body, a process called metastasis. Cancer metastasis is the result of migration, affected by both properties of the cell and the surrounding matrix, such as microenvironment stiffness. As cancer progresses, the extracellular matrix (ECM) stiffens, and because of this, cancer cells in the body can experience dramatically different stiffnesses that drive differences in migration and proliferation. By studying breast cancer migration and proliferation, two of the fundamental behaviors of cancer cells, we hope to identify the characteristics associated with ECM stiffnesses that affect when and where the cells will metastasize. To study the effect of stiffness on breast cancer cells a highly metastatic breast cancer cell line was cultured on the surfaces of hydrogels of stiffnesses 1 kPa, 41 kPa, and hard plastic tissue culture surfaces for 17 weeks. Cells cultured on the 3 environments (1 kPa, 41 kPa, or plastic) were each plated onto new surfaces with a different stiffness, and average cell speeds were manually tracked. In order to directly compare the three cultures at varying time points, multiple cell adhesion and motility phenotypes were observed. These phenotypes were cell speed, total distance, displacement, mean squared displacement, chemotactic index, area, and persistence. The sensitivity of each phenotype to changes in ECM was observed and the quantified values of each phenotype were directly compared. Using this data, two heat maps were created to identify unique phenotypes for each culture for the most conditioned cells. The percent similarity between each culture and the most conditioned culture, based on the determined unique phenotypes, was calculated. By observing multiple phenotypes, and their relationship with each other, different time points of culture can be directly and accurately compared. This is a novel platform to discover time points of critical changes in tumor cell development and better understand tumor cell memory.

Developing Genome Engineering Tools for Bacillus subtilis

Microorganisms that inhabit the plant rhizosphere microbiome confer advantageous traits to the plant by interactions through the plant roots by signaling, biosynthesis, and pathogen protection. Some of these beneficial soil bacteria are used in commercial agriculture to improve the crop productivity and/or disease resistance. Bacillus subtilis is one such bacteria that is used widely as a biological crop protectant, and additionally is a model organism and the focus of diverse research in academic and industrial settings. The field of synthetic biology has demonstrated precise reprogramming of bacterial cells, yet relatively few synthetic biology tools exist for soil
bacteria, even for this most commonly studied soil microbe. Therefore, we are interested in developing effective genome engineering tools for *B. subtilis* to advance the field of synthetic biology for soil microbes. Possessing the capability of editing targeted locations of a genome would allow for the control of essential biological processes like the regulation of metabolism and cellular machinery. This research studies undomesticated strains of *B. subtilis* which are environmentally relevant and possess advantageous properties that commonly used domesticated strains do not. From the several research projects that have used *B. subtilis*, one in particular outlines a method to easily manipulate undomesticated strains for strong competency by transiently expressing the competence factor ComK protein using an IPTG inducible promoter and plasmid construct. Thus, in this project we investigated genome engineering in domesticated and undomesticated *B. subtilis* strains and the effects of targeting loci throughout the genome on genome editing efficiency and accuracy.

2:45-3:30  Board 52
Taylor Rene Lewis
Michael Henson (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Computational Modeling of the Pediatric Cystic Fibrosis Lung Microbiome

Cystic fibrosis is a genetic condition that affects mucus production, putting over 30,000 Americans at an elevated risk of infection due to frequent hospitalization and altered lung environment. These infections are difficult to treat due to antibiotic-resistant biofilm formation. Research has shown that the pediatric cystic fibrosis lung microbiome is more diverse than the adult microbiome and that decreasing diversity of the microbiome is strongly associated with disease progression. *In silico* multi-species genome-scale metabolic models are key to investigating and predicting the behavior of microbial species and may be used to gain an understanding of this shift. A multispecies model composed of the five most abundant genera correlated with young patient age has been produced using model species available in Virtual Metabolic Human and optimized for maximum growth of the community using SteadyCom. To obtain a working model, inulin and starch-2 were added to a base list of essential metabolites, such that all five species may grow. The lung is permeable to these oligosaccharides from the bloodstream, so their addition is appropriate. This model can be tuned to represent individual microbiomes based on patient data from Dartmouth Medical School. The selected species cover an average of 56.62% of total reads, ranging from 37.79% to 73.94% coverage for each case. Manual tuning of glucose, L-lactate, inulin, starch-2, oxygen, and nitrate exchanges are used to match cases to individual patient compositions. Then, media randomization simulations are performed to determine exchange parameters that best simulate an individual case.
Complex coacervation is an associative liquid-liquid phase separation phenomenon that has a long history of use in food and personal care products, and which has been the subject of increasing excitement and research in the areas of encapsulation, drug delivery and stabilization, and underwater adhesion. While the rheological behavior of coacervates has been a frequent topic of study, the quantity of material necessary to perform traditional rheological characterization is beyond the reach of many novel and/or biologically-relevant coacervate forming materials. Our method uses a simple, well-plate based method for determining characteristic timescales for coacervate formation and equilibration that can serve as a low-cost proxy for more traditional viscosity measurements. We explored the potential of this new method using a range of different lysine- and glutamate-based polypeptides. We explored the following variables: symmetry, length, patterning of polymers, order of addition and salt. The addition of salt increases equilibrium time while longer chain lengths decrease equilibrium time. For symmetrical polymers, the addition of a positive peptide first resulted in a shift left toward neutrality and the addition of a negative peptide first resulted in a shift right toward neutrality. Comparisons of coacervate made with a homopolymer and patterned polymer illustrate that the difference in equilibrium time are not due to diffusion.

Complex coacervation is an associative liquid-liquid phase separation occurring from the electrostatic complexation of oppositely charged polymers in water. Coacervation has a history of use as a method for encapsulation of many materials including flavors and fragrances. We are looking to use coacervation to encapsulate different biomolecules and eventually vaccines to stabilize and break the cold chain of transportation. Our current efforts utilize Bovine Serum Albumin and Hen Egg White Lysozyme as model proteins with a range of molecular mass and net charge. Samples are prepared by mixing aqueous solutions of postive- and negatively-charged polymers with protein. We then use turbidity, or the amount of light scattered by the sample, to determine whether phase separation occurred. These measurements are paired with independent quantification of protein concentration in both the polymer-rich coacervate phase and the polymer poor supernatant via a colorimetric Bradford Assay. By changing the relative amount of polymers and protein added to the solution, we can investigate how coacervation is affected and understand which formulations maximize protein encapsulation. We will also extend this approach to study how changing the charge on the protein via a change in pH affects protein encapsulation. Through understanding the parameters that affect the encapsulation of model protein, we hope to inform the encapsulation of more complex...
biomolecules, such as vaccines. Ultimately, our goal is to stabilize vaccines within a coacervation phase to allow for enhanced treatment and travel procedures.

Abigail M. Cabral, Shari B. Traiger, Whitney C. Blocher McTigue, Sarah L. Perry

2:45-3:30    Board 55
Hansen Tjo
Sarah L. Perry (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Exploring the Phase Behavior of Polyelectrolyte-Surfactant Systems

In solution, electrostatic complexation may cause oppositely-charged macro-ions to undergo an associative liquid-liquid phase separation into a complex coacervate phase – a dense, polyelectrolyte-rich liquid with widespread applications across a range of industries – and the polymer-dilute phase, the supernatant. The widespread applications of coacervates for molecular separation and controlled delivery have resulted in extensive analysis of the phase behavior and properties of polymer-surfactant systems. However, much of this work has focused on a very narrow range of composition space. Here, we utilize a combination of high-precision turbidimetry coupled with optical microscopy, to characterize the phase behavior of complexes between the cationic polymer poly(diallyldimethylammonium chloride) (PDADMAC) with surfactant micelles containing a mixture of the anionic surfactant sodium dodecyl sulfate (SDS) and the neutral surfactant Triton X-100 (TX100) as functions of composition and salt concentration. We have observed both liquid-liquid and liquid-solid phase separation, in agreement with previous literature reports, but our objective is to identify the minimum and maximum micellar charge densities for which complex coacervation can be observed. The results from this study will help to inform the design of future coacervate systems, including materials where nanoparticles are used in place of surfactants.

2:45-3:30    Board 56
Joshua E. McGee
Jacob Robert Brandner
Sarah L. Perry (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Microfluidic Synthesis and Purification of Albumin Nanoparticles for Drug Delivery

Albumin nanoparticles show significant potential for use in drug delivery and medical imaging because of their inherently low cytotoxicity, high biocompatibility, and high binding capacity. Today, FDA approved products like Abraxane© utilize paclitaxel bound albumin nanoparticles to treat metastatic cancers. One of the most common methods for synthesizing albumin nanoparticles uses desolvation via the dropwise addition of ethanol to a concentrated aqueous solution of protein while stirring. The addition of ethanol leads to protein aggregation, and cross-linking chemistries such as glutaraldehyde can be used to increase stability. The main limitation of this process is the inability to synthesize uniform nanoparticles across a wide range of sizes. This is a direct result of uncontrolled variations in concentration during the mixing process. We
propose the use of microfluidics to overcome this challenge by performing nanoparticle synthesis in a precisely controllable micro-environment, while also facilitating continuous production. The laminar flow conditions present in a microfluidic geometry enable precise control over diffusion and other transport phenomena, as well as direct control of the residence time and concentration for all particles, important characteristics in nanoparticle synthesis.

Using these parameters, we have created a microfluidic device capable of synthesizing size-tunable particles. Furthermore, we can perform purification on chip via diffusion to remove cytotoxic impurities and facilitate subsequent loading of drug molecules.

2:45-3:30 Board 57
Savannah Szemethy
Sarah L. Perry (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
The Aesthetic Applications of Microfluidic Devices

Microfluidic devices consist of a small chip that contains channels that allow for the flow of fluid and are the perfect media to bridge the growing gap between art and science. Because of their small scales, microfluidic chips have a low Reynolds number, thus creating a very smooth laminar flow, allowing for the production of fluid-based artwork. Intricate designs are first drawn in Adobe Illustrator. Then, photolithography and replica molding are performed to create the finalized chips. A mixture of food coloring and distilled water is then used to fill the devices, creating colorful artworks. During the fill process, the intensity of flow can be manipulated to create swirling patterns and brilliant gradients. This presentation displays a portfolio of scientific artworks and highlights how the design process involved with the creation of these devices promotes core values associated with the STEAM (Science, Technology, Engineering, Arts, Mathematics) movement. By completing projects that intertwine art and science, students foster important creative thinking skills that are often underdeveloped due to the formulaic nature of STEM-based education.

Room 903 3:45-4:30 Panel 7
Bryan Minghan Chua
Sarah L. Perry (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
iCons: Developing a Portable, Low-Cost System for Producing Medical-Grade Intravenous Solutions Using Bottled Water

In the wake of the current ongoing intravenous fluid shortage caused by Hurricane Maria in September 2017 that disrupted the production and distribution of Intravenous (IV) fluids, a new solution of producing intravenous fluids on-demand and on-site was called for. To address this challenge, our goal is to develop a novel, portable, low-cost method of producing medical-grade IV fluids using bottled water. We explored the ion content of different brands of bottled water (Poland Springs, Dasani, and SmartWater) using Inductively-Coupled Plasma Mass Spectrometry (ICP-MS) as well as the utility of various purification methods for our application. Potential methods include nanofiltration, vapor distillation, and Electrochemical Advanced Oxidation Process (EAOP). As part of our initial studies, we investigated using EAOP which
uses oxidation/reduction chemistry to remove microbiological and chemical contaminants from water. While potentially effective for microbiological sterilization, EAOP's potential generation of potentially hazardous inorganic and organic byproducts. Hence, additional purification steps and further research is needed. Our experiments also explored the microbiological and chemical contents of bottled water and validated the sterility of water after nanofiltration and vapor distillation. Ultimately, this work has the potential to produce IV fluids on-the-go at the same or lower cost than traditional manufacturing processes at under a dollar. This could help save or prolong the lives of patients who depend on the over 200 million liters of IV fluids sold every year in the US alone.

Room 903  3:45-4:30  Panel 7
Svilen Kolev
Sarah L. Perry (Faculty Sponsor)
Department of Chemical Engineering, UMass Amherst
Microfluidic Device Development for Characterization of A1AT Folding

The misfolding of a1-antitripsin (A1AT) mutants is implicated in a number of diseases since it aggregates in the liver and cannot be exported to perform its function in the lungs. The development of new non-gene editing therapies will require understanding of its folding pathway. The protein molecule is too large to run precise molecular dynamic simulations to uncover its folding pathway but there are simulation algorithms that include unrealistic biasing forces that speed up the simulation time which have uncovered possible folding pathways of A1AT. Due to the unusual intervention used in these simulations, the theoretical data requires experimental comparison for validation. In this work, a microfluidic device for studying the protein folding kinetics has been designed and the operating conditions and procedure have been optimized. It uses the principal of hydrodynamic focusing for the rapid dilution of a denaturant, allowing a protein to fold as it travels along the channel where it can be observed. Two devices have been designed for observation at different timescales; one for 2 minutes and one for 30 minutes. The observation is done by labeling particular amino acids with donor and acceptor fluorophores and conducting single molecule Forester Energy Transfer (FRET) experiments to determine the distance between the labels at various lengths along the device or times of the folding pathway. The distances between these labels as a function of time as experimentally determined, can be used in conjunction with the simulations to create a model of the folding pathway of A1AT.

Room 903  3:45-4:30  Panel 7
Lindsay Paquin
Ryan Hayward (Faculty Sponsor)
Department of Polymer Science and Engineering, UMass Amherst
Electro-adhesion of Ionic Liquid Networks

As the field of soft materials has grown immensely in recent years, so has the breadth of applications that these materials are used for. For example, an emerging development in soft
Presented Details

Robotics is the use of electro-adhesion. Electro-adhesion is the electrostatic attraction between two surfaces subjected to an electric field. Conventional electro-adhesion is based on a polymer dielectric insulating layer, but this set-up requires high operating voltages which is a major limitation of these systems. The goal of this research is to examine the adhesion of ionic liquid networks (ILNs) in order to enable a new class of electro-adhesive materials that can be operated at a substantially lower voltage. In particular, the contact adhesion force of an anion-conducting ionic liquid, [AEBI][TFSI], on a conductive surface, such as indium tin oxide (ITO), will be measured. This experiment allows the operating voltage to be lowered to only a few volts due to the formation of an electric double layer at the interface. For more practical applications, it is vital that an ILN-based electro-adhesive pad is able to adhere to any type of surface at a low operating voltage. Therefore, the adhesion between an electro-adhesive pad and a variety of surfaces will also be examined by creating the pad from interdigitated electrodes of [AEBI][TFSI] and the cation-conducting ionic liquid, [EMIM][SPA]. Overall, these experiments will allow for the establishment of a theoretical basis for the electro-adhesion of ILNs and broaden possible applications of electro-adhesion.
CHEMISTRY

8:30-9:15  Board 32
Andrew T. Burden
Vincent Rotello (Faculty Sponsor)
Department of Chemistry, UMass Amherst
Engineering of Supramolecular Assemblies for Optimal Therapeutic Protein Delivery

Recent trends in precision medicine highlight a growing interest in proteomic and genetic therapies for a variety of diseases. Protein-based therapies could be highly beneficial, as they avoid complications associated with gene delivery and the immunogenicity associated with viral vectors. Despite this benefit, protein delivery into cells can be difficult due to high molecular weight and polarity, often resulting in endosomal entrapment and cargo degradation. A robust strategy for direct cytosolic delivery of protein using arginine-functionalized nanoparticle supramolecular assemblies (ANSA) shows promise, but when applied in vivo, macrophage-specific delivery is observed. This obstacle minimizes systemic availability of biotherapeutics in vivo, thus attenuating the impact of treatment. Previously proposed, the protein/nanoparticle surface corona that is formed in plasma is thought to influence this interaction. This corona is due to the net charge presented by ANSAs, which attracts plasma proteins to the surface of ANSAs. Through zwitterionic postfunctionalization via ligand-exchange, we propose a method to tune the physical and electrochemical topography of ANSAs to decrease macrophage-specific deliveries. Here, we will explore the studies that will lead to in vivo applications of our method, with the goal of increasing the availability of therapeutic proteins for other cells in vivo.

8:30-9:15  Board 33
Parvati Abdulpurkar
Vincent Rotello (Faculty Sponsor)
Department of Chemistry, UMass Amherst
Nanomaterials for the Treatment of Bacterial Infections

Bacterial infections, coupled with increasing incidence of antibiotic resistance, are causes of various chronic diseases and increased mortality rate. Studies have shown that most bacterial pathogens are intracellular pathogens, able to fight both humoral response and antimicrobial therapies by using the host cells as refuge. Engineered nanomaterials such as gold nanoparticles and self-assembled polymers have been emerging as novel antimicrobial therapies that can combat resistance development. A technique development method will be followed to derive a new treatment strategy to address intracellular macrophage bacterial infection. This will entail deciding the type of antibiotic and nanomaterial to use and whether the assembly will work as a novel antimicrobial therapeutic or a drug delivery vehicle. By studying the antibiotics, nanoparticles and the bacteria, the synergistic and additive properties of the components will be understood providing information that will be useful for future studies. Methods such as minimum inhibition concentration (MIC) determination, minimum biofilm inhibition/bactericidal concentration (MBIC/MBBC) and checkerboard titrations will be used to study antibacterial activity. After observing a strong structure-activity relationship of the novel antimicrobial treatment, a rational and effective therapeutic strategy will be developed.
Adsorption and Desorption of Naphthalene by Carbon Nanotubes Coated with Sequentially-Extracted Soil Humic Acids

Carbon nanotubes (CNTs) could easily be coated by soil humic acids (HAs) in the real environment and subsequently alter the adsorption and desorption of organic contaminants on CNTs. However, the effects of soil HA coatings on the adsorption and desorption of organic contaminants by CNTs and the underlying mechanisms are still unclear. In this study, adsorption and desorption of naphthalene (NAPH), a model organic contaminant, by single-walled CNTs (SWCNTs) and multi-walled CNTs (MWCNTs) both coated with four sequentially extracted soil HAs were investigated. It was found that the HA coatings reduced the adsorption of NAPH on CNTs, with a negative linear relationship between the adsorption capacity of NAPH and the coated amounts of HAs on CNTs. This inhibition of HA coatings on the adsorption of NAPH was much more significant for SWCNTs than MWCNTs, and HAs with higher polarities showed greater inhibition. The HAs occupied the adsorption sites on the CNTs and thus reduced the adsorption of NAPH. The occupancy of adsorption sites by HAs was more efficient on SWCNTs than MWCNTs, and HAs with higher polarities showed higher occupancy efficiency. Additionally, no desorption hysteresis of NAPH was observed for any HA-coated CNTs due to the lack of pore structure change and chemical interactions during the adsorption-desorption process. The results obtained in this study will not only promote the environmental applications of CNTs as adsorbents, but also shed light on the environmental risks of both CNTs and organic contaminants.

Endophyte Research of Evening Primrose (Oenothera biennis) and Its Possible Medical Uses

Endophytes are microorganisms that live symbiotically inside plants to help them survive disease and other hazards from their surroundings. In this research, evening primrose was studied and its endophytes and their metabolites were grown and extracted for testing. The metabolites showed strong antibacterial properties against *Pseudomonas* and *Vibrio Parahaemolyticus* strains of bacteria. Other potential medicinal properties were identified by running the extracted metabolites in an LC-MS and analyzed using MassLynx software. These results were then compared against a known drug database to identify other potential medicinal uses for the endophytes found in evening primrose.
11:45-12:30  Board 65
Haley Shaye Curtis
Christine MacTaylor (Faculty Sponsor)
Department of Chemistry and Physics, Salem State University
Examining Endophytes and Medical Uses of *Juniperus communis*

*Juniperus Communis*, commonly known as juniper, is a conifer plant that populates the majority of North America. It has been shown that most plants contain endophytes, microorganisms that live within the plant. Endophytes are similar to a virus in respect that they live in and rely on their host organism. However, unlike a virus, endophytes have been observed to benefit their host plants by providing some form of protection. Sometimes that is in the form of producing an antibacterial, antiviral, antiparasitic, or antifungal metabolite that will help the plant survive. Much is left to be discovered about the endophyte and plant relationship but it raises the question about whether endophytes from plants can be used medically for humans. Endophyte samples were collected and isolated from *juniper communis*. The endophytes and the metabolites were tested against four bacterial pathogens to determine the antibacterial properties. The extracted metabolites were then analyzed using a UPLC-MS and analyzed using MassLynx software. Compounds were compared against a known drug database to determine if certain classes of compounds appear to be present in the endophyte metabolites. Those found were also compared with data from a previous year to determine if the same endophytes and the same metabolites appear reproducibly over time.

11:45-12:30  Board 66
Jacob M. Subik
Christine MacTaylor (Faculty Sponsor)
Department of Chemistry and Physics, Salem State University
Fungal Endophyte Research-An Exploration of *Juniperus chinensis*

The Chinese Juniper (*Juniperus Chinensis*), a common hedgerow plant, may be hiding secrets in plain sight. Aside from being useful in the field of landscaping, this plant may also be beneficial as a medicine and in drug synthesis. This is the essential question being asked: Does this plant, or more accurately, do the endophytes which reside within the plant harbor any useful medicinal compounds? To answer such a question, samples of a Chinese juniper from the Forest River Salt Marsh at Salem State University were obtained and endophytes isolated from them. These endophytes were allowed to grow and their metabolites were extracted and tested against a panel of pathogens to determine anti-microbial activity. Using LC-MS, metabolites were also separated, analyzed, and identified from each sample in the search medicinal compounds. The known medicinal uses of *Juniperus* was compared with the compounds isolated from the endophyte metabolites.
Bio-elastic materials behave in extraordinary ways, such as the mandible motion of trap-jaw ants, the snapping of which enables the ant to jump many times its own body length. Our group aims to understand material behavior undergoing high rate elastic unloading, inspired by the behavior of numerous impulsive organisms, including the trap-jaw ants. In support of this goal, the current work, supported by the URAP program, focused on developing a consistent, efficient synthetic method for the creation of elastic materials with tunable mechanical properties.

Specifically, we studied double network elastomers, which have interpenetrating networks of polymer chains that increase toughness of the material. We synthesized a structure of cross-linked acrylate elastomers, where a set of pre-stretched chains is designed to break and dissipate energy before failure of the material. We observed that reducing the polymerization rate of the network structure led to materials with increased toughness and elastic modulus, a difficult combination to achieve with traditional elastomer materials. Future work with this process will include quantifying the relationship between specific synthetic steps and the materials properties related to high rate elastic unloading.

Humans are in constant contact with bacteria, which can be both crucial to survival and life-threatening. Understanding their movement capabilities and the systems involved in bacterial movement could be paramount to designing the next class of antibiotics or could be harnessed for drug delivery. The Thompson Lab investigates bacterial movement through bacterial chemotaxis, the system through which bacteria sense chemical gradients and direct their swimming towards favorable environments. This is done using transmembrane receptors, including the system studied in this lab, the aspartate chemotaxis receptor in *E. Coli*. This receptor forms trimers of receptor dimers that bind a kinase CheA and a coupling protein CheW. Assembling this complex *in vitro* with native structure and function is challenging, but essential to test theories about the signaling mechanism of the receptor complex. The goal of this project is to use DNA origami to assemble the complex by attaching receptors to a DNA tetrahedron. With this assembly method, the position of specific mutant receptors, not just the protein stoichiometry, can be controlled in future experiments to test proposed mechanisms. In addition, control of the dimensions and geometry of the DNA origami scaffold will test whether inhibition of kinase activity involves expansion of the receptor trimer of dimers.
**Presentation Details**

**12:40-1:25    Board 41**
Benjamin Laliberte  
S. Thayumanavan (Faculty Sponsor)  
Department of Chemistry, UMass Amherst  
**A Reactive Self-Assembly Approach for CRISPR-SpCas9 sgRNA RNP Conjugation and Traceless Release Using Self-Immolative Polymer**

In the Thayumanavan Group at UMass Amherst, we have developed a robust delivery strategy for globular proteins utilizing a stimuli responsive random copolymer which provides a dual advantage of protecting encapsulated cargo as well as traceless release at intracellular target sites. We aim to utilize our polymeric platform for the delivery of CRISPR machinery to cellular nuclei for genome editing applications. Viral vectors have been utilized for the delivery of Cas9-sgRNA ribonucleoprotein (RNP) for in-vitro studies. However, their ability to integrate within the host genome and limiting packing space limits their practical use. We envision that our polymeric platform can serve as a robust non-viral vehicle for Cas9-sgRNA RNP delivery and traceless release. Our approach is to design, synthesize, and study protein-polymer assemblies that are formed due to covalent self-assembly of a random co-polymer, templated by Cas9 protein. We hypothesize that the surface exposed functionalities on Cas9-sgRNA RNP can covalently react with a few polymer chains to form self assembled structures with Cas9 at the core. A secondary crosslinker can react with remaining side-chain moieties on the polymer to form well-defined protective sheath around the RNP. We are focusing on developing a polymer framework that can predictably encapsulate Cas9, turn its function off, protect it from denaturation in non-native environments, and provide charge-neutral surface for cellular uptake. The covalent conjugation is made through self immolative (SI) moieties installed as side groups on the polymer chain which can disintegrate in response to redox trigger in cytosol and release Cas9-sgRNA tracelessly.

**12:40-1:25    Board 42**
Nicholas Ronald Fragola  
B. Alexander White  
Yuying Zhang  
Julian Fell Tyson (Faculty Sponsor)  
Department of Chemistry, UMass Amherst  
**Validation of a Simple, Low-Cost, Colorimetric Procedure for the Determination of Carcinogenic Compounds in Rice**

Much of the world’s rice contains inorganic arsenic, a human carcinogen, at concentration that may cause long-term health problems. The situation is particularly acute for countries such as Bangladesh, where eating rice irrigated with arsenic-contaminated water is compromising the health of millions of people, and reliable methods to measure the relevant arsenic compounds are needed. We have partnered with Chemists Without Borders to develop a simple, inexpensive test. A Hach EZ kit was modified by replacing the sulfamic acid and zinc with sulfuric acid (0.5 M) and borohydride agar gel, which gave the best color intensity at 50 µg L⁻¹.
(and also extracts arsenic from rice) while decomposing the gel. To slow down the release of
borohydride, the stability of the gel will be adjusted based on thermal pre-treatment. To validate
the developed test-kit method, spiked rice will be analyzed by a simple, microwave-assisted
extraction with only dilute nitric acid, followed by quantification with inductively coupled plasma
mass spectrometry (ICP-MS). Furthermore, since ICP-MS measures total arsenic, methods for
non-HPLC-based speciation, such as solid-phase extraction or selective hydride generation, are
being investigated. To prepare the spiked rice, 300 g of white rice are ground in a kitchen
blender and extracted several times with 3 L of water in a domestic pressure cooker. After
rinsing, the rice is dried at 80°C. To prepare rice spiked with 100 µg kg⁻¹, 40 mL of a 1000 µg L⁻¹
standard solution is added to 400 g of rice, which is then dried and homogenized.

1:30-2:15  Board 23
Anca Ioana Stoica
Bela Torok (Faculty Sponsor)
Department of Chemistry, UMass Boston
Green Synthesis of Substituted Benzimidazoles

Benzimidazoles are the structural backbone of many drugs – ranging from antiseptics
(Halethazole) and diuretics (Ethoxzolamide) to glutamate antagonist agents (Riluzole). Although
the synthesis of these and other building blocks are important in drug development, the
pharmaceutical industry remains one of the foremost polluters, preparing many drugs using
harmful catalysts, high temperatures, and extensive amounts of often toxic solvents. The
amount of waste produced commonly overweighs that of the useful product, resulting in issues
detrimental to both people and the environment. Although several syntheses of our target
compounds are known, they use potentially harmful catalysts and solvents.

To offer an environmentally benign alternative, a catalyst and solvent-free synthesis of the
target compounds has been developed. Following optimization, reactions were carried out by
combining ortho-phenylenediamine with substituted benzaldehydes at room temperature in a
1:1 ratio, with no catalysts or solvents. To ensure proper mixing of reactions involving two solid
reactants, minimal amount of ethanol - a sustainable solvent - was utilized. To date, 33
compounds have been synthesized, with most reactions typically lasting 5-6 hours and yielding
100% product. The reactions were analyzed at multiple time points using Thin Layer
Chromatography for reaction progression and purity check, and Gas Chromatography/Mass
Spectrometry and Nuclear Magnetic Resonance spectroscopy (¹H and ¹³C) for structure
determination. The major green advantages of this protocol are (i) catalyst and solvent free; (ii)
requires no external heating; (iii) produces minimal amount of non-toxic waste (water); (iv)
procures nearly quantitative yields with (v) 91-93% atom economy.

MASSURC
To explore students’ conceptual understanding of chemistry, researchers need to investigate how students approach crosscutting disciplinary concepts. One crosscutting concept focuses on the question of how we control chemical changes. Well-informed understanding of controlling chemical reactions contributes to fruitful design of chemical substances and the ability to reduce or mitigate undesired pathways. Research related to chemical control suggests that novice learners of chemistry assume that the only way chemical processes can be controlled is by modification of external parameters, such as variations in temperature or pressure, while ignoring internal parameters. Additionally, students think of chemical reactions as processes that always go to completion. One way of exploring students’ ways of thinking about chemical control is to create opportunities to observe different types of reasoning that students may draw upon when using chemical control to explain a chemical phenomenon. In order to learn how best to build upon students’ resources for teaching about chemical control we investigate how student reasoning about chemical control changes through schooling. In the upcoming months, we will primarily be analyzing data that has been collected from participants while they were working on the “The Exploding Pringles Can Design Challenge”, to observe the ways participants think about chemical control. We anticipate that the data will reveal patterns in how reasoning about chemical control changes. Such patterns can provide insights for the design of teaching sequences that take advantage of students’ resources and productive stepping stones that teachers can use to leverage learning.

The Buchwald-Hartwig aryl-amination reaction is an important catalytic process that results in the formation of carbon-nitrogen bonds. Carbon-nitrogen coupling reactions have great applications for natural product synthesis, medicinal chemistry, and organic materials chemistry. The new compounds that can be produced have a particular importance in the pharmaceutical industry, as this amination process is a critical step in the production of many drug candidates. Usually, these coupling reactions are traditionally performed with palladium-based catalysts, and the use of this precious metal adds a significant cost to this reaction. Our lab has developed a carbon-nitrogen bond coupling reaction that is mediated by an inexpensive early transition metal. We have begun to explore the mechanism and scope of this reaction, working to move from a stoichiometric reaction to a catalytic process. The ability to form carbon-nitrogen bonds with readily available, inexpensive early transition metals could have great impact in the chemistry community and the pharmaceutical industry.
1:30-2:15    Board 38
Duyen Kieu Pham
David R. Manke (Faculty Sponsor)
Department of Chemistry, UMass Dartmouth
Synthesis of Covalent Metal Organic Networks Using Base-Labile Protecting Groups

Covalent Metal-Organic Networks (CMONs) are a subclass of Metal-Organic Frameworks (MOFs) which contain strong, covalent bonds between transition-metals and multidentate organic linkers. The orbital overlap provided by these covalent interactions can result in conjugated systems with an extended electronic structure. This impacts the opto-electronic properties of the materials, giving them great potential for applications in electronics and sensing. The synthesis and characterization of CMONs are challenging because the highly favorable network formation leads to fast reaction rates and the formation of powdered or amorphous products. We have incorporated base-labile protecting groups into our linker, granting pH control of the rate of network formation and allowing for crystal growth. Our networks are based upon soft-soft metal-linker interactions, with heavy metals and thiolate ligands, and incorporate pyrene functionality to add emissive properties to the system. The synthesis and crystal structures of various one-, two-, and three-dimensional networks using the deprotection method will be presented.

2:45-3:30    Board 58
Daphne-Ann Cruz Vessiropoulos
Argyroula Stamatopoulou (Faculty Sponsor)
Department of Chemistry and Food Science, Framingham State University
Computational Analysis of the Thermodynamic Parameters of Human γD-Crystallin

Human γD-crystallin (HyD-Crys) is a monomeric protein found within the lens of the eyes. The protein is composed of two β-sheet domains, connected by a central hydrophobic cluster. The cluster itself consists of Met43, Phe56, and Ile81 at the N-terminal domain and Val132, Leu145, and Val170 at the C-terminal domain. Peripheral interactions with the cluster occur between Gln54/Gln143 and Arg79/Met147, respectively. Mutations that occur within HyD-Crys induce protein aggregation and insolubility, specifically with regards to the single mutation of Arg58 to His58. A mutation occurring at this position destabilizes the N-terminal domain by reducing phase transition barriers and results in a greater population of a single folded, domain intermediate. Covalent damages result in a partially unfolded crystallin species that does not polymerize through loop-sheet insertion or domain swapping. The purpose of this experiment is to investigate the thermodynamic parameters that surround the mutation of HyD-Crys. Because experimental alanine scanning mutagenesis is expensive and time consuming, theoretical methods are necessary to further the understanding of binding free energies. By comparing experimental results with those derived from molecular simulations, further understanding of the total binding free energy is achieved through analysis of the non-polar term's contribution with respect to the solvation free energy.
2:45-3:30  Board 59  
Alexis Natalie Melton  
Devon Hassan  
Eihab Jaber (Faculty Sponsor)  
Department of Chemistry, Worcester State University  
Computational Analysis of the Stabilization Energy Contributions of Individual Hydrogen Bonding Interactions in Parallel-Stacked Guanine Tetraplex

Telomeres, or the terminal structures of chromosomes which mitigate the loss of genetic information during DNA replication, are composed of guanine (G) rich sequences. These sequences form G-tetramer complexes in vivo that are stabilized by eight G-G hydrogen bonds and ligand bonds to a central cation. While previous investigations utilizing ab initio methods have provided insight into the interactions that contribute to G-complex stability, they failed to identify the contributions of the individual bonds within the complex, as well as the cation contribution to the overall stability. A novel computational methodology is presented that has facilitated the characterization of each individual hydrogen bond’s energy contribution to the complex’s stability while selectively breaking individual bonds. This methodology will be utilized to elucidate the formation dynamics of parallel-stacked Guanine Tetraplexes.

2:45-3:30  Board 60  
Alexander McCann Drake  
Emmanouil Apostolidis (Faculty Sponsor)  
Department of Food Science, Framingham State University  
Evaluation of Plant Extracts Alone and in Combination for Their Total Phenolic Content and Carbohydrate Hydrolysis Enzyme Inhibitor Activity

Phenolic compounds, natural antioxidants, are utilized in the food industry for their health benefits. This experiment explores four different powders: green tea, cranberries, cocoa, and blueberries. The first three powders are soluble in water and will be analyzed for their total phenolic contents and alpha-glucosidase inhibitory activities after being extracted at a concentration of 5 mg/ml in water. The blueberry powder is not water soluble and will be extracted using various solvents of decreasing polarity. After each extraction, it is centrifuged and the liquids are separated from the solids and the solids are re-extracted. The first extraction is in water at 95°C, for two hours, then in 50% ethanol for 20 hours. Followed by 100% methanol for 2 hours and then 70% acetone for 20 hours. This procedure is repeated one more time, but the 70% acetone will be extracted for 2 instead of 20 hours. All resulting extracts are combined and roto-evaporated to a final volume of 14 ml of water.

The extracts will be evaluated for their total phenolic contents using the Folin Ciocalteau’s method and for the inhibitory effect of alpha-glucosidase. Inhibition of carbohydrate-hydrolyzing enzymes, such as alpha-glucosidase, is relevant to type 2 diabetes prevention, since being able to inhibit this enzyme the digestion of dietary carbohydrates is prevented, hence allowing carbohydrates to pass through the digestive system without being absorbed into the bloodstream. Successful completion of this project will result in production of healthier food products that allow the consumer to control blood glucose levels.
MALDI (Matrix Assisted Laser Desorption-Ionization) Mass Spectrometry is one of few mass spectrometry methods that is well suited to the study of peptides, proteins and other biomolecules due to its “soft” ionization method. Due to MALDI’s importance to the field of proteomics, investigating ways to improve its quantitative potential is a logical goal that has been pursued from countless routes for decades. Gold nanoparticles (AuNPs) have been shown to form novel formations in MALDI sample spots when combined in the right proportions with limited matrix concentrations (<2.5 mg/mL). These “Coffee Rings” have been demonstrated to improve detection of very low amounts of biomolecules (peptides, lipids, phospholipids) compared to traditional MALDI. Under specific conditions the Coffee Ring Method was found to increase the sensitivity and dynamic range of peptide analysis via MALDI MS, but was also found to introduce significant error. Improving the sensitivity and dynamic range of MALDI MS is a starting point for improving the method’s quantitative potential.

Isoflav-3-enes are phytochemicals that have been shown to display estrogenic properties in biological systems due to their structural similarities to mammalian estrogen compounds. Isoflav-3-ene compounds are of interest because several have been shown to have antitumorigenic properties, meaning that they could be potential therapies for various forms of cancer. For example, Eryvarin H and Haginins A-E are all isoflav-3-ene compounds shown to have numerous medical benefits. Eryvarin H has been shown to have antitumorigenic properties in breast, ovarian, and prostate cancers. Haginins A-E have been shown to hinder melanogenesis. There is currently very little published research on isoflav-3-ene synthesis, and no current publications use an intramolecular coupling reaction to achieve the isoflav-3-ene core structure. This project seeks to achieve a more facile methodology for the synthesis of isoflav-3-enes than currently published methods using a titanium-induced intramolecular McMurry coupling reaction. This intramolecular McMurry coupling has been achieved in our laboratory using a di-ketone model system: 1,6-diphenyl-1,6-hexanediene. This model system of synthesis will be optimized to achieve an intramolecular McMurry coupling in 2-(2-oxo-2′,5′-dimethoxy-2-phenylethoxy)-4,6-dimethoxybenzaldehyde, a dicarbonyl precursor of Isoflav-3-enes. The dicarbonyl precursor is synthesized via the O-alkylation of 4,6-dimethoxy salicylaldehyde with 2-bromo-2′,5′-dimethoxycacetophenone. This new, more efficient method could then be used in further research to produce a variety of isoflav-3-enes.
3:45-4:30    Board 30
Christian Mikule
Maria G. Carranza (Faculty Sponsor)
Department of Chemical and Physical Sciences, Westfield State University
Cellulosic Biofuels: Purification of the Enzyme Cellobiase from Fungal Material

With fewer and fewer new discoveries of traditional fossil fuels and the exponential increase in cost for extracting these resources, biomass conversion for bioethanol will become a major contributor in transforming our traditional means of energy production into a cleaner and more accessible process. Terrestrial non-food biomass remains one of the largest underutilized resources that remains to address our growing energy crisis. Utilizing non-starch biomass components including agricultural byproducts, construction waste, urban development and landscape waste material, and disaster cleanup are just a few sources of future biofuel potential that go into landfills. Currently, enzymes derived from fungi are the major method for converting lignocellulosic biomass into sugars to make bioethanol. Efforts are being made on many industrial and scientific fronts to increase the effectiveness and efficiency of this process. By searching for new sources of promising enzymes as well as new methods for efficiently obtaining these enzymes from source material, production of bioethanol from terrestrial biomass can become a featured alternative to fossil fuel for our energy needs. The aim of this research is to help find more efficient procedures to concentrate cellobiase for greater experimental applications. Using variations of experimental parameters for isolating and thus concentrating target enzymes on a High-Performance Liquid Chromatography system (HPLC) and verifying results with SDS-PAGE, it is feasible that a more efficient means of purifying cellobiase may be uncovered.

3:45-4:30    Board 31
Rachel Nicole Bunce
Maria G. Carranza (Faculty Sponsor)
Department of Chemical and Physical Sciences, Westfield State University
Isoflav-3-ene Synthesis: Effect of the Protection of Salicylaldehyde Intermediate

Compounds with an isoflav-3-ene structure have potential use for breast cancer treatment as their structure and their ability to bind to estrogen receptors is similar to that of estrogen. Eryvarin H is a more recently discovered isoflav-3-ene that provides antibacterial, antioxidant, antiplasmodial properties and has a preliminary estrogenic profile. Phenoxodiol, another isoflav-3-ene has shown to inhibit proliferation in many types of cancer cells, which includes breast cancer. The similarity in structure of Eryvarin H to both estrogen and phenoxodiol make this compound an attractive target for chemical synthesis as well as further evaluation. However, isoflav-3-ene structures are hard to synthesize at high yields. Only one group has been able to chemically synthesize Eryvarian H in twelve steps. Prior research in our lab looked to establish a novel, more efficient, two-step synthetic route to obtain the same compound. The result, without protection of the aldehyde, was a 22% yield of the isoflav-3-ene dicarbonyl intermediate. Thus, we propose a new strategy for the synthesis of the isoflav-3-ene dicarboxyl intermediate,
which includes the protection of the aldehyde group on 4,6-dimethoxysalicylaldehyde as a dimethyl acetal, followed by O-alkylation. The expectation of a higher yield of this intermediate is due to a possible reactivation of the nucleophilic properties of the hydroxyl group on the starting material by the protection of the aldehyde. This new strategy may contribute to a novel, more efficient synthetic route toward isoflav-3-enes.

3:45-4:30  Board 32
Albert B. Cuevas
Maria G. Carranza (Faculty Sponsor)
Department of Chemical and Physical Sciences, Westfield State University
Protein Purification: Extracting Myoglobin from Bovine Tissue

Myoglobin is a red protein containing heme that carries and stores oxygen in muscles cells. It is structurally similar to a subunit of hemoglobin. Meat is one of the riches sources of dietary protein. Meat contains all of the essential amino acids our body requires daily to build proteins; it is also classified as a high quality, complete protein. The color reflects the bound iron and changes with oxidation state and bound ligands. Consumers use the color to assess the freshness of meat and to see whether meat is properly cooked. Myoglobin is commonly prepared at 95% purity levels from a variety of protein sources. In this project, we propose a method to prepare myoglobin using beef as our protein source. The experiment will proceed using an ÄKTA instrument, which is a chromatography system for fast purification of proteins, peptides, and nucleic acids. We will use anion exchange, cation exchange and size exclusion chromatography. To analyze purity, we will use gel electrophoresis and to analyze oxidation state and ligand binding, we will use UV-vis spectroscopy. We hope that we can obtain the desired results, so we can contribute to the biochemistry fields in the development of the purification techniques and this can be used in benefit of future education purposes and biochemistry laboratories. Myoglobin can be used in therapeutics treatments for patients with lack of oxygen in their bodies, so, the successful results of this procedure will play an important role in this project.

3:45-4:30  Board 33
Joshua Keith Rumple
Shelli Organic Waetzig (Faculty Sponsor)
Department of Chemistry and Food Science, Framingham State University
Palladium Catalyzed N-Allylation of 2-Benzoxazolinone through a Pi Allyl Intermediate

Transition metal catalysis has become a novel tool in synthetic organic chemistry especially in the generation of carbon-nitrogen bonds to N-heterocycles. Additions of allyl methyl carbonate to the 2-benzoxazolinone (2-BOA) heterocycle have been achieved using palladium(0) as a catalyst when complexed with the 1,4-Bis(diphenylphosphino)butane (dppb) ligand. It has been observed that the reaction of cinnamyl methyl carbonate is considerably slower under the same conditions. A variety of catalyst/ligand/solvent combinations were screened to determine the optimal reactions conditions for reaching completion with a high product yield.

MASSURC
3:45-4:30  Board 34
Emily Giantonio
Shelli Organic Waetzig (Faculty Sponsor)
Department of Chemistry and Food Science, Framingham State University
Supplemental Instruction in Chemistry: Why Are Students Not Going and Are Incentive Programs Enough to Reel Them In?

This project will evaluate why supplemental instruction has such low attendance in chemistry courses at Framingham State, and methods of improving this issue. Despite data continually proving the benefit of SI, there is only a small percentage of students who attend. Students will be surveyed about their opinions on the SI program, which will analyze the relationship between class year and attendance, as well as how students perceive its effectiveness. As a method of improvement, this project will study the impact of incentive programs. The vocabulary used to promote the program will also be changed by discussing it as interpersonal and relational learning. These approaches to increasing attendance will be evaluated midway through the semester to determine whether the implemented programs have made a difference in attendance.

3:45-4:30  Board 35
Guilherme Antunes Vicente
Sivappa Rasapalli (Faculty Sponsor)
Department of Chemistry, UMass Dartmouth
Design and Synthesis of 2-Pyrazolyl Quinazolinones as Celecoxib Analogs

Sivappa Rasapalli* and Guilherme Antunes Vicente

Department of Chemistry and Biochemistry, University of Massachusetts Dartmouth, North Dartmouth, Massachusetts- 02747.

Quinazolinones play an extremely important role in medicinal chemistry. They also form cores of many natural products that are biologically active. Attracted by their potential, we have set out to develop facile synthetic access to new scaffolds appended to quinazolinones. We have successfully synthesized 2-pyrazolyl quinazolines as mimics of celecoxib. They key step involves the synthesis of enone systems appended on to quinazolinones that served as Michael acceptors for the pyrazole construction via the addition of arylhydrazines. This collection of molecules will be evaluated for their antibacterial and anticancer potential and towards cyclooxygenase-2 (COX-2) inhibition. Our synthetic efforts will be presented.
Many people do not have water safely piped to their homes which poses a serious public health risk. One solution is point of use water treatment. The goal of this thesis is to determine the log removal of total coliform and \textit{E. coli} performed by six selected point of use water treatment mechanisms to assess the effectiveness of their treatment. The point of use mechanisms tested were two candle filters, a ceramic filter, UV and bleach disinfection and a multifunctional filter. The challenge water put through the filters included one set of trials with water containing primary effluent dosing from a wastewater treatment plant and the other with water containing a dose of lab strain \textit{E. coli} to see how natural and lab strain \textit{E. coli} differ in removability. The log removal of total coliform and \textit{E. coli} performed by each device was measured using IDEXX Quantitray method along with turbidity before and after. The results will hopefully provide insight into the effectiveness of these different treatment devices and help create a treatment standard that these devices should meet. The results should also help determine how testing is affected based on the use of naturally occurring contaminants as compared to lab prepared contaminants. Lab strain \textit{E. coli} is less hardy generally and likely easier to deactivate than naturally occurring \textit{E. coli}, so these tests aim to determine how significant the difference in deactivation is between the two types.

The Mill River and Lake Warner Watershed is comprised of Amherst and Northampton Massachusetts. The Mill River is the main stem of a series of tributaries which eventually flows into the Connecticut River. The headwaters of the Mill River is made up of a series of smaller streams, and the Atkins reservoir, a 200-million-gallon capacity reservoir which is the primary drinking water source for the town of Amherst. The Mill River flows through pristine rural forest area, then through Amherst and Hadley, which consists of residential, agricultural and university property, eventually flowing into Lake Warner. Lake Warner is a eutrophic lake, meaning it is nutrient rich and susceptible to algal blooms. It is hypothesized that agricultural runoff provides high nutrient loading to the Mill River. The nutrient rich water promotes aquatic growth which attracts non-aquatic species, such as birds. The high level of aquatic growth and animal activity is believed to be the main contributor of the fecal matter levels in the Mill River. The goal of this research is to determine correlations between fecal bacteria levels of \textit{E. Coli} and total coliform in the Mill River and parameters such as precipitation levels, time of day, and air temperature. The preliminary methods include sampling a direct tap to the Mill River and directly in the river.
two times a week, two hours a part. The IDEXX Colilert method is used to determine most probable number of E. Coli and total coliform in each sample.

3:45-4:30 Board 36
Emily Anne Dors
Marguerite Lucia Zarrillo (Faculty Sponsor)
Department of Physics, UMass Dartmouth
Public Transportation on College Campuses
This project will report on the current public transportation system on select college campuses. The main purpose is to identify the successes and failures of college shuttle systems and improve them based on the campus set up and the students they service. UMass Dartmouth, UMass Amherst, and Bridgewater State University were chosen for having a similar demographic of the student body and variety of opportunity in addition each school has a unique set up in terms of geography and location. Using both data collected from the shuttles and data from the students body, the system is analyzed for efficiency, user need, and accessibility. This data is used to build a sustainable and accessible system through the implementation of alternative methods of transportation such as bikes, scooters, and driverless cars.

4:45-5:30 Board 68
Isabella Cobble
Caitlyn Butler (Faculty Sponsor)
Department of Civil Engineering, UMass Amherst
The Effect of Acetate, Propionate, and Butyrate on the Efficiency of Double-Chamber Microbial Fuel Cells
Microbial fuel cells (MFCs) are becoming increasingly popular as an energy-efficient strategy for wastewater treatment and electricity generation because they are bioelectrochemical systems that produce electricity that can be recovered while simultaneously treating wastewater. However, MFCs are anaerobic processes that could also be used for treatment of other concentrated waste streams such as for the reduction of biosolids, if combined with fermentation. Before this option can be evaluated as a process, power production with short chain fatty acids (SCFAs) produced in fermentation should be evaluated. When complex organic substrates are introduced to the anode in an MFC, degradation steps must occur before anode-respiring bacteria are able to use available substrates and pass electrons to the anode for electricity production. Complex organics are hydrolyzed by microorganisms, then acidogenesis produces short-chain fatty acids (SCFAs). Power generation and organics removal were evaluated in MFCs fed three different common SCFAs: acetate (CH₃COO⁻), propionate (CH₃CH₂COO⁻), and butyrate (C₄H₉CH₂COO⁻). Four bench-scale double-chamber MFCs were constructed and operated in batch mode. Hach kits were used to measure chemical oxygen demand (COD) removal and determine how much organic matter was in the synthetic wastewater. According to preliminary results, the control is producing no power, acetate is currently producing an average of 126.8 ± 6.3 µW, correlating to the greatest COD removal of
125.2 ± 67.2 mg/L. Butyrate is producing 16.4 ± 11.6 µW, and propionate is producing 0.2 ± 0.1 µW. This semester I plan to use different combinations of SCFAs and observe resulting changes in power production.

4:45-5:30  Board 69
Faith Joan Duffy
Kara Peterman (Faculty Sponsor)
Department of Civil Engineering, UMass Amherst
Predicting the Hysteretic Response of Cold-Formed Steel Framed Shear and Gravity Walls Subject to In-Plane Loading

The purpose of this research project is to generate a computational model capable of accurately predicting the lateral resistance exhibited by cold-formed steel (CFS) framed shear and gravity walls subject to in-plane loading. This research operates as a continuation of summer work conducted at the University of California San Diego (UCSD) Large High-Performance Outdoor Shake Table (LHPOST) as part of a larger effort to investigate the behavior of CFS framed walls during seismic events. Previous research has found that predictive models are not capable of accurately capturing specimen behavior, but that models fitted using experimental data are capable of capturing the hysteretic response of specimens. This project aims to eliminate the need for experimentally fitting models by constructing an accurate predictive model. This research is conducted by implementing a fastener-based modeling paradigm using SAPWood Seismic Analysis Package for Woodframe Structures, Version 2.0. The computational model is calibrated using existing experimental specimens. Calibration of the computational model has revealed a 3.0% accuracy in applying SAPWood, a woodframe analysis software, to steel specimens. The validated model is then applied to wall specimens that were experimentally tested at UCSD to predict the lateral resistance. Preliminary results have yielded a prediction of 11.5 kN for the lateral resistance of one UCSD wall specimen, characterized as a type I shear wall, consisting of two shear wall segments separated by a gravity wall.

4:45-5:30  Board 70
Bryan Gomes Ovelheiro
Simos Gerasimidis (Faculty Sponsor)
Department of Civil Engineering, UMass Amherst
Micro-lattice Architected Cellular Materials for Applications on Planar Elements of Building Structures

The purpose of this research was to study the viability of using 3D constructed lattices to provide a lightweight replacement to concrete in floor slabs of a building. Reducing the mass in floor slabs could make buildings more earthquake resistant, provide less of a footprint for the foundation to have to carry, and possibly allow for taller construction. This research uses ABAQUS to analyze the stiffness properties of slabs constructed from octet micro-truss lattices in comparison with solid concrete. The lattices were analyzed as a pure truss structure, a core with a face sheet on the bottom, and a core with a face sheet on the top, all subjected to a distributed load. The models involved ranging strut diameters from 0.1 mm to 1.0 mm, varying the struts from solid diameter to hollow diameter, and changing the density of unit cells, with models being run with 1, 2, 3, and 5 unit-cells high, and a proportional amount long and wide.
We found that lattices with face sheets on the top and the bottom were stiffer than the concrete slabs at higher strut diameters for the 2 and 3 unit-cell models. Several of these models were also less mass than the concrete, surpassing the mass of concrete at the highest strut diameters of the 3 unit-cell model. This finding shows that the concept was viable, and future research would involve testing the lattices in real conditions. Additionally, the effects of alternate geometries should also be explored.
The Infrastructural Landscape of Ancient Tharros: A GIS Approach to Recording a Roman City

This presentation focuses on the mapping and analysis of the infrastructural elements of the ancient Roman city of Tharros (Sardinia, Italy), including the drainage system, cisterns, and roads. An examination of GIS data and drone imagery collected in 2018 is used to model the infrastructural systems of Tharros and determine potential paths and volumes of drainage in the excavated and unexcavated portions of the city. Outcomes include modeling of the cityscape, documenting sources and outflows of water, and reconstructing roofing and the water environment using GIS. To date, the study of where and how water entered and left the city has not been fully conducted. This study will help to better understand the everyday lives of the inhabitants of Tharros, and how they may have interacted with the infrastructural landscape daily.
COMMUNICATION

8:30-9:15    Board 3
Daniel Harris
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
Art in Anonymity

With the rise of transparent publicly-visible social media, anonymous online communities have become integral to our modern culture as well. While the sociological dynamics of anonymous social media has been studied extensively, little research exists which analyzes the media generated by these communities, the unique art cultures that form around them, or how out of a gestalt mind of many unknown users, singular pieces of media are able to emerge.

One example of this is an experiment dubbed “r/place”, which emerged on Reddit.com. A blank 1,000x1,000-pixel digital canvas was created which allowed individual users to color one pixel every five minutes. Over the span of 72 hours with no interpersonal communication, entire communities and stylistically defined regions emerged across the workspace. Many musical compositions, animations, and other spontaneously generated projects have risen out of digital communities on similar sites through the dynamics of collective intelligence.

This raises a fascinating question: Can similar pieces of art be created within a community outside of the internet, and to what extent does anonymity, digital space, and collective intelligence influence the results? By creating an interactive art exhibit on Fitchburg State’s campus where users contribute to an illustration project designed to mimic conditions found in projects like r/place, this research project compares the resulting work with its digital counterparts. The results of this experiment show that regardless of the project medium, similar graphic patterns will emerge due to the naturally chaotic dynamics of media created by collective intelligence.

8:30-9:15    Board 57
Sydney Morgan Chase
Colleen Coyne (Faculty Sponsor)
Department of English, Framingham State University
Blogging Isn’t Dead: The Evolution of Blogging in Digital Business Communications

This thesis argues against the notion that blogging is dead in the world of business communications. Blogging is distinguished in the digital sphere as an old and new media technology that has undergone an evolution within the communications world. In this paper I discuss “old media,” referring to mass communication technologies prior to the digital age, including the traditional form of blogging. “New media” refers to mass communications using digital technologies. Blogging has evolved so rapidly that the traditional form of blogging belongs in the category of old media, and the new, evolved form of blogging has been known as new media. This paper examines current research in the field, and uses primary data, personal experience, and interviews from business professionals which finds that blogging has great potential for business communications. After the rise of social media, the new, evolved form of
blogging has taken on different styles but contains traditional elements. Evolved blogging can take place through social media or by adopting multimedia tools paired with the digital integration of social media. Blogging has unique benefits such as permanence on the web to increase search rankings, the ability to lead viewers to a product, and the power to create a company voice. Blogging is helpful to companies in marketing, advertising, and public relations. Businesses have the control to build their brand and relations with their customers. This paper argues that blogging is thriving and essential for business communications when it caters to the target audience and uses appropriate outlets and form.

Room 809 10:45-11:30 Panel 2
Tyler Jacques
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
How to More Accurately Rate Media as Creators and Consumers of Entertainment

Television Executives often have to make the hard decision of whether to renew or cancel a show. More often than not, there is backlash for the calls they make. For example, Fox executives recently chose to axe Brooklyn Nine-Nine and an outcry was heard all across the internet. The fans were not ready to let go of such a fun and inspirational show. How could there be such a disconnect between the Fox executives and the abundance of fans. Luckily, NBC picked up the show due to the echoing frustration of Brooklyn Nine-Nine fans. So, all is well, right? I don’t believe that’s the case. Fans seem to have a different understanding of the influence a show can have. There is a discrepancy between the creators of media and those who consume it. I explore the current methods television executives use to make decisions about their media, and in contrast have created my own method to help executives make a more holistic decision when it comes to cancelling or renewing media. I have analyzed Steven Universe from the perspective of a network executive as well as from the perspective of a fan, using: moral and political discourse, viewership statistics, writing, music, animation style and aesthetic, merchandise and influence, etc. This research provides greater understanding into how we can more accurately rate media both as creators and consumers of entertainment. I’m hoping my method for calculating the true impact of a show will become an industry standard.

Room 809 10:45-11:30 Panel 2
Lindsey Joyce Ogden
Daniel Sarefield (Faculty Sponsor)
Department of Economics, History & Political Science, Fitchburg State University
The Impact of Technological Advancement on the Evolution of Writing Systems

Writing is one, if not the most, important invention of mankind following the creation of language. Starting as basic elements of graphic communication, writing systems have evolved throughout history to convey information over time and space. These evolutionary changes, such as simplification of shape, are driven by the creation of more efficient communication technology as the culture of the systems progress. Compared to the established evolution trend, modern
technology-mediated communication seemingly allows users to revert into using more visually complex forms such as emojis.

This presentation addresses how and why this may be the case by describing the general trend found in writing system evolution, how it has been impacted by technological advancement, and exploring the idea that emoticons/emoji usage will be further integrated into our modern, everyday communications. In doing so, this presentation will also analyze and respond to these three questions: What are the notable impacts of technological advancement in regards to transmission and ritual communications? How do emoticons/emojis fit into the established trend of writing system evolution? What does the democratization of writing systems potentially mean for emoticon/emoji usage in the future? By answering these questions we can understand how emojis came to be used during interpersonal, ritual communications and how they could potentially become their own type of logographic writing system.

1:30-2:15   Board 26
Ashley Kelly
Lauren Torlone (Faculty Sponsor)
Commonwealth Honors Program, Salem State University
Socio-Political Advertisements and Their Effect on a Brand’s Sales and Public Perception

Over the past few years, many advertisements, from commercials to television, radio, print and digital have had a socio-political or humanitarian aspect to them. Commercials during various Super Bowls have focused on immigration, diversity, overcoming obstacles and more. This study will investigate whether these types of advertisements affect a brand’s sales and public perception, be it positively, negatively, neutral or a combination of these.

My hypothesis states that these advertisements elicit strong emotions from consumers, which in turn impacts a brand’s sales and public perception. To test this, I designed and sent out a survey via Facebook showcasing three advertisements: Coca-Cola’s “Together is Beautiful” commercial, Oreo’s “Pride” social media image and Ram’s “Built to Serve” commercial. The survey included demographic questions as well as questions about each commercial, such as “did you think the commercial was effective?” and “after viewing this image, would you be more willing to buy from this brand?” Results were then examined to see if consumers felt positively, negatively or neutrally towards these advertisements, and whether these emotions affected these brands’ sales and public perceptions.
For my Honors thesis, I wanted to analyze the way Generations X, Y and Z interacted with social media and new technology and how it influences their online and social relationships. To study this, I researched previous works that discussed the relationships that each generation had with social media and new technology (such as Alexa and smartphones). After my research was complete, I created my hypothesis that Generation Z, the youngest generation, is the best naturally equipped generation that navigates social media and technology and can build stronger relationships online but lack the social skills that the other generations have, making it harder to read in-person social cues. To find out if my hypothesis was true, I conducted a series of interviews with members from each generation and I posted an online survey for my personal Facebook friends to take about the subject. I asked two people from each generation their experiences using social media and if they noticed their social skills changing because of their use of social media. With these results, I hope to find that Generation Z is the generation that uses social media the most and the have superior skills to navigate the online world, but struggles to communicate efficiently in-person.

Black Theatre has refined and redefined American theatre as we see it today, by showcasing an artistic representation of the African American experience. I examine how race has played a factor in the progression and perception of contemporary American theatre in society. Black theatre has faced violations in an art valued culture since the beginning of the Harlem Renaissance, as racial inequality and cultural appropriation continues to influence standards in our society. Specifically, I dive into analyzing and studying the response to: “What color has American theatre been, what color is American theatre now?” I will argue that, for decades, American theatre has been a means of artistic expression and career opportunity for primarily White Americans due to the lack of racial acceptance and collaboration. I will study efforts made to change this reality by looking at the influences of August Wilson and Suzanne Lori Parks, who have changed not only the face of American Theatre, but the voices and visuals in Black narratives and of the Black Body on stage. The Black Body is the outlier in the culture of American Theatre, constructed by the narratives and transgressions of the moment, opening up an invitation to the representation which stresses oppression and their Black Body’s domestic space which is subject to limitations, violations and a racist reality. This is significant because Black Theatre is written by, for, and about African Americans. It strives to be more progressive, more radical, and more militant; reflecting the ideals of black revolution and
Medically assisted death is slowly being legalized across several states in the United States. I wanted to get a closer look at what physicians think about medically assisted death. I interviewed four physicians and analyzed physicians’ discourse about their ethical considerations of assisted death. The physicians will be anonymous because assisted death is illegal in Massachusetts. The four physicians I interviewed are an emergency room physician, a gastroenterologist, a palliative care physician, and a pediatrician. My research began with several questions on assisted death. Among them were, what are your personal feelings on assisted death? What are the pros and what are the cons of assisted death? Does the Hippocratic Oath affect your view on assisted death? The Hippocratic Oath’s main point is do no harm when treating patients.

My findings were that all physicians agreed that assisted death should be legalized in Massachusetts with strict guidelines. All of the physicians interviewed agreed that assisted death should be available for terminal patients and not available for someone with a mental illness that can be treated with medication. I found that all of the physicians I interviewed shared the same beliefs. They agreed that if the patient’s quality of life was going to decrease to a state the patient was not comfortable with, then the patient should be able to choose to end their life. The importance of my research is to provide a variety of views about assisted death from a wide range of healthcare professionals.

When thinking about a living space, a restaurant, a venue, a place to gather, what is important? What stands out? What gives people comfort? From minor decor to the attire of the people filling the space, every item, every color, and each texture help build an atmosphere. From forks and knives clashing to beautiful notes sailing through the air, sounds put one either in a panic, or in a bliss. The same way a room is stylized to manifest a feeling, movies must pay close attention to small detail in their world building to pull the viewer in. In other words, nothing is more important than immersion; and no movie or series of movies does this better than the Star Wars saga. The smallest, most minute details are not overlooked; the stains on a cup in a gritty cantina, sand stuck in every orifice after walking through the desert, strange sounds not of this
Earth create a world that is both recognizable and leagues away from our own. Small oversights can cause the death of an immersive world, if a Pepsi can were left in the cup holder of the Millennium Falcon, the viewer would be pulled away from the movie. There’s a fine line in creating an immersive experience of a fiction’s nature: the world must be consistent and it must be detailed. If either of those two rules fail to be met, the immersion is lost.

2:45-3:30    Board 15
Dean Roussel
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
Aesthetic Evolution of the Boston Red Sox

Sports teams give fans something to look forward to seeing. Since the visuals of these teams as well as individual players are always changing, it is refreshing that we have imagery such as logos and structures such as game and practice facilities to remind us of the evolution of sports aesthetics in general. People associate a team with its visuals, and the physical landmarks become well established in the minds of fans of all ages as well as residents of the team’s area. The Boston Red Sox in particular are associated with red stockings, their home stadium, Fenway Park, the Green Monster wall in left field, their mascot Wally, who is a green monster, Yawkey Way outside of the stadium with the championship banners waving around, and the ever-present Citgo sign visible from the park. All of these monuments are historic. There are also yearbooks, print publications, and online documentation that have led to the continued mystique of a team that was founded in 1901 and has thrived in a society where so much else has happened. I am designing a book that looks at the intricacies of these visual landmarks, as well as an explorative look on why they have remained so recognizable and symbolic of the city of Boston and baseball as a whole. Although fans have hardships in their everyday life, sports is an escape from this, and a look into the history of the aesthetics surrounding the Boston Red Sox serves as a reminder of this.

2:45-3:30    Board 5
Lulu Simone Amirault
Melissa Y. Mueller (Faculty Sponsor)
Department of Classical Language and Literature, UMass Amherst
Tumblr and the Modern Kore

My honors thesis, based within the departments of Communication and Classics, is centered around the transmission and creative adaptation of ancient Greek mythology in modern social media and fandom cultures. The thesis focuses on the adaptations of the myth of the Greek god, Hades of the Underworld, who kidnaps the goddess of spring and daughter of Demeter, Persephone, including Lore Olympus by Rachel Smythe. Additionally, it focuses on the victimization and power dynamics at play within heterosexual relationships and how these manifest themselves within online fandom and creative mini-societies, as this myth represents very specific gender dynamics both in the way it was used by the ancient Greeks and the way it has re-manifested itself in today’s online culture. Specifically, I hypothesize that the increased understanding of widespread victimization of and among young women has influenced the
selection of stories that are to be told and retold. Moreover, the lack of representation of powerful female characters within popular entertainment media and the relative powerlessness of actual women in online media has created a void that many are filling with the alteration and adaptation of ancient stories. I also hypothesize that many young (and primarily heterosexual) women are flocking to these newly altered stories because of the lack of support within their own love-lives, whether that is lack of support from the culture or even specifically from their male partners. I seek to prove these hypotheses through research done within gender studies, classical mythology, and analysis of online images.

2:45-3:30 Board 62
Sydney Amanda Buono
Jennifer Dowling (Faculty Sponsor)
Department of Communication, Framingham State University
Listen-Closely Oral Tradition and Podcast Technology

Audio storytelling, through such mediums as podcasts, radio, and audiobooks, are becoming increasingly popular. They promote imaginative thinking and engage the brain in different ways than viewing videos or reading. Through certain techniques and methods, podcasts can captivate and educate people by becoming part of their daily commutes or downtime. For my thesis project, I am researching the effects audio storytelling have on listeners and investigating the best ways to do this using podcasts. With this research, I am conducting my own podcasts to share stories by means of my voice and other audio attributes. Demonstrating proven techniques for producing a successful podcast for listeners is only part of my project. I am also exploring ways to advertise and promote these stories with current technology and social media, as well as utilizing my skills with graphic design and digital media. Through my research and podcast production, I am able to showcase what I learn about modern day storytelling.

2:45-3:30 Board 63
Shauna Q. Legsdin
Max Saito (Faculty Sponsor)
Department of Communication, Westfield State University
The Influence of US Stereotypes in Spain and Mexico on International Relations

The goal of this research project is to identify a relationship between what type of media Spaniards and Mexicans are consuming about the United States and how they feel about, and their opinions about the United States. The current U.S. government serves as the focal point, making this research fairly relevant to current world affairs. The initial question that influenced this research has been that Spain and Mexico would think negatively of both the current U.S. president and U.S. citizens, and that the international relationships between these three countries, presented through media outlets, would be tense or weak due to the opinions held by Spaniards and Mexicans.
Several communication and sociological theories or models of thinking are applied, including the theory of Encoding and Decoding, Cultural Discourse Analysis (CuDA), Hegemony, and Expectancy Violations Theory (EVT). The purpose of these theories are to provide a lens, or way of looking at the information, in an attempt to answer how stereotypes are formed and influenced by the media outlets and culture's present in Spain and Mexico. A survey, distributed to Spaniards and Mexicans currently living in their respective countries, provides quantitative data to accurately identify current opinions and stereotypes of the United States. The literature review includes specific media examples (e.g. articles, television news) that mention the United States, and other research, which focus on the political and cultural history of the United States, Spain, and Mexico. Conclusions provide an insight into the international relations between the three countries.

2:45-3:30    Board 7
Raffael DeFeo
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
Disability Services: The Bigger Picture.

This project is an informative presentation of FSU's Disability Services, including their policies, language, services and procedures, shared in a creative, stimulating visual manner. The project consists of 3 video spots that will inform faculty, staff and students about the Disability Services. The videos consist of facilities, tools, procedures, policies, and examples of proper etiquette, as well as testimonials and examples of students, staff and their involvement with Disability Services. The project creates a greater understanding of "Disability Services" role within the university for faculty, staff and students, as well as the challenges it faces. In addition they and Disability Services will continue to work in a more cooperative and productive manner, that benefits all.

The project puts a face to invisible disabilities such as dyslexia and the people that interact with them everyday and what it is like to look through their minds, such as how a neurotypical person sees words and numbers correctly and a person with dyslexia sees them incorrectly, jumbled and backwards for example. It also shows how the lack of understanding, of these disabilities and the role of Disability Services, results in negative outcomes that affect all.

Although this project documents Disability Services at FSU, it is also a template for other institutions to start a dialogue and create a more understanding, cooperative and productive learning and working environment that benefits everyone.

2:45-3:30    Board 8
Rebecca Lynn Landry
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
Social Media Differences
Pick a friend and look at their Facebook. What do they post? Now look at their Twitter and Instagram. How do they differ? After an analysis of common themes within social media posts and a survey regarding social media usage, it was noted that a user may showcase a different persona on each platform, but why? What causes a user to make varying choices about their self-representation on different platforms? Is it a result of the user’s psychology? A social media analysis shows that a user may post formal pictures on Instagram and Facebook, but meanwhile post casual and funny comments on Twitter. In turn, this develops a different persona on each platform because the user is representing themselves professionally on Instagram, but appears laid-back on Twitter. A platform’s features may have some effect on how it is used, but the features alone would not be enough of a reason for someone to represent themselves differently or develop new personas. Do psychological trends or phenomena affect social media usage? Are there common themes among users? Do a user’s personality traits have an impact on their social media usage? Personas are noticeably different on each platform, but what is the reasoning behind them?

Room 809  2:45-3:30  Panel 6
Clovis Anokye
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
Social Media Changing Our Opinions on Big Issues

Major Social media networks like Facebook, Instagram, Twitter, etc. are huge platforms that connect the world together with how anyone can leave their ideas. The exchange of information on posts gives users around the world the freedom to discuss and reveal information. The young adult generation (18-29) are the people impacted the most by opinions on social media as they are the group that spend the most time on these platforms. A study done by Pew Research Center found that 14% of Americans say they’ve changed their minds on an issue. This is a small share of the public, but a number like that, for example, could change the entire outcome of an election.

Scrolling through social media, you may unconsciously be looking at people’s beliefs and people’s opinions could quickly become yours even if it’s false. In my project I am exploring social media’s impact on society in terms of how it can influence a user to change their opinion on a social/political issue from observing what others have to say on an issue. I am doing a conversational analysis on how users interact with each other on big issues. In my work, I am showing specific examples of users leaving their opinions on a post, unpopular opinions, and how users are communicating their differences. #MeToo, #BlackLivesMatter, and #MAGA are some of the tags you can find debates on social media. This project should make young adults realize how social media can influence a user to sway their opinions.
Is Social Media Diluting Friendships?

Before the 21st century, friends predominately interacted face to face, over the phone, or even through letters. However through the evolution of technology and social media, friends began to interact more virtually, as well as more frequently, and sending letters to your penpal in another state became obsolete. Social media has become a crucial factor through the way the younger generations such as millennials and Generation Z interact among their peers. Today friends can be thousands of miles in distance, but only a click away with the help of interacting virtually online. It is estimated that roughly, 94% of teenagers and young adults claim they spend time with friends on social media. With the constantly rapid growth and overuse of social media, it has begun to dilute the meaning of a truly valued friendship. One could potentially be “friends” with someone on various social media platforms but speak a word in person. I myself associate as a Gen Z, I can relate to the problem of overusing my smartphone and connecting with my friends more virtually than in person. To grasp a deeper understanding of how the authenticity of friendships has evolved due to social media, I have constructed interviews with both millennials and Generation Z adults. I have thoroughly analyzed childhood friendships and adult friendships, and the similarities and contrasts between the relationships. The significance of my research proves clear evidence of how social media plays an important role in the establishment of friendship, as well as staying connected throughout the relationship.

Tilted over Trigger-Warnings: A Case Study Analysis of How Pro-Gamers Commodify Toxic Behavior

Online gaming communities are often critiqued for harboring a culture rife with misogyny, heterosexism, racism, and anger management issues. With over 70% of teens and young adults participating in online gaming spaces (The Washington Post, 2018), understanding the origins of this so-called “toxic” online behavior becomes imperative to understanding how future generations will engage topics of social justice and equality both within these communities and in daily life.

Most of the research dedicated to toxic gaming culture points to content of games as an explanation or analyzes gaming culture as a function of Alt-right influence. The current case study adds importantly to those literatures by examining the influence that professional gamers might have on the community-at-large.

In order to understand how pro-gamers might influence the gaming community, I use frameworks provided by past research to propose a theoretical progression for how toxic behavior is commodified and perpetuated within the eSports community. I then compare that
progression to the real-life career of a major controversial figure in the pro-gaming scene, Félix “xQc” Lengyel by engaging in a textual analysis of his social media presence and his performance when broadcasting on a popular video game streaming website.

From the study, I find evidence that xQc not only externalizes toxicity in online spaces but has also internalized this toxicity in the construction of his online identity. More research is needed to understand the typicality of this phenomenon in the careers of other high-profile professional gamers.

3:45-4:30    Board 6
Jake Lawrence Dedian
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
The Invisible Ad

It is estimated that people usually are exposed to 5,000 ads per day. With the growing influence and use of social media, people are being exposed to even more ads in ways they are unaware of. Usually people see and recognize advertisements as an external piece of media from the content that they wish to view on the internet and social media. But as of recent, there seems to be a gray area and less obvious differences in original content and advertisements.

The massive collection and use of personal data has led to a brand new type of advertising that not everyone understands. Advertising has become so engrained in the life we live that we more and more often are being influenced by ads without knowing it. This covert form of advertising can influence the way we live, and direct our decision making.

Some of my major research questions consisted of; how do companies engrain their advertisements into organic media and the channels of our media consumption in ways that cannot be seen by the average consumer? How does this effect the behavior of the average consumer?

My method of research for this project is to know the channels of social media inside and out, in order to understand the channels that the advertising companies take to reach the consumer. I analyzed the artifacts and instances in which advertisers implicitly influenced the decisions of the consumer with this covert advertising.

3:45-4:30    Board 7
Kebelin Toloza
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
Color and Meaning in Cultures through Cinematic Analysis

Color is our storyteller one would say; it holds a piece of significance within us and films we’ve watched. Yet, the question that rose from this finding is the following: do colors contain socially known meanings, a universal understanding, or is it restricted to the culture in America we’ve have manifested? For example, throughout films, some may portray and depict the color Red for
hate and violence, while other films may have the usage of it, in royal settings and for the feeling of endearment. This sparks the realization that color and meaning have no physical guidelines, but we as viewers unconsciously condone this phenomenon. As this may include a small excerpt on the psychology about how we perceive color, this is part of the supporting findings that I have addressed. I've explored the research done on the association of color and the mind. I've gotten the most commonly known colors that everyone had connections with and compiled film pieces that provide the link of color with different meanings because of cultural prerequisites. Therefore, this presents viewers with a new perspective on how color influences are universal. The significance of my method has created a way for people to witness in one place, a visual gathering and breakdown on how our culture has implemented meanings in color that is being portrayed in films. This research will be used as a part of future formulas of executing cultural aspects in films, not just through historical content, but through color that appeals naturally to the audience.

Room 174  3:45-4:30  Panel 7
John Weston Gifford
Robert Harris (Faculty Sponsor)
Department of Communications Media, Fitchburg State University
Audio Identities

The topic to be studied in this thesis project is audio identities. The term “audio identity” is an umbrella term for any sound meant to be associated with the identity of something else, be it a company, product, idea, etc. An audio identity could be a jingle, a soundscape, a piece of a song, or even just a single tone. By associating sounds with ideas, they become more present in one’s consciousness and harder to forget. A popular example of an audio identity is the Mac startup tone, which was composed by the ambient musician Brian Eno. The sound was developed in such a way to make the brain associate it with the Apple brand, causing it to stick in people’s minds. I plan to study exactly what audio identities are, how they affect people psychologically and physiologically, and how they change one’s perceptions of brands. I also plan to create audio identities for WXPL, the student-run radio station at FSU to build the WXPL brand. These sounds will display the proper qualities that audio identities should have in order to be successful. The way in which I create these identities will be careful and thoughtful, keeping in mind all the aspects of sound and how they affect the human brain.
COMMUNITY/PUBLIC SERVICE

8:30-9:15   Board 22
Emily Ishak
Ashley Bellevue
Deborah Keisch (Faculty Sponsor)
Department of Civic Engagement & Service-Learning, UMass Amherst
Storytelling as a Tool for Patient Engagement

The Caring Moments Program was created in order to improve patient quality of care within the Baystate Medical Center Neurosciences Unit in hopes of humanizing patients. In today’s hospital setting, clinicians and patients are both affected by the limitations of time and resources within their fast-paced environment. As volunteers, we engage patients in the act of storytelling, prompting positive memorable moments such as stories of their greatest achievements and their greatest loves. The value of this activity is twofold. It is most immediately found in the caring interaction between volunteer and patient. The hope is that the recount of the story included in the patient’s chart may also serve as the basis for personalized interaction between the patient and provider. Nurses and other primary clinicians are surveyed in order to determine how this activity affected the patient-provider interaction. The long-term objective of this program is to establish a means of personal connection through the art of storytelling. In this presentation, we will share preliminary outcomes of the storytelling intervention measured qualitatively by means of patient and caretaker survey responses.

Room 903   11:45-12:30   Panel 3
Soncere Marie Williams
Kari Dupuis (Faculty Sponsor)
Department of Social Work, Berkshire Community College
Complexities in Helping United States Veterans

Veterans are a unique population that includes a variety of ages, ethnicities, genders, and abilities. They are sons and daughters, husbands and wives, and a unique group that has historically been somewhat idolized. Generally, it is assumed that veterans are well off: they receive training, education, income, insurance, and a whole host of benefits for serving our country. What is not widely known is that these benefits seem to be disappearing, while the number of needy veterans continues to increase, and the hardships they face are becoming more widespread. Homelessness and poverty have become repetitive themes throughout society, both of which are often a consequence of the challenging mental health issues that our veterans face. Although veterans may not be viewed as an underrepresented population, the complexities they face and growing concern for their overall well-being is certainly an issue to be discussed. This presentation aims to address the research findings in reference to this population, their needs, and common misconceptions of the services available to them.
Westfield State Circle K: A Look into the Life of a Student Volunteer

This presentation aims to inform its audience about the Circle K Club at Westfield State University, part of the world's largest collegiate organization related to community service and leadership. The presentation will provide information on this year's community service events and fundraisers at Westfield State, as well as a general overview of Circle K in general and its relation to the Kiwanis Family.
Knowledge of one’s physical well being on a daily basis is often not on the front of one’s mind. To combat this, we developed a system in which a user has direct access to their sensed health data via voice commands. This system utilizes the E4, a wearable health monitoring device from Empatica, to gather health information. This device utilizes electrodermal activity (EDA) or galvanic skin response (GSR) sensors, which measure fluctuations in electrical properties of the skin, PPG sensors, which measure blood volume pulse (BVP), and other sensors to gather understandable health information such as heart rate. The data regarding these metrics is then communicated over BLE to an AI speaker running on a Raspberry Pi with internet connectivity. Amazon Alexa, and similar services provided by Amazon, serve as the AI speaker, provide voice recognition, handle request processing, and allow cloud storage. This system increases ease of use and accessibility of health metrics. Since early detection of problems, simplicity, and normalizing the act of knowing one’s physical well being is the goal, interfacing with an AI speaker via voice commands will increase convenience and accessibility. Additionally, if an easily detectable problem arises, such as a seizure or cardiac arrest, taking advantage of an already existing AI speaker in the home to broadcast the immediate problem to those locally available may be of critical importance. Furthermore, the commercialization of AI speakers could allow for more data to be collected, and more people to utilize health monitoring on a regular basis.
existing systems. We achieve this by using a hybrid physical-empirical model to map measurements from the internal battery temperature sensors contained in all mobile phones to ambient indoor air temperature. Our application models the relationship between battery temperature and ambient air temperature as some function of both computational and physical phone context using measurements from both hardware and software sensors as features. A deployment of such an application can turn a building full of smartphones into a building equipped with a temperature sensor network capable of gathering dynamic spatial temperature data at the room level.

Observing and Characterizing Light Bulb Features for Measuring Electric Grid Power Quality

The technological advancement in developing regions is drastically different than that of industrialized countries. While the United States heavily relies on electricity to function, areas in Africa struggle to consistently deliver power to people’s homes. Inconsistent electricity can be harmful to electronics and frustrating to rely on, resulting in consumers avoiding the usage of electricity entirely. As a result, the objective of this research project is to monitor the electric grid via cheap and scalable methodologies. One major feature of light bulbs that can achieve this goal is the characterization of a light bulb’s waveform. The photons emitted from a light bulb supplied by alternating current electricity can be translated to the output current of a phototransistor; each type of light bulb produces a unique waveform. To classify a diversity of lightbulbs, we will build a database that identifies and matches hundreds of different light bulbs to their respective waveforms. This database will also include a multitude of other light bulb features such as chromaticity, color temperature, luminous intensity, and illuminance. These features can provide information towards grid fluctuations in addition to the characterization of a light bulb’s waveform. As our research eventually aims to be applicable for any developing region, a robust database that can recognize almost any type of light bulb will improve accuracy.

Analysis of Secure Authentication and Encrypted Communications between Drones for Delivery Applications

Drone delivery is approaching widespread commercial use and must be secured from wireless attacks or intrusions before full implementation. Current communication with a central operator or other drones may compromise a vehicle, but are often necessary for safe and successful navigation in congested skies. Technical limitations delay the introduction of delivery by drone at this time, however limited thought has been put into security where drones may be as common as automobiles. This paper studies the ability for communication units with Raspberry Pis, XBee...
radios, and supporting peripherals to provide low cost authentication and AES encryption between drones from any owner. The drones were modelled with APM 2.8 flight controller boards that have telemetry sensors such as GPS to simulate real time data that may be disclosed to trusted entities. The Raspberry Pi and its XBee radio can be connected to existing drones and authenticate the identity of a paired drone. Following identity authentication, the appropriate amount and type of encrypted information can be transmitted. Measurements of effective range, power consumption, and latency may indicate the feasibility of this implementation in drones with varying integrated wireless security. Based on this analysis, potential applications in the delivery space will be discussed.
COMPUTER SCIENCE

8:30-9:15 Board 2
Christopher Lamar Reid
Karen Druffel (Faculty Sponsor)
Department of Management and Business IT, Framingham State University
Public Trust of AI in Different Consumer Applications

Artificial Intelligence includes the capability of a machine to imitate intelligent human behavior. In recent years, Artificial Intelligence has become more prevalent in everyday technology, like personal assistants in smart phones, self-driving cars, and services like Netflix or Pandora. These advanced technologies allow for more productivity, while cutting out the potential human error. With AI growing at such a rapid pace, and becoming more involved in consumer products, privacy is more of a concern. This paper explores consumers’ perceptions of Artificial Intelligence and the different levels of willingness people have for A.I. integration in everyday life. By gathering surveyed public opinions on different aspects of AI (AI in our phones/personal devices, and AI with its increasing presence in our medical lives), the research tries to determine the point where people’s trust of technology turns to distrust.

10:45-11:30 Board 52
Edward F. Clifford
Claudine E. Barnes (Faculty Sponsor)
Department of History and Political Science, Cape Cod Community College
Effects of Data Collection and Digital Regulation in Today's Society

This project will explore the effects that the rapid expansion of digital data collection has had on our society: using data analysis for targeted media, lack of security and personal privacy, and sale of data. Since the invention of the web, government regulation has lagged behind the boom of technology and techniques used by large corporations to turn information into profit. This age of information has come to define a generation, and as technology advances faster and faster, the lack of regulation will only affect more areas of our society. I am going to explore the technological advances in data collection that corporations have utilized to turn their users into products, and the unwelcome influences this practice has brought into to today's world.

Room 168 10:45-11:30 Panel 2
Anthony Van Le
Hao Loi (Faculty Sponsor)
Department of Computer Science, Quinsigamond Community College
Enhancing Human-Robot Interactions Using NAO Robot and Google Assistant

The NAO Robots have immense potential for usage in a wide variety of applications both in the industry and everyday life. A known issue that affects developments in this space can be found in their unresponsive and limited speech recognition interfaces, which can limit their ability to interact with people in a normal, approachable way. Conversations and human interactions with
NAO robots are limited to the scope of a dialog database, which presents problems for more human-like robots to develop. Therefore, we plan to implement a solution for the NAO Robot to overcome its limited speech recognition capability by integrating the Google Assistant into the NAO robot. The Google Assistant engine can provide the robot with a rich dialog dataset for Human-robot speech interaction. Therefore, the door is open for conversations, Q&A style prompts, and the full potential of its Google Assistant interactive library.

Room 168 10:45-11:30 Panel 2
Christopher A. Lindberg
Hao Loi (Faculty Sponsor)
Department of Computer Science, Quinsigamond Community College
Creating the Framework to Allow a Robot to Play Chess

On February 10th, 1996, IBM's Deep Blue became the first computer to win a chess game against a reigning world champion. This was a giant milestone in the field of artificial intelligence (AI). However, a human had to act as a proxy for Deep Blue, because the computer had no way of moving the pieces on its own. The lack of a physical agent to carry out tasks is a fundamental dilemma in the field of AI, and, consequently, is the problem we will seek to solve.

The end goal of our research project will be to connect the NAO robot to Deep Blue and allow it to physically interact with a chess board to play a game against a human. However, in order to make this possible, the robot must first be programmed to identify and interact with a chessboard. This will be the sole focus of this research project. We'll design a customized chess board with specific landmarks so that the NAO robot will be able to recognize it. Next, we will program the robot so it can orient itself and move to any of the chess board's four quadrants. Lastly, we'll develop the ability for the NAO robot to pick up and place specific chess pieces at any given location. The implications of this work will allow the linking of the NAO robot to Deep Blue, in order to give the computer the ability to physically play a game of chess against a human, without outside assistance.

Room 168 10:45-11:30 Panel 2
Meet S. Patel
Peter Erian
Hao Loi (Faculty Sponsor)
Department of Computer Science, Quinsigamond Community College
Secure Simple Login

This project entitled "Secure Simple Login" (SSL) will be a cross-platform application that allows users to log in to SSL using multiple layers of authentication. This is all done with minimal configurations from users and administrators and without the mundane routines of security configuration. The user will start the application by scanning a QR code that is embedded with location data. The embedded data will then be compared to the user location from the smart device that is being used. Once the location data has been verified then the next step will be a username and password authentication. In the case of an unregistered user, the user
information will be sent to the administrator for authorization. This application can be used in businesses with high rates of turnovers, so, the administrator does not have to authorize users using the time-consuming security configuration routines. The application will be developed using QT with FELGO engine and C++.

**Room 168  10:45-11:30  Panel 2**  
Kenneth Lord Tubman  
Hao Loi (Faculty Sponsor)  
Department of Computer Science, Quinsigamond Community College  
**Data Accessibility of Social Media Platforms**  
The amount of data that is held by major companies of social media platforms is becoming an increasing concern to the general public and even in some governments, especially with the recent Facebook privacy scandal. Knowing the data that the social media companies have on you and how much can be accessed by others is important to keep yourself safe and keep other people away from your private data.

The goal of this research is to see how much data the companies Facebook, Instagram, Twitter, and Facebook have on the average user and what the accessibility of that data is from different perspectives of the user. The different perspectives that a normal user might encounter: the own user account holder, friends, and non-friends/random people.

**11:45-12:30  Board 13**  
Kyu Bin Lee  
Monica Poole (Faculty Sponsor)  
Department of Interdisciplinary Studies/BDIC, Bunker Hill Community College  
**The Future of the Deep: Ocean Exploration with Artificial Intelligence**  
This project inquires into the future possibilities for exploring the deep ocean with the use of Artificial Intelligence (AI). Much of the earth’s ocean remains unexplored; yet as humans have progressed with explorations, each new oceanic frontier crossed reveals a wealth of minerals and species previously-unknown. Most likely, future discoveries will prove similarly fruitful, so oceanic exploration should be accelerated. By incorporating modern and highly developed AI, scientists, researchers, and the wider society will be able to accelerate the pace of ocean exploration and discovery. This project will review cutting-edge uses of AI for oceanic exploration, consider technologies currently under development, and explore what will be next in the future.
We are now living in an era of 21st century industry - the industry of automation, and data exchange in manufacturing, where digital devices become an essential part of our daily life. What if those devices could think for themselves and talk to each other? In other words, what are the possibilities that would emerge from integrating the Internet of Things (IoT) and Artificial Intelligence (AI)? While AI researchers try to give the machine the ability to learn and making human-like decisions, IoT researchers are trying to advance synchronization among machines - enhancing communication between devices. AI technology is now widely used in many aspects of our life including smart homes, and IoT is successful in creating a communicating network of devices, also essential to smart homes. For some, this might seem like a threat to privacy and security, but in fact, the integration of IoT and AI can improve home security and personal privacy. This research will explore approaches to support home security by integrating AI and IoT.

Countless technologies rely on satellites. Since the 1950s, thousands of satellites have been launched into Earth’s orbit, but only a handful of them have reentered. The remaining thousands of inactive satellites have created a field of space debris that poses a significant threat to current and future space operations. Many of these satellites orbit the planet at incredibly high speeds and risk collisions with other objects (including other satellites), creating new, smaller and equally dangerous particles. While many technologies are in development to solve this issue, an successful solution has yet to be identified. One challenge facing the management of space debris involves effectively identifying the position and orientation of the debris. Having a precise, accurate understanding of an orbiting object's relative position is critical to avoiding collisions and developing effective strategies for repair and/or removal. The purpose of this project is to explore how artificial intelligence could be leveraged to efficiently provide accurate pose estimations of orbiting objects.
In the last decade, self-driving car and their AI implementation have been widely discussed. Many benefits could be accomplished with the usage of AI on self-driving cars such as lowering the traffic if not eradicating it, providing driving comfort, the ability for the “driver” or passenger to consume alcoholic drinks and still ride the car, etc. However, when accidents are inevitable, decisions will have be made. Accidents such as children suddenly running into the streets, or an elder person taking lots of time to cross it, or a blind person walking into the street. When this kind of accident is presented, the car will have to make a decision if it cannot stop or otherwise avoid the accident of who it will harm. The ethics that will be used for the car have been widely argued and researches have been made. In this research it will be explore what the opinion on the ethics do students from different majors such as art majors, computer science major, religious majors, and others have. This research, however, will use references from the study “moral machine” by the Massachusetts Institute of Technology. This research will survey different students from different majors to see how ethics depending on a major could change.

The purpose of this project is to help users identify a song that they might not know the name or artist of. This application will allow users to play a song and have an easy-to-use mobile application recognize the song and display its general information such as: artist, song name, and album art of the song. This will be achieved by creating a dataset of songs and audio sampling them using the K-nearest neighbors’ algorithm; comparing the peak values within the song and finding the closest match in the supplied dataset. This dataset will be implemented using python code that will be trained in an unsupervised manner to recognize the users’ song of choice.

This project will be exploring the effectiveness of App Inventor, in combination with a project called “Java Bridge,” in teaching computer science students how to problem-solve and write code. Currently, the way programming is taught can be very difficult for students who have
never written code before. Part of a computer science class is about acquiring the problem-solving skills necessary for the subject, which is typically combined into assignments requiring the students to write a code solution to a problem. For a student with no prior programming experience, this is likely to be overwhelming, and may strongly discourage him or her from pursuing a career in computer science. My research into the App Inventor Java Bridge will highlight the benefits of separating the problem-solving learning component from the code portion without slowing down the learning process. The results of this research will be beneficial to high school teachers and college professors who teach introductory programming courses.

Room 168  11:45-12:30  Panel 3
Andrew Leger
Daniel Joseph Warner
Hao Loi (Faculty Sponsor)
Department of Computer Science, Quinsigamond Community College
Exploration of Varying Approaches to Sentiment Analysis

In this new world of copious data and online markets, it has become vastly more pressing to identify how people view a company’s brand. The modern solution to this problem is sentiment analysis using machine learning algorithms, which attempts to map a collection of consumer information to a known set of data, such as online ratings or sales figures. Two of the more common approaches to this task are natural language analysis using word connotation, and recurrent neural networks which attempt to solve the problem with a more abstract machine learning algorithm.

The goal of this project is to design software which will use Twitter’s API to collect tweets about specific movies, and then analyze those tweets using neural networks and natural language analysis with TensorFlow to generate two sentiment scores, using IMDB’s community voted movie rating as a comparison. From there, the natural language and neural network approaches will be compared along several metrics, most prominently success rate and accuracy, to determine if one is similarly successful with considerably less resource consumption than the other.

Room 168  11:45-12:30  Panel 3
Nelson Josue Montesinos
Sergei Albert
Hao Loi (Faculty Sponsor)
Department of Computer Science, Quinsigamond Community College
Goldfish Diagnostics Application

For this research project, we will be comparing two machine learning algorithms: The C5.0 decision tree algorithm, and the Neural Network classification system for the diagnosis of goldfish diseases. Our goal is to determine which system computes the most accurate diagnosis and which of the two systems is easier and more efficient to implement.
Very often, people diagnose their sick fish through guesswork, or by making a quick search on the internet. These approaches, however, may produce unwanted results, which will, in turn, make the illness worse or kill the fish. The goal of the “Goldfish Diagnostics” application is to help goldfish owners accurately determine whether their goldfish suffer from one or multiple ailments, as well as provide the necessary information, medication, and treatment to successfully cure and prevent future illnesses. The application gives the user the opportunity to select and combine between thirty-two different symptoms each of which could be found in fourteen different illnesses. Once selected, the application will gather the data, compute the diagnosis, and present it to the user through data visualization tools where each illness is listed as a variable and their frequencies are determined according to the symptoms the user has selected. The application will then provide the user with a brief description of the illness, list the possible causes of the illness, and provide treatment. Finally, the application will link the user to a website where the proper medicine can be purchased.

**12:40-1:25    Board 10**  
Kush K. Patel  
Lori A. Clarke (Faculty Sponsor)  
Department of Computer Science, UMass Amherst  

**Smart Checklists**

Medical errors are the third leading cause of death in the United States. Healthcare information technology introduces systems that assist medical professionals and help reduce the frequency of medical errors. The goal of this project was to extend and redesign the Smart Checklist System, which automatically generates and dynamically updates a list of tasks or events in an executing medical process in order to provide guidance, not only during normative scenarios but also when non-normative (or exceptional) situations arise. The checklist is generated from a carefully elicited and validated model of the process. The resulting Smart Checklist is intended to be used during medical procedures to help reduce medical errors. For my project, I refactored the server/client architecture of the web-based system to improve understandability and reduce communication overhead. The system follows the Model-View-Controller architecture design. I extended both the Model and the View to make sure that they are always consistent with each other to accurately display the current process execution state, including the process history and the current tasks to be done. This redesign also provides support for medical procedures involving multiple teams, which are more complex than single team procedures and typically require considerable coordination and organization. Additionally, I added several user customization features to the Smart Checklist. This work will allow the researchers involved in this project to evaluate alternative ways of representing information to the clinicians to determine which are easier to comprehend and thus most effective in reducing errors.
The manufacture of computer chips using a plasma reactor is accomplished by depositing and activating various substances to and from the masked surface of a silicon wafer to create a desired pattern. To ensure that processes have been successful without performing costly tests, we would like to be able to predict the metrology measurements using automatic tools. There is an enormous amount of information that can be gathered from a single process, but each process is costly to perform metrology on, which is a limiting factor on the number of examples available to train an estimator. Part of the significance of this work is the success of the regression despite the limited number of examples. In order to accommodate the high dimensional process signatures, we isolated important sensor variables and applied domain-specific summarization on the data using multiple feature engineering techniques. We used a neural network to estimate the two metrology measurements in the dataset, Recess and Remaining Mask, from the summarized data. Our results approach the error tolerance of the microscopic imaging system. The models can make predictions for a general class of recipes and reactors that include the correct number of etch steps and the sensors, respectively. Notably, this method is not restricted to some maximum process length due to the summarization techniques used. These allow the method to be adapted to many other processes, given the data. In order to automate semiconductor manufacturing, estimators like these will be needed throughout the process to evaluate production quality.

A reliable web application was designed and implemented, which can help a currency exchange business to efficiently manage the actual process of currency conversion transactions management across multiple branches. The application is designed for the use by admins and customers as well. As a result, its benefits can be seen as: 1) Time and efforts for currency conversion transactions by hand are greatly saved through this automated system 2) Improved profits with better and easy reporting system 3) E-mailing reports directly to the bank.
Cyber-security within the Healthcare Industry: Why Are They at Risk?

Healthcare is of high importance and is in a field that only continues to grow. This study explores the cybersecurity within the healthcare industry and the threats and vulnerabilities that it currently has. Cyber criminals seek information from within the healthcare industry. Our research looks into specifics of what is so valuable that makes cyber criminals target this industry and also what factors might explain why this industry continues to be at risk. We use a survey instrument to see how much college students between the ages of 18-29 know about their information that the healthcare industries have that are currently at risk. Our study will ultimately show the role that cyber-security has in the healthcare system in the U.S.

The Effect of Recommendation Systems on Consumer Online Purchasing

Background and Objectives: This project analyzes the effects of online recommendation systems on online consumer behavior and the important influential impact on online buying internet surfing trends. Recommendation systems are used to predict a user's preference by utilizing past user data. The three types of recommendation systems are collaborative filtering, content-based filtering, and hybrid recommendation systems. This study measures the consumer's willingness to buy a certain product or spend more time browsing on a particular website based on the results of the recommendation system's algorithm.

Research Design and Methods: Results are based on a survey of 30 Framingham State University students, ranging from freshman to senior class.

Keywords: Artificial intelligence, Recommendation systems, Behavioral economics, Ecommerce, Algorithms

Which Age Groups Are in the Dark About Cybersecurity?

1:30-2:15 Board 51
Ryan J. Buchanan
Emmanuel Destine
Matthew Pellegrino
Karen Druffel (Faculty Sponsor)
Department of Management and Business IT, Framingham State University

1:30-2:15 Board 53
Louis K. Bradley
Karen Druffel (Faculty Sponsor)
Department of Management and Business IT, Framingham State University

1:30-2:15 Board 54
Adessa Batts
Michael Joseph Edwards
Christopher Anthony Melnik
Karen Druffel (Faculty Sponsor)
Department of Management and Business IT, Framingham State University
People that were born between 1993-2000 have been able to grow up using the internet and are known as digital natives. On the other hand, the digital immigrants, people born between 1946-1964 (baby-boomers) have had to learn about the internet as adults. Our research explores whether or not growing up with access to the internet impacts a person's views on cybersecurity risks. The study's results are based on survey responses from these two age groups. The survey questions include demographic information about the survey participants, their views on cybersecurity, and the types of methods they use to protect themselves on the internet.

Room 174  1:30-2:15   Panel 5
Viktar Yasiuchenia
Komalpreet Kaur (Faculty Sponsor)
Department of Computer Science, Salem State University
MindSpeller: P300 Classification Using EEG Signals

Brain Computer Interface (BCI) helps people with severe neuromuscular disorders to communicate and control devices using brain signals. The goal of this project is to design a P300 classifier that will help to convey the user's intent. P300 Speller is an application that allows the user to spell words and display them on the screen by using only the power of thoughts. It uses visual stimulation, meaning that when we focus on specific visual stimuli, our brain produces specific patterns. This phenomenon is called P300. The application itself represents a matrix that consists of letters and numbers. Rows and columns are consecutively highlighted with the interval of 100ms each. The subject is asked to focus his attention on just one letter, and once the desired letter is highlighted the signal goes through the occipital lobe. This brain activity is recorded by the process called Electroencephalogram (EEG). The EEG signals are recorded from the scalp using EMOTIVE EPOC+ EEG cap. The acquired EEG data is preprocessed and used to train and test a model based on Linear Discriminant Analysis (LDA) classification algorithm.

2:45-3:30   Board 65
Joseph Edward Freitas
David Morgan Keil (Faculty Sponsor)
Department of Computer Science, Framingham State University
The Internet of Things: Security and Applications

The Internet of Things, or IoT as it is commonly referred to, is a concept that is fairly new in the grand scheme of technology. Briefly, IoT is the vast connection of devices to the internet and from this connection, data can be extracted, and certain devices can control or communicate with other devices that are connected to the same network. Currently IoT is well-known for being implemented by primarily large businesses and some high-tech devices that one would only dream of owning. This presentation will focus on not just explaining what the IoT is, but it will also explore current applications of the IoT, security aspects and possibilities for future IoT applications, and explore how the many possibilities and applications of IoT could affect our future in various aspects of life.
Cybersecurity, which refers to the technologies used to protect the data, access, and integrity of computing assets against cyber-attacks, has increasingly gained attention in recent years. Within the last decade, U.S. suffered from more than 500 number of data breaches with over 580 million records exposed due to various types of cyber-attacks. The purpose of this research is to analyze and discover cyber-attack patterns through data mining on cybersecurity datasets. Data mining refers to the technologies for knowledge-discovery in databases, which performs the modeling of a large amount of data to discover relationships among data, find particular data patterns, and derive data tendency. In this project, we use statistics program language R to perform data mining on selected cybersecurity datasets. One finding we have deduced is that most recent cyber-attacks are related to PoS (Point-of-Sale) Malware and account hijacking to target both people and large institutions. We are working on to perform more analysis of the cybersecurity datasets. By the end of this research, we are expecting to produce two comprehensive graphical data models along with analysis details that would denote the trend of cyber-attack and the effectiveness of various security methods. The research findings would be valuable for developing better cybersecurity practices against cyber-attacks.

Machine learning has led to significant progress in previously unsolved problems such as speech recognition and self-driving cars. Reinforcement learning is the subset of these algorithms that deals with computer agents making a sequence of autonomous actions to achieve a set goal or reward. One popular way to test and train reinforcement learning algorithms is through playing video games because they have a set reward and are easy to model in ways that computer agents can understand. One area of reinforcement learning that has shown promise is multi-agent environments where more than one autonomous agent interacts in a competitive or cooperative way. While static environments are easier to solve because they have set rules that the agent can learn, this can lead to over fitting of the agent and less generalized skills. Multi-agent environments provide variability that has been shown to lead to more complex emergent behaviors. In this paper, I implement some of the state-of-the-art reinforcement learning algorithms, including DQN, PPO, and A3C in a multiplayer clone of the classic game snake. The environment the agents will compete in will use the Gym framework and the agents will use TensorFlow, a Python API for implementing machine learning algorithms. Pitting these agents against themselves I will show the behaviors they learn and the capabilities of these algorithms in a multi-agent environment.
Frank W. Firicano
Nadimpalli Mahadev (Faculty Sponsor)
Department of Computer Science, Fitchburg State University
Playlist: A Mobile Application Development Project

I have used the opportunity given to me by the Fitchburg State University Honors Program to work on developing a mobile application with the help of Professor Mahadev. The goal of this thesis was to design and build a functioning application, work with new languages/programs, and gain experience in the field of mobile application development in general.

The application I developed allows users to create ranked/ordered ‘playlists’ of electronic games they have played, ranging across the extensive library of titles, genres, and platforms created throughout the medium’s history. These games can be organized in lists based on how much users enjoyed each of them, how groundbreaking they were, or however else they would like; the possibilities are limited only to the users’ imaginations. They can also view a catalog of games to find titles to add. After lists have been created, users can edit the order of them, too.

While the actual application I created is the real end product of my work, my supplementary writings describe the project in greater detail. I discuss the original plans for the application, how they changed throughout the semester, the process of choosing the appropriate tools to work with, how the application works, my advisor’s contributions, the problems I encountered, and the solutions I found.

Emily Goroza
Tim David Richards (Faculty Sponsor)
Department of Computer Science, UMass Amherst
Affective and Accessible Design in Social Media UI

Social media is a platform rooted by technology and computer science and becoming more relevant in our everyday lives. How do social media user interface designs target their users? And in particular, how does it appeal to their audience? This study examines two specific aspect of UI design in social media: font types and color palettes. We investigate the affect 7 different color palette and font type combinations have on the general population of social media users, and in particular how this aligns with the Web Content Accessibility Guidelines, in order to gain a better understanding of how to portray social media user interface design in both a positively affective and accessible way for everyone. We then present the "ideal interface" which is designed based on results from our research investigation, in order to bring awareness to accessibility issues in web-based technological design and how to make the social media user experience positively affective for everyone.
The electricity bill constitutes a significant portion of a data center’s operational expenses. In an effort to reduce this expense, many data centers have begun supplementing energy drawn from the grid with on-site renewable sources. The total energy demand of data centers can be met by drawing energy from different sources such as the electric grid, local renewable generation, and energy storage systems. With the goal of minimizing the cost, a procurement algorithm acquires energy from different sources and decides when to charge or discharge energy from the storage system. We propose machine learning (ML) based algorithms that procure energy at near-optimal cost for a variety of scenarios. Our algorithms use a novel supervised learning approach that uses the decisions made by an optimal offline procurement strategy as labels for training.

We devise two complementary approaches: **LearnBuy** learns the amount of energy to buy or sell to the grid and **LearnStore** learns the desired storage level at each time step. **LearnStore** achieves a normalized cost between 1.13 and 1.45 and lowers cost by 10-16% compared to prior approaches. In the special case where energy prices are non-negative and selling energy back to the grid is not allowed, we show that **LearnBuy** performs better, achieves a normalized cost between 1.16 and 1.19 and lowers cost by 7% compared to prior approaches. Finally, we show both **LearnBuy** and **LearnStore** are robust when trained with inputs from one location and used in another location.

World Health Organization estimates that there are 1.3 billion people in the world are affected by some form of visual impairment. Visually impaired people have limited facilities to navigate and often use walking canes to navigate through their surroundings. Many visually impaired do not get help or have no formal support structure for normal living and is a major concern to the quality of life. Using interviews and surveys, we find that navigation has been one of the biggest constraints for visually impaired people. This includes minimal tasks like reading a bus ticket or other complex tasks like walking to a grocery store. As part of the project Stepify, we are developing a novel device that acts as an assistant to the visually impaired and provides them the freedom, convenience, and safety they need to navigate. We use ultrasonic sensors for detecting distance, accelerometer for fall detection, a camera for object detection with computer vision, and a panic button for notifying an emergency contact. We are using cloud technologies to integrate the functionality of the whole device, especially handling APIs and the voice assistant. We are continuing to research and develop the device to increase further functionality and exploring integration with other devices.
For-Profit Prisons

There are two types of prisons: public and private for-profit. When comparing both types, private prisons do not have to report information on inmate population, employees, and budget expenditure, whereas public prisons have to show this information. I plan to address the issue of whether private prisons are more cost-effective, and use the latest technology and management approaches. The majority of private prisons are in the western and southern United States. Private prisons emerged more during the 1980’s when former President Reagan started his War on Drugs campaign. Private prison inmates create goods that can be sold to consumers as they learn skilled labor. Some private prisons also house a lot of immigration detention facilities that are under the jurisdiction of the Department of Homeland Security. The highest inmate populations are in private prisons, but the consolidation of excellent management and employees with sufficient resources and the proper conditions make for better conditions. Government politics takes issue with both public and private institutions differently because of government regulation. This presentation will explore the topic of prison.

Future of Law and Law Enforcement

As new technology is introduced to the world, laws and constitutional interpretations must evolve to include developing surveillance and recording mechanisms. In the age of rapid technological advancement, legal precedents are being set constantly to attempt to account for the unprecedented prevalence of technology in society. This begs the question; to what extent can evidence obtained by technology be admissible in a court while maintaining an individual’s right to privacy and due process? This presentation will focus on historical legal precedents regarding technology use, developing precedents regarding new technology, and the implication that new technologies will have on an individual’s 4th Amendment rights.

Exploring the Racial Disparities of Police Shootings

The purpose of this presentation is to take a deeper look behind the police shootings of unarmed men of color and the current racial disparities they face when interacting with law
enforcement. Using data from the Washington Post, I will be exploring the contexts behind these shootings and the variations over time. Potential policy changes and solutions to lessen police shootings as a whole will also be discussed in this presentation. This presentation hopes to shed some light on the severity of this issue and how we can work to resolve it both for the good of law enforcement and our citizens.

11:45-12:30  Board 5
Liam Patrick Carroll
Forrest R. Rodgers (Faculty Sponsor)
Department of Criminal Justice, Salem State University
The Cost of Order: The Attica Prison Riot

This presentation is about the influence and relevance of the Attica Prison Riot in regards to the fair treatment of inmates. During this police riot which occurred in 1971 in New York, twenty nine inmates and four hostages were killed by police, along with eighty nine others seriously injured. This riot occurred due to the inhumane treatment of inmates, which is still very relevant to the prison system today. Lastly, what this presentation aims to do is to explore more humane and cost efficient ways to treat inmates in current society, with the hopes of preventing tragedies like the Attica Prison Riot from occurring again.

11:45-12:30  Board 71
Kelly Ann Blanchard
Forrest R. Rodgers (Faculty Sponsor)
Department of Criminal Justice, Salem State University
Juveniles and Violent Crimes by Race/Ethnicity

When it comes to the criminal justice system in the United States, there are obvious signs of discrimination and inconsistencies in the amount of crimes committed, individuals arrests and sentencing lengths. When examining juveniles and crimes, it is clear that the numbers show inequalities and disparities within races. Using statistics from the Uniform Crime Report and the National Criminal Victimization Survey, this presentation will explore the juvenile violent crime statistics by race/ethnicity. Preliminary results indicate an overrepresentation of youth of color for these offenses. Implications of these data and suggested programs will be discussed further.

1:30-2:15  Board 29
Kevin Sullivan
Israel Elijah Etienne
Matthew Robert Fogarty
Kaitlyn Selman (Faculty Sponsor)
Department of Sociology, Framingham State University
"I Tried Marijuana Once, and I Did Not Inhale":Youthful Perceptions and Marijuana Use
In this project, we explore how the perceived disapproval of marijuana use impacts marijuana use among young people, specifically the perceived disapproval of parents and friends. There are numerous factors that can influence a young person’s decision to use or abstain from marijuana use, a relationship that Social Learning Theory provides much insight into. As such, in this research project we focus our attention on the impact that perceived peer and parental disapproval has upon marijuana use among youths, using Social Learning Theory as our theoretical inspiration. This research uses the 2014 National Survey on Drug Use in Households (NSDUH), a cross-sectional telephone survey. The sample consisted of 67,901 respondents—13,600 of which are under the age of 18, our target demographic. The responses from the youth are analyzed using bi-variate and multivariate analysis techniques. Drawing from Social Learning Theory, we hypothesize that 1) as perceived disapproval of marijuana use by parents increases, the likelihood of a young person having tried marijuana decreases and vice versa, and 2) as perceived disapproval of marijuana use by close friends increases, the likelihood of a young person having tried marijuana decreases and vice versa. The research presented in this project is important because of its bearing on current societal discourse, as well as the impact it has upon the further development of social learning theory and its implications. Specifically, the content of our research is particularly pertinent to the relationship that exists between social learning theory and marijuana use among young people.

1:30-2:15  Board 30
Joe Bettinelli
Katrina Digiacomo
Jonathan Clarence Rouser
Kaitlyn Selman (Faculty Sponsor)
Department of Sociology, Framingham State University
School Security: How to Make Your School a Prison without Making the Kids Prisoners

In 2018, there were 82 school shooting incidents in the United States, the highest there have ever been since 1970 (CS staff, 2018). The spike in school shootings and other school related instances of violence set a new precedent for school security measures across the country. As such, we are interested in understanding the relationship between the presence of security measures and the level of violence that occurs in school. Specifically, we are interested in understanding how school security measures such as school resource officers, metal detectors, and surveillance cameras impact the frequency of physical violence and mental/emotional violence. To answer this question, we analyze data from the School Survey on Crime and Safety, a cross-sectional survey that was completed in 2016 by administrators from 2,092 public schools across the United States. The data are analyzed using bivariate and multivariate analysis techniques. Drawing primarily on Deterrence Theory, we hypothesize that schools with those security measures in place will experience fewer instances of physical and mental/emotional violence. Essentially, we predict that through the implementation of security measures, children will be less likely to experience physical and mental/emotional violence in school. The ultimate goal of this research is to better understand how security techniques can impact learning facilities so that our children may focus on increasing their learning without having to constantly worry for their own safety while at school.
The Use of Risk Assessments and Cash Bail in Massachusetts

The use of risk assessments to determine the outcome of bail hearings has the potential to eliminate inequality in bail decisions and establish an impartial uniformity for the use of bail in jurisdictions across Massachusetts – but only when the assessments are based on empirical evidence and combined with judicial discretion. In April of 2018, Massachusetts passed a criminal justice reform bill. Under the new reform, judges must take into account a defendant’s ability to pay bail before a bail amount is set. My research measured the success of the bill by sitting in on bail hearings and observing the bail setting process, tracking whether judges ask defendants about their ability to afford bail, and if they are not able to afford bail, whether defendants are given alternative options to monetary bail. In each case, my research tracked the judge’s use of risk assessments in their determination of a defendant’s release or bail amount. It is expected that despite the new reform bill in Massachusetts, the majority of judges are not consistently factoring in a defendant’s ability to pay for bail when setting bail amounts and that the majority of judges are not referencing scientific evidence on a case-by-case basis before making their bail decisions. Bail reform has been the subject of intense debate within the criminal justice field for years, especially since the Bail Reform Act of 1984. Despite the constant debate, a solution for the best use of bail (if any) has yet to be found.

The Exploration of the Implications of Police Interrogative Methods on False Confessions

False confessions are the leading cause of wrongful convictions in the United States. To reduce the occurrences of wrongful convictions within the United States judicial system, false confessions and their implications within the criminal justice system must be addressed. My thesis looks at the origin of false confessions – formal police questioning – and addresses the difference in standards and practices between the United States and the United Kingdom. In doing so, my thesis compares and analyzes the Reid Technique of Interrogation, used by the United States, and the PEACE Method of Interviewing, used by the United Kingdom, and discusses the implications the two different methods have on the fostering of false confessions. My thesis argues that the deceptive tactics used by the Reid Technique foster false confessions at an alarming rate, and addresses policy implications to aid in the reduction of false confessions within the United States criminal justice system. My thesis statement is that interrogative reform is necessary in the United States to reduce the current manipulative aspects of the interrogative process. The use of the Reid Technique by police officers has widespread implications for the criminal justice system, creating false confessions at an
alarming rate, which in turn are a leading cause of wrongful convictions in the United States. A reform in policy that reflects similarities to the PEACE method might assist in reducing the number of wrongful convictions in the United States, and help the police to gather truth rather than falsity during their investigations.

Room 162  1:30-2:15  Panel 5
Madison T. Medina
Philip D. McCormack (Faculty Sponsor)
Department of Behavioral Science Department, Fitchburg State University
Examining the History and Scope of Wrongful Convictions: Where Do We Go from Here?

This paper seeks to explore the scope of wrongful convictions by examining historical context, contributing factors, the nature and extent of the issue, consequences, and policy implications. The historical overview begins with Borchard’s research in 1913 that sparked the conversation about wrongful conviction in the United States. Other well-known and groundbreaking research such as Bedau and Radelet’s seminal 1987 study is analyzed, as well as many other crucial findings since, to gain a full understanding of causes and consequences of wrongful convictions. The foremost contributing factors provided by the National Registry of Exoneration treatments are evaluated to reveal individual and offense-specific disparities. The contributing factors include mistaken witness identification, false confession, perjury or false accusation, false or misleading forensic evidence, official misconduct, and inadequate legal defense. After providing readers with the historical background and examining the nature of wrongful convictions, consequences of the issue are explored. These consequences include those that affect the wrongfully convicted individual, society, and the criminal justice system. Lastly, policy implications are explored to demonstrate what has been done to relieve the problem of wrongful convictions and suggestions for updated solutions are provided.

2:45-3:30  Board 10
Eric James
Erin Katherine Krafft (Faculty Sponsor)
Department of Crime and Justice Studies, UMass Dartmouth
House of Deliberations: Society Condones Sexual Assault

In my research, I examine the difference between the morals we as a society say we have and the morals that we exhibit through our actions. Specifically, I focus on morals surrounding heteropatriarchy and rape culture, in both mainstream society and within social justice movements. One primary text in my research is Elaine Brown’s A Taste of Power. In this memoir, Brown talks about how her time spent in the Black Panther Party included prioritizing her blackness over her being a woman, and gendered hierarchies she faced even within a movement that claimed to be anti-hierarchical. This theme repeats in other primary source texts.

Clearly, there is a schism between stated morals and actions in revolutionary movements, as well as in popular culture. To deepen this research, I took this topic to the House of Deliberations, which is a student organization that seeks to discuss the various social

MASSURC
inequalities that students may face/enact in their individual lives. We aim to provide the students with the means to have critical discussions in the future. Our session on this topic examined the sex-positive culture we are trying to implement as a progressing society, and if our actions align with our stated morals. By bringing my academic research into the real world in this way, I am able to use historical precedents to examine the present, as well as use contemporary beliefs to bring new perspectives on historical social movements/norms.

This presentation aims to be interactive!

2:45-3:30  Board 36
Nicole Tardanico
Susan McCourt (Faculty Sponsor)
Department of Mathematics, Bristol Community College
Will Neuroscientific Evidence Find a Place in Our System of Justice and Be Ruled as Admissible?

My research will discuss this theory in detail by examining an emerging field called Neurolaw, which includes law, neuroscience/neuroimaging, and abnormal psychology. First, my research will review how the law is applied to neuroscientific evidence. This includes its capabilities and limitations, and a brief history of criminal and constitutional law. Second, my research will examine how neuroscience can and should be used legally in criminal trials, considering its validity, reliability, and admissibility. I will explain the Daubert Standard and the Frye test, the Federal Rule of Evidence 702, the M’Naughten rule, and their relevance to evidence law. Third, my research will examine applications used in the courtroom, which include lie detection, MRI, fMRI, PET, and SPECT images. Finally, my research will refer to areas of abnormal psychology, addressing the issue as to what extent a tumor, brain injury, or mental illness can alleviate criminal punishment. I will use examples from serial killer Ted Bundy, Massachusetts teen killer Michelle Carter, and late former New England Patriots football player Aaron Hernandez to analyze the psychology of convicted killers discuss whether neuroimaging would have helped or hurt these individuals in their criminal trials? In covering each of these topics, I conclude how neuroimaging and abnormal psychology can play major roles in deciding the fates of individuals in criminal trials. I will also uncover the challenges that lie ahead in the up and coming field of Neurolaw with respect to brain scans in the courtroom.

2:45-3:30  Board 50
Sean McCarthy
Bayley Martin Laughlin
Nick Peter Martino
Jim Sean McQuaid (Faculty Sponsor)
Department of Sociology, Framingham State University
Crime and Criminality in the United States

In recent studies, 85 percent of boys ranging from 12-17 years old have reported that they have committed a crime, and more than half of them were classed as repeat offenders or have
committed serious crimes. To conduct our research, we will be using dataset General Social Survey (2010). Within the study we evaluate criminality, specifically what leads criminals to commit crimes. To help answer our research question we plan to use two criminological theories: general strain theory and social learning theory. General strain theory emphasizes the negative impacts from strain in someone’s life, and turn that strain into a deviant action or behavior. For the purpose of our study, we emphasized two types of strain. The types of strain used were emotional and financial. These are two of the biggest examples of strains and they carry numerous other subcategories with them to help strengthen the theory. Social learning theory emphasizes the use of direct experience and social reinforcement as to why a person may commit a crime. Within social learning theory, we looked into how positive and negative reinforcement can either encourage or deter a person from committing a crime.

Room 903  2:45-3:30  Panel 6
Lyvia Yoho
Kaitlyn Selman (Faculty Sponsor)
Department of Sociology, Framingham State University
Media and Perpetuating the Fear of Crime

According to news outlets and television programs, “violent crime” is rampant in the US. Importantly, this construction of crime is often related to specific communities—particularly poor, black and brown communities. Many TV and online media outlets perpetuate the claim of continuous dangers that marginalized people pose while ignoring the crimes of the powerful, and such coverage has done nothing more than perpetuate a false reality around crime. As such, this research explores websites that feature articles from scholarly journals, such as the Journal of Criminal Justice and Popular Culture and the Journal of Communication, as well as websites that blogged about such topics, like npr.org. Using a qualitative content analysis, I explore the images of crime/criminals that emerge in these media representations. I then situate these images and constructions in relation to well-known research on who actually engages in crime, the types of crimes people engage in, and the harm such law-breaking behavior brings. The results suggest that the media is reporting on and constructing a false reality. By reporting heavily on violent “street crime”, the media downplays the harm of white-collar, corporate crime, and environmental crime, and by focusing predominantly on poor, black and brown people as perpetrators, it downplays the extent to which people with privilege impose such harm. Educating people about this false reality is a first step toward finding possible solutions to the real crisis we find ourselves in—one in which people/corporations with power are able to operate invisibly and with impunity.
Parole is the conditional release of an offender from incarceration, under the supervision of the community. Under parole, offenders agree to comply with parole conditions and do not further violate the law in order to receive an absolute discharge from supervision at the end of their sentences. If a parolee violates the conditions, parole may be revoked, and the person must return to the correctional facility. At the beginning of the year 2016, 874,800 prisoners were released on parole. Since 2000 the parole population has been increased by 20.6% (BJS, 2018) and the recidivism rate of parolees has been continuous concern by the public. Although there are various factors that affect the recidivism of parolees, Chamberlain et al. (2017) concluded that the role of parole officers was crucial to parolee's success in reentering society. In their study, it was found that parolees with bad relationships were much more likely to end up back in prison than those that had good relationships with their parole officers. The purpose of this research is to examine how parole officers can support parolees to be reintegrated into society, while supervising them in the community. By identifying the parole officers’ role in reducing recidivism, this study intends to suggest the importance of the relationship between parole officers and parolees.

Probation makes up the majority of the American correctional population. Thus, being a probation officer is an extremely important and potentially dangerous segment of our criminal justice system. With an estimated 3,673,100 adults on probation by the end of 2016 (BJS, 2018), the normal caseload averages at over 100 cases per probation officer (Jalbert et al., 2011). Such high caseloads accompanied with increased workloads have a detrimental effect on offender supervision as well as rehabilitation, regardless of risk levels of offenders. Since it is so easy for an offender to violate his or her conditions of probation, it unfortunately increases the rate of technical violations, which is included as a recidivism measure. This study focuses on the effect of probation caseload and recidivism rates, and will discuss various factors where change can be implemented in the probation system to positively affect the recidivism rate among offenders. Historically, rehabilitation has been and continues to be a major focus for community corrections, and more light should be shed on how this goal can be achieved more efficiently. This study will ultimately conclude that reduction in probation officer caseloads paired with changes in probation officer supervision practices is what will help reduce recidivism.
3:45-4:30    Board 12
Dana Mohammad
Jessibelle Burgos
Michelle Perry
Hyesun Kim (Faculty Sponsor)
Department of Crime and Justice Studies, Worcester State University
Roles of Probation Officers in Reducing Recidivism

There is an estimated number of 4,537,100 adults under community supervision at the end of 2016 and eighty-one percent of them were serving probation. Although the probation population had declined since 2007, probationers accounted for the majority of offenders, fifty-six percent in 2016, under correctional supervision (BJS, 2018). Contrary to the public’s belief that probation is a sanction for low-risk level offenders, fifty-nine percent of probationers have been convicted of a felony, and about one-fifth are convicted of violent crime, including domestic violence and sex offense (BJS, 2018). Probationers can be discharged from the supervision upon their successful completion of the sentence, while the offender’s probationary status can be revoked due to recidivism, including a technical violation and a new arrest. Considering the high risk level of probationers and high technical violation rates, probation officers’ role becomes much more crucial than the past. Although probation officers have traditionally performed two conflicted functions: investigation and supervision, it is also essential for them to work and mentor offenders not to violate a supervision condition and commit a new crime. Thus, this study is intended to analyze recidivism rates of probationers and the roles of probation officers in reducing recidivism. This study will also discuss how probation officers can affect the overall success of probation and suggest an effective supervision model.

3:45-4:30    Board 13
Alexxis Nikole Vautour- Link
Brandon Tyler Caouette
Shaun McCarthy
Hyesun Kim (Faculty Sponsor)
Department of Crime and Justice Studies, Worcester State University
The Effectiveness of Drug Treatment for Drug Offenders in Prison

Criminal offenders who abuse drugs pose a very distinct challenge for criminal justice officials and the system because they present both treatment and management problems for corrections. Multiple studies consistently show that having a drug problem greatly enhances a person’s risk for committing crimes at some point in their lives (Effectiveness of Drug Treatment Courts, 2003). According to ADAM II 2013 Annual Report (Office of National Drug Control Policy, 2014), from 56 percent to 83 percent of offenders arrested in 5 U. S. cities tested positive for an illegal drug at the time of their arrest. The drug abusers also represents a potential control problem for correctional staff because of a high likelihood of re-arrest. Thus, correctional personnel must address the effects of drug dependency while the offenders in prison. Treatment programs have been implemented in prison and special drug treatment facilities were opened to house addicts as a special populations of incarcerated offenders.
Implementing drug-abuse treatment to these offenders, as well as providing them with resources, will eventually lead to successful transitions back into society as productive human beings. The goal of this study is to analyze the effectiveness of prison-based drug treatment programs on recidivism rates by comparing several programs implemented by institutions. By identifying successful programs and essential factors of the drug treatment programs, this study will make a recommendation for a promising model of drug treatment programs. Further, the benefits that participants received throughout the program will be discussed.

According to the Bureau of Justice Statistics (2005), 44.7 percent of inmates from federal prisons and 76.6 percent from state prisons have recidivated within five years from their release. It is crucial to have prison-based programs to effectively reduce recidivism. The vast majority of people in U.S. prisons do not have a high school diploma (Steurer, Linton, Nally, & Lockwood, 2010) and education programs have proved to be a great tool for prisoners to be reintegrated into society. According to a study done by Huttonsville Correctional Prison, 26 percent of inmates who did not participate in educational programs recidivated, while prisoners who participated in GED educational programs had a 6.77 percent recidivism rate and those who completed vocational educational programs had an 8.75 percent recidivism rate. Prison education is far more effective at reducing recidivism than vocational programs and any other punitive approaches. This study intends to evaluate the effectiveness of prison-based educational programs on recidivism and examine different aspects of educational programs. This study also investigates how educational programs affect inmates.

A report from the 2016 National Crime Victimization Survey found an increase of violent victimization reports from 2.7 million to 2.9 million by residents around the ages of 12 and older. For our study we used data from the National Crime Victimization Survey in order to explore the effects of daily life and power on personal and household victimization and find out how people
become victims to a crime. We apply routine activity theory and backlash theory in relation towards criminal victimization. Routine activity theory is described as a perspective of criminology and argues that daily activities of potential victims can be used to explicate the victimization of individuals and or the victimization rates of groups.

3:45-4:30  Board 9
Matthew Lewis Doane
Quentin Michael Lucas
Hyesun Kim (Faculty Sponsor)
Department of Crime and Justice Studies, Worcester State University
Can the Comfort of Home Deter Crime?

House arrest, or home confinement, is “an intermediate sanction designed to confine pretrial detainees or convicted offenders to their home,” (Alarid, 2017, p. 216), introduced in Miami in 1984 as a solution to an overcrowding prison system. House arrest can be sentenced for non-violent and low risk offenders and is considered a cost-effective sanction. Stanz and Tewksbury’s study (2000) found that 85% of offenders who were sentenced to house arrest successfully completed their sanction, but 65% of them reoffended within 2 years from their discharges. This study implies that house arrest may not be effective in deterring criminal behavior and rehabilitating offenders. Further, it raises a question whether house arrest is a reliable way to maintain public safety. The goal of this study is to identify major issues with house arrest, including recidivism rates, deterrence effect, as well as the burden on family members. Family members of the offenders are also a focus as they are forced to cope with the punishment of an offender. This study also intends to provide suggestions on changes that can be used to improve House Arrest as a criminal sanction and bring light to the issues surrounding it.
A Study of Energy Development Pathways to Identify Robust Investments in Mexico

Mexico’s long-term climate change goal is to reduce greenhouse gas (GHG) emissions by 50% by the year 2050 from its emissions in the year 2000. This ambitious goal will require substantial changes in electricity infrastructure. To study how this could be accomplished, we are developing detailed infrastructure development plans for the Mexican electrical grid between the years 2016 and 2050 under a series of business as usual (BAU) scenarios, in which greenhouse gasses are not limited. These BAU development plans will form part of a larger study looking at corresponding climate change abatement scenarios which will be used to identify robust development options across all scenarios. We are using the PEGyT model, a detailed, bottom-up model of the Mexican electrical grid, to analyze the BAU scenarios and develop detailed geographic information on the distribution of resources and infrastructure within Mexico. By studying and comparing the BAU development scenarios we hope to identify robust areas of development for energy planning and policy development.

iCons: The Value of Flexibility in a High Renewable Future: A Case Study of New England’s Power System

We investigate how pumped hydro energy storage (PHES) can support a high renewable future and the impacts this would have on sustainability. Many regions, including New England, are looking to increase the amount of renewables (i.e. solar and wind) in their power system. The issue with renewables is that they are variable in nature (i.e. the sun does not shine all day and the wind does not continuously blow). To address this intermittency, electricity storage is being considered. Electricity Storage is valuable because of the ability to harvest excess electricity during low demand and then supply electricity during peak demand times. We compare different high-renewable electricity futures with and without PHES, to determine the sustainability value of PHES. Each electricity future is evaluated in terms of seven sustainability indicators (i.e. environmental, economic and societal factors), and the energy contribution of each technology. This information would be of value in energy planning and can highlight the value of energy storage in a high renewable future.
The inherent nature of a manufacturing job-shop layout depends on the synchronization across shared resources which require product-dependent, often lengthy, setup times. Capacity constraints and a multi-level product tree make planning production in this environment very complex. In my thesis I investigate an optimization tool’s framework that schedules orders for a typical manufacturing shop-floor at a high level. By testing and evaluating different solutions through a series of sensitivity analysis, I identify the best option which can be generally applied throughout factories like the one under investigation. There are many different companies that specialize in developing production planning software, such as Infor, Oracle Corporation, and SAP SE; however, the licensing fees for these products are often financially infeasible for smaller firms. My thesis deals with addressing the need for realistic optimization tools to help smaller companies execute production more efficiently.
ECONOMICS

8:30-9:15  Board 15
James Stephen Abraham
Christine L. Crago (Faculty Sponsor)
Department of Resource Economics, UMass Amherst
Assessment of the Economic Impact of the Endangerment of the Tasmanian Devil (Sarcophilus harrisii) on Tasmania’s Timber Industry

The threat of extinction of the Tasmanian devil (Sarcophilus harrisii) due to devil facial tumor disease is a significant case study for the growing problem of a worldwide loss of species. The worldwide decrease in biodiversity is a major concern for not only ecologists, but also economists because species serve a significant role in regulating ecosystems, which affect ecosystem services such as mining and timber harvesting. The objective of my research is to determine if the conservation of the Tasmanian devil would provide economic benefits to the economy of Tasmania. To answer this, I conducted a cost-benefit analysis of Tasmanian devil conservation. I presented a counterfactual of no devil conservation and a population drop at their current rates, and two alternatives where devils are conserved. The first alternative involves the Tasmanian devil population stabilizing, and the second alternative involves an increase in their population. Because of the Tasmanian devil’s ecological niche of being an apex predator, it can be expected that they would have a positive effect on the ecosystem, which would result in increased ecosystem services, especially in the timber industry. I expect to see that the benefits of conserving Tasmanian devils would outweigh the costs associated with their conservation. This research is important for decision-makers to consider when trying to reach compromises for conservation of endangered species and profit for businesses directly involved in ecosystem services who would experience losses as a result of increased conservation efforts.

8:30-9:15  Board 16
Katherine I. Heidelberger
Christine L. Crago (Faculty Sponsor)
Department of Resource Economics, UMass Amherst
Evaluating the Effects of a Potential Carbon Tax on Boston Commuters

With excess greenhouse gasses in the atmosphere being a leading cause of climate change, and transportation contributing a significant amount to this issue, it is crucial to cut carbon emissions in transportation in order to lessen impacts on the environment. This research aims to examine the effects of a potential carbon tax in Massachusetts on Boston commuters through cost-benefit analysis and distributional impact analysis. By comparing the cost of driving versus taking the commuter rail, before and after a potential carbon tax, commuters will be able to clearly see how and where their costs will change. These results will empower them to make more educated decisions on whether or not a carbon tax is right for them, and which mode of transportation will be most cost-effective for them if the tax is implemented. For the MBTA and the city of Boston, the implications of this research come from commuters’ potential behavioral changes that may result from a carbon tax, and what they can do to prepare for and influence this for better social and environmental outcomes. Additionally, Lawmakers can consider the
impacts on the commuters and transportation systems in Massachusetts, thus allowing them to set up the tax in the most effective way in order to lower impacts on the environment while best serving Massachusetts citizens.

8:30-9:15  Board 17
Justin Charles Livoli
Christine L. Crago (Faculty Sponsor)
Department of Resource Economics, UMass Amherst
The Impact of Climate Change on the Skiing Industries of Massachusetts and Vermont

Climate change is affecting snowfall patterns in the regions of New England resulting in less than ideal skiing conditions. Ski resorts will find themselves more heavily reliant on snowmaking as temperatures increase and snowfall totals decrease. My research question looks at the economic impact of climate change on the skiing industries of Massachusetts and Vermont by 2060. I will conduct an impact analysis for ski resorts of Butternut in Massachusetts and Killington in Vermont using data on snowfall projections and cost of snowmaking on both states. The main objective of the analysis is to see how the cost of snowmaking for these resorts will increase as temperatures increase and snowfall decreases. I project that by 2060 Butternut will be in a larger financial disadvantage than Killington for several reasons. Butternut receives far less natural snowfall than Killington and endures far warmer winters. Killington benefits from a far larger budget than Butternut allowing them to invest in snowmaking equipment at a much higher rate than Butternut. Skiing is a cultural and recreational activity for many people. These communities in Vermont and Massachusetts almost single-handedly rely on the skiing industry to run their economy. Any negative impacts that climate change causes for Vermont and Massachusetts could have dire consequences for these skiing communities.

10:45-11:30  Board 31
Jonathan D. Vos
Laura Lamontagne (Faculty Sponsor)
Department of Economics, Framingham State University
The Public Green: The Impact of Investment in Conservation Commons

For over a century the United States has invested hundreds of millions of dollars in environmental conservation. While the most recognized these conservation efforts is the National Park System, there are many more projects that receive less attention at both the state and local level. The resources available to state and local governments for these efforts are significantly more limited in scope, which is why it is important to determine which efforts have the greatest impact given the lower level of funding and their overall return of investment. This study will examine the impact of investment into conservation efforts at the local level in Massachusetts, specifically those involving watershed conservation, special attention is given to the Sudbury Valley River watershed. A thorough analysis on the efficiency of these conservation projects is conducted. This study will use this evidence to build the case that these conservation
investments are justified due to the magnitude of the impact in a number of different forms, which can be measured from total welfare benefits to ecotourism revenue that they may generate.

10:45-11:30    Board 32
Jennifer S. Pinto
Laura Lamontagne (Faculty Sponsor)
Department of Economics, Framingham State University
Solving the Kidney Shortage: A Hypothetical Market for Kidneys in the United States

In the United States, there are over 100,000 people on the waiting list for a kidney transplant. However, the number of available donations, both living and deceased, is not nearly enough to satisfy the demand. In 1984 National Organ Transplant Act (NOTA) prohibited the buying and selling of human organs making it a crime "for any person to knowingly acquire, receive, or otherwise transfer any human organ for valuable consideration for use in human transplantation if the transfer affects interstate commerce." Should NOTA be abolished, a regulated market for kidneys would substantially reduce the shortage, saving thousands of lives and reducing extensive medical costs associated with kidney failure, such as dialysis. For over 20 years Iran has successfully conducted a kidney market where patients in renal failure can purchase an organ from a willing donor. This paper will propose and analyze a hypothetical kidney market in the United States paralleling it to the Iranian market. Implications to producer and consumer surplus will also be analyzed, as well as the argument for why opening up trade in the organ industry would be an advantage.

10:45-11:30    Board 33
Kelsi D. Gunarathne
Laura Lamontagne (Faculty Sponsor)
Department of Economics, Framingham State University
Smarter Economics for Prison Systems

Since the 1970’s state prison populations have grown approximately 700%. According to the Bureau of Justice Statistics, in 2017 the costs of mass incarceration in the United States totaled $81 billion. On average, each inmate costs American taxpayers $31k to $60k per year. In Massachusetts, the average annual cost per inmate is $46,000. This study investigates the inefficiencies in the public prison system and compares the current system in the United States to Norwegian prisons. Norway spends approximately $90k per inmate annually, however its recidivism rates are substantially lower than that of the United States. Special consideration is given to federal and state prisons in Massachusetts prisons as a baseline for comparison to their Norwegian counterparts. Results show that American Prison Systems could be substantially improved if they were to adopt a framework similar to Scandinavian models. Additionally, this would prove to be financially beneficial as recidivism rates are one of the lowest globally and prison sentences are shorter.
10:45-11:30   Board 34
Christopher Paul Goodwin
Laura Lamontagne (Faculty Sponsor)
Department of Economics, Framingham State University
Raising the Minimum Wage: How Much Money is Enough in Massachusetts?

Across the country there is a push for a $15 per hour minimum wage. Minimum wage is legally the lowest wage that can be paid to an employee. The federal minimum wage is currently $7.25 per hour, however a state can mandate a minimum wage that is greater than the federal rate. This study will focus on the effects of increases in the minimum wage on low income households and the impact on business. Minimum wage in Massachusetts has risen from $8 per hour in 2014 to $12 per hour as of January 1, 2019. Over the next three years this wage will increase by $1 annually until minimum wage reaches $15 per hour in 2022. This study will identify the costs and benefits of a higher minimum wage for Massachusetts. A cost of living estimate is assessed in Boston, MetroWest, Worcester, and Western Massachusetts. Finally, a determination is made on if a $15 an hour wage is a living wage in Massachusetts.

10:45-11:30   Board 35
Adam James Wilbur
Laura Lamontagne (Faculty Sponsor)
Department of Economics, Framingham State University
An Economic Portrait of Fine Art Auctions

Chrsitie’s & Sotheby’s are the world’s largest auction houses facilitating a combined estimated 90% of all fine art sales. These two firms provide a valuable service in being a public record of art valuation by hosting a searchable database of hammer prices, considered to be fair market value. During the 1990s these firms engaged in a price fixing scandal by agreeing to set identical commission charges, making it impossible for sellers to play each firm against one another to secure a more competitive rate. As an oligopoly in the fine art market these firms the collusion between Chrsitie’s and Sotheby’s resulted in a pure monopoly. Since Sotheby’s Chairman Alfred Taubman and CEO Diana Brooks resignation in 2000 over the scandal, both firms have returned to their previous business model of negotiating with sellers over commission and resumed other incentives, such as the speculative policy of price guarantees, aimed at attracting high value pieces that were suspended during the collusion. Studying the motivations of buyers and sellers in response to firm actions, as well as their role as rational actors in auction theory, leads to questions about the controls the auction houses’ actions have on supply, liquidity and price of fine art in cartel, Cournot, Stackelberg and Bertrand models.
A Green and Black Market

In 1937, The Marijuana Tax Act made consumption of marijuana federally illegal. Decades later, marijuana remains federally prohibited however several states have passed laws allowing both medical and recreations use of the substance. In 2012 Massachusetts voters approved a ballot that allowed the medical use of marijuana and in a 2016 referendum ballot, approved the use of recreational consumption. The first dispensaries for recreational consumption opened in November 2018. During the first five days of operations these recreational dispensaries brought in over two million dollars in sales. According to the Cannabis Control Commission there were 56,000 products sold in the first week with an average sale of $39.33 per customer. The marijuana market hold great potential to generate millions of dollars in tax revenue for the state. However, heavy legal restrictions and limited availability the black market is still thriving within the state. This study examines the economic implications of the new marijuana market in Massachusetts by comparing it to already established markets like the Colorado market and by comparing it to alternatives including the black market.

The Video Game Industry: The Transition from Physical to Digital Media and Its Relation to Piracy

The video game industry has experienced consistent growth for over three decades. As a result of advancements in technology, consumers’ preferences have shifted from physical media to digital where gamers can interact with each other in real time. Digital media now represents the majority of the industry. Traditional console games are transitioning from outdated cartridges and discs to this new model of the future. This opens up a new risk that was previously easier to prevent: piracy. All digital media has a history of piracy, but the physical divide offered by consoles, discs, and cartridges made piracy in the video game market substantially harder. This study examines how piracy affects the video game industry, the growing threat of piracy, and what actions can be taken by the video game industry to prevent the threat of digital content theft.
10:45-11:30    Board 69
Kimberly Fuller
Clifton M. Chow (Faculty Sponsor)
Department of Economics, Bunker Hill Community College
Micro Economics: Cronos Group

The purpose of this paper will be to make recommendation for Cronos Group Inc. to achieve financial and market sustainability in the near future. The method involves an analysis of Cronos Group Inc.’s annual report and select documentation on the medical marijuana industry.

This presentation will highlight a brief history of Cronos Group Inc. and the product or service it produces and sells. It will also show the supply and demand conditions for medical marijuana and how it has impacted [NAME OF FIRM]. Next, price elasticity of demand for Cronos Group Inc. products will be reported. This will be shown by analyzing pricing and the availability of substitutes; while also exploring factors that affect consumer responsiveness. The cost of production will also be explored to help explain output decisions and their impact on profitability. Additionally, Cronos Group Inc.’s market share as well as any barriers to entry and industrial organization structure of the medical marijuana will also be examined. Findings will be used to form recommendations on how Cronos Group Inc. should go forward with future actions and production to sustain its success in the market.

11:45-12:30    Board 72
Isabella Maria Repucci
Yelenna Rondon (Faculty Sponsor)
Department of Business, North Shore Community College
Outsourcing Manufacturing to China: Do Companies Still Acknowledge This as a Smart Managerial Plan?

American companies take advantage of the high productivity and low wages by outsourcing manufacturing to China. In my research, I investigate the effects of recently imposed tariffs on Chinese goods on outsourcing by U.S. businesses and the effects of The Tax Cuts and Jobs Act of 2018.

As a way to resolve trade tensions, U.S. car manufacturers are now allowed to own their company outright for the first time in China. Tesla will be able to operate independently within China for the first time. By manufacturing within China, they will be able to bypass any tariffs that the country has which will increase sales and lower their Chinese prices.

Nike uses outsourcing as a way to save money on wages. Chinese workers make as low as $238 a month whereas U.S. workers make roughly $1,700 per month. Through outsourcing 10,000 factory employees to China, Nike is able to save $14.5 million a month on salary expenses. However, the annual growth rate in Chinese manufacturing wages is up 16.7% over this period which is very rapid compared to other countries globally.

The rise in international competition, higher shipping costs, and lengthy transportation times has made U.S. production tantalizing for some companies. Recent tariffs on Chinese imports by the
U.S. make foreign outsourcing much less appealing to company managers that cannot generate most of their sales within China. This should alter some company's future decisions on outsourcing.

Room 809  11:45-12:30  Panel 3
Benjamin Bressette
Keren Horn (Faculty Sponsor)
Department of Economics, UMass Boston
Examining the Relationship between Transportation Grant Recipients and Residential Displacement: A Difference-in-Differences Approach

There is a strong consensus that improvements in and changes to public transportation can have positive externalities on surrounding communities in terms of property value increases and falling crime. In this study, I expand upon this conclusion and explore if it holds true for specific rapid transit projects funded with federal discretionary transportation grants from 2009 to 2012. I explore the effect these improvements have on home values, racial makeup, income, and eviction rates, using the Decennial Census, American Community Survey and the Eviction Lab. I use a difference-in-differences estimator to look at how characteristics of neighborhood change differ from projects that received federal monies, versus those who applied but were not funded. Based on existing literature, I can hypothesize that homes in neighborhoods surrounding these projects will see an increase in property values, but with little to no change in racial makeup, income, and eviction rates in the short run. As research is ongoing, specific findings and conclusions will be discussed.

Room 809  11:45-12:30  Panel 3
Caitlyn Danielle Letourneau
Supriya Sarnikar (Faculty Sponsor)
Department of Economics, Westfield State University
Economics in the American Legislative System

The American legislative system is constantly battling opinions and perspectives when deciding what should be law. Could an economic analysis of costly legislation de-polarize government in order to ensure decisions are made in the best interest of Americans? To ensure that legislators are making good decisions that will be beneficial to the majority of Americans, I gauge whether constituents would be in support of the use of an economic cost-benefit analysis in the law-making process. Through previously conducted research, I discovered that some federal agencies are mandated to conduct cost-benefit analyses to ensure that regulations do not become burdensome on the American people. While cost-benefit analyses do help in ensuring good government practices, they can be costly to conduct and have the potential to allow some biases. However, I advocate that constituents would appreciate the benefits of conducting a cost-benefit analysis alongside legislation to ensure good-law making. In addition to previous research, I will be presenting the results of a pilot survey that is focused on determining whether constituents are in support of an economic cost-benefit analysis to be conducted alongside costly legislation before it is voted upon.
Past and Present Federal Reserve Chairpersons: A Historical Perspective of Monetary Policy Challenges

Since the inception of the Federal Reserve in 1914, the leadership that has been displayed by our multiple fearless chairmen has evolved. Specifically looking at the following leaders: Paul Volcker, Alan Greenspan, Ben Bernanke, Janet Yellen, and Jerome Powell, each chairperson responded to an array of obstacles in different manners. In regards to their encounters with detrimental economic events such as two huge stock market crashes, a recession, a terrorist attack on our country, and unemployment rates that have been higher than ever, my research investigates the goals and priorities of each chairperson during their serving period.

I further analyze economic variables including the federal funds interest rate, inflation rate, unemployment rate, and GDP to obtain a generalization of the economic position of the United States during each person’s serving period. Through the application of economic theory for each chairpersons, my research concluded that in 2018, our country is in decent economic standing for the first time since the 2007 - 2008 recession, due to the extraordinary measures that these national leaders took.

Univariate Modeling Techniques for Short-Term Energy Demand

My thesis consists of a historical review and present-day application of univariate modeling techniques in predicting short term energy demand in New England. With the emergence of more affordable, renewable energy sources, the traditional energy market is changing daily. To predict and overcome these changes, independent service operators, such as ISO-NE, must monitor and adapt the energy grid in New England to simultaneously satisfy both producer supply and consumer demand. My project will be analyzing historical energy demand data and generating a profile of different univariate forecasts to help predict future demand within the New England electricity grid. Technological advancements and environmental research are driving the movement towards energy conservation, and its implications can cause a divergence from historical forecasting methods. Variables such as changing global temperatures and consumer tastes will be introduced in potential multivariate forecasts as well.
Polarization and the Media

America is divided along political lines. At the heart of this divide is our collective inability to agree on which values we should adopt when interpreting shared experiences. Is Roe v. Wade a victory for women’s right to choose or a step in the wrong direction for creating a culture of life? Is income inequality the result of consensual market transactions among adults who differ in their ambitions and attributes or an unacceptable blight upon our society that must be corrected through government intervention? This study is designed to determine if our sources of news media encourage political polarization through their use of editorialized reporting on political issues. By leveraging text-analysis software and a large database of news broadcast transcripts I will be able to determine if there has been an increase in the amount of value-laden language in news media programming over the past three decades. Together with the data provided on increasing American political polarization in the Pew Research Center’s Political Polarization in the American Public report, I examine the relationship between the news media and polarization in America. My expectation is that news networks will use a greater number of words associated with Liberal or Conservative values based on the composition of their respective audience and that this increase in the use of value-laden language will overlap with the increase in political polarization among Americans observed by Pew.

Examining Corruption in the Haitian Military

In my thesis I seek to examine the ways in which corruption in the Haitian military has flourished and how that corruption has affected the people of Haiti. I look to answer how Haiti, going forward, can protect itself from future instances of corruption. To do so, I examine several proposals from international experts on how to address corruption, and consider how they apply particularly to Haiti. I also examine records of instances such as atrocities committed by the military under leaders who staged coups as well as international rights groups’ analyses of these coups to determine the effect on Haiti’s people. I expect to find that a hardline stance on corruption complete with third party (outside of the existing police/military structure) enforcement of anti corruption laws will be necessary to prevent recurrent corruption. I also expect to find that a restructuring, or even an abolition, of Haiti’s military is necessary to change the corrupt nature of the country.

The United States maintains one of the highest infant and maternal mortality rates among industrialized countries. According to recent government data, black infants are more than twice as likely to die than white infants. Furthermore, according to the CDC, black mothers are three to four more times likely to die in childbirth than white mothers. America not only has a maternal and infant mortality rate problem, but a serious issue of racial disparity in our healthcare system. Using statistical regression, this paper analyzes the United states trend of the Black-White infant and maternal gap over the past few decades. Race gaps will be broken down by state and factors taken into consideration include: population size, demographics, healthcare spending, and use of AIM bundles.

What Are the Causes of Nutritional Inequality?

This paper describes the issue of poor nutrition and the causes, and the differences between worse off individuals and better off individuals. Individuals and families, especially those in the lower income brackets, are purchasing less healthy food options because of increasing food prices. The problem is that the items families are purchasing are items that are high in: fat, sodium, and sugar. Ingredients that can be toxic to one’s body and cause serious harm, which is leading to poor nutritional health. Another issue that leads to poor nutrition may be the lack of information given to families and individuals at a young age. The research shows that receiving more education on nutrition at a young age will improve one’s health later in life. Another way to improve one’s nutrition is by providing worse off families more opportunities to purchase healthier options. Whether that is at local food stores selling healthier options, subsidies to either or both the consumer and the producer, for purchasing or producing healthier foods. Possible reasons as to why nutritional health is low among poor individuals, might be because of the lack of information that they receive when they are growing up. Then that leads to poor decision making later in life: choosing less healthy food options, overeating. In my thesis I will be looking at how policy changes in either nutritional information or price manipulations can improve nutrition in the United States.
It is commonly known that climate change poses an incredible threat to our planet, and that effective carbon reduction policies must be enacted in order to combat this danger. However, the exact price to be set upon carbon emissions is highly contested. At the core of one’s prescription for carbon pricing are their preference for the present over the future (pure time preference), their assumptions of future economic growth rates, and their assumption of the rate at which marginal utility falls as consumption rises (consumption elasticity of marginal utility). Combined, these three factors form the social discount rate, the tool used in determining carbon pricing policy. In this thesis, I explore the moral dilemmas and uncertainties that each of the three aforementioned factors present through a philosophical lens, ultimately concluding that any pure time preference (other than to account for the probability of human extinction) is unjustifiable.

The People’s Republic of China has the world’s largest education system and produces some of the world’s most talented academics. However, Chinese students receive a much different level of education based on their geographical divides. Currently, there is a great urban-rural education disparity within China. According to Project Partner, only 40% of rural Chinese students attend high school and 5% attend college. A study done by OECD in 2012 concluded that when a country’s education policies revolve around equity, the level of income inequality reduces over time. Individuals with higher levels of education and human capital are more desirable within the labor market and therefore, earn a higher salary. Through qualitative research, this paper will explore the variables contributing to China’s urban-rural education gap and how education disparity is affecting China’s income inequality. Some factors taken into consideration include the Chinese Hukou Household Registration System, Chinese school entry exams, school quotas, and student access to schools.
The Global Financial Crisis and Eurozone Crisis have affected many individuals’ employment, income, daily life, and even self-reported life evaluation. Loss of employment can lead many people into depression and physical illness, although some individuals never experience these when unemployed. Why do some countries’ citizens experience mental health issues during times of financial downturns, while others do not? The global financial crisis lowered people’s present-day life evaluation as well as their future outlook. This is due to the strength of the social safety net that each country has in place. The strength of social safety nets ranges from country to country based on their specific public policies. This paper will explore how the recent financial crisis and Eurozone crisis affected individuals’ life satisfaction ratings. It will also delve into how the strength of a country’s social safety net, specifically the expenditures on social spending, unemployment spending, and labor market program spending, played into the unemployed individual’s evaluations.

This thesis will examine the social and economic effects of legalized sports gambling in Massachusetts and propose a Pigouvian tax structure for sports gambling in MA should it be legalized. The major points covered in this review are the methods used by researchers to estimate social costs of gambling, or cost of illness (COI), economic, and public health approaches, and their application to Massachusetts. A DSM description of problem gambling and the costs associated with this behavior will be included as well as current estimations of the amount and demographics of problem gamblers in Massachusetts collected by SEIGMA. The limitations of quantifying the social and economic costs of gambling will be discussed and the methodology behind estimating social costs and benefits with respect to gambling will be examined. This information will then be used to provide an estimate of the social costs and benefits of sports gambling in MA using information on the amount of problem gamblers in MA and the cost per problem gambler. This thesis will then analyze the notion of ‘voluntary’ gambling should gambling be marketed to a poor and uneducated population as well as at-risk and problem gamblers. A Pigouvian tax equal to the costs accrued by problem gamblers in MA will be proposed as well as recommendations for other public health-oriented measures to combat problem gambling and other negative externalities associated with gambling.
EDUCATION

10:45-11:30  Board 62
Philip Patrick Henry Francis Saal
Susan McPherson (Faculty Sponsor)
Department of English, Quinsigamond Community College
An Exploration in Inclusion

This project will focus on the future of students with disabilities in higher education institutions in the United States. How they will be integrated into the classroom via the use of technology and teaching methods, along with a brief look at how schools are targeting them as a demographic will be explored. Additionally, the history of students with disabilities entering the classroom, as well as the history of assistive technology, will be examined to give some context on the subject.

11:45-12:30  Board 49
Julia Marshall
Dr. Cami Condie (Faculty Sponsor)
Department of Education, Salem State University
Exploring Finland’s Literacy Practices

Finland is known for its high literacy rates. To study the factors that impact a child’s literacy development, four schools were visited in the Helsinki metropolitan area with the support of VisitEDUfinn, a program that schedules school visits for education professionals interested in learning about the Finnish education system. Three professionals were interviewed including one 2nd grade teacher, one pre-primary teacher, and one educational psychologist. Data were analyzed and categorized based on themes from the observations and interviews. Findings were framed using Bronfenbrenner’s Biological Systems. Emerging themes included (1) a holistic view of child development consistent and supported across family, school, government, and society, and (2) a professionalized view of teachers. Questions arose about whether these themes would be consistent with a changing Finnish population.

11:45-12:30  Board 73
Marina Whitney Germain
Phoebe Lin (Faculty Sponsor)
Department of Psychology, Framingham State University
Contemporary Issues Surrounding Education for Native Americans: Native American Students’ Experiences through the Massachusetts Education System

Through the current study, I seek to give voice to the educational experiences of two Native American students from one small, college campus in Massachusetts. While recognizing that the experience of one individual is not reflective of the entire community of Indigenous Peoples, this study contributes to the relatively small body of literature focusing on the educational experiences of Native American college students. First, guiding questions were created to lead the research. A collective-case study design was chosen and interview questions were
developed. Participants were recruited by advertisement and volunteered based on willingness to participate. Two participants volunteered and each participant was interviewed twice. As expected, the participants had widely different experiences relating to education. One participant, Autumn*, grew up surrounded by Native American culture while the other participant, Sebastian*, found out later in his adolescence that he is Native American. Autumn feels that her language identity has been taken away from her. She also feels that she did not get the opportunity to learn about her culture as other students did in school. Through the data collected from the participants, there is a necessity for educators to develop teaching skills to teach Native students about Native American culture in an accurate and appropriate way. Further, there is also a need for schools and universities to create a more inclusive environment that supports Native American culture.

2:45-3:30 Board 12
Oressa Kelly Gray-Mullen
Daniel Pope (Faculty Sponsor)
Department of Film Studies, UMass Amherst
Hong Kong International Baccalaureate Schools as a Catalyst for “Cultural Empathy” and Global Mindfulness Affecting Student Engagement in Science Education

My research is in preparation for a documentary project to be conducted, as my honors thesis, in the fall of 2019. I will be investigating how Hong Kongese international schools motivate students to think as global citizens and cultivate “cultural empathy” for their peers, to better understand the relevance of science curricula to actual, global issues. A culturally empathetic team member is defined by Congden, Matveev, and Desplaces (2009) as having, “an ability to view the ways things are done in other cultures not as bad, but as simply different.”

Multicultural, globally oriented learning at a rigorous academic level flourishes throughout the international schools of Hong Kong, where expatriates and local Hongkongese meet to create an open-minded social community and expand their scholastic knowledge in relation to real-world issues.

Based on my own experience and current research into educational outcomes, I believe a curriculum with an emphasis on collaborative problem solving, alongside a diverse group of peers, enriches student engagement in science education.

For over a century, Hong Kong has been a center for international business and global finance. The historical development of a region between western and eastern cultures has produced an acceptance of multiculturalism and social lifestyle attractive to those who feel like “in-between” peoples or desiring a place of intercultural communication.

For my presentation, I would like to speak about my documentary, the International Baccalaureate, and science curriculum research, as well as speak to the surprising influence of globally oriented attitudes on science classroom environments in secondary education.
2:45-3:30 Board 67
Matthew S. Sykes
Erold K. Bailey (Faculty Sponsor)
Department of Education, Westfield State University
Why Am I Learning This?: The Transferring of Educational Ownership to Students through Authentic Lesson Plan Designs in ELA Classrooms

The purpose of this study is to investigate the impact of authentic lesson plan designs on record low student engagement in ELA public school classrooms. How many times have students asked “Why am I learning this?” or, “When will I use this information outside of school?” These questions illustrate a lack of purpose and relevance in lesson plan design, which discourages students from participating in learning experiences that do not cater to their unique interests and goals. Therefore, this study seeks to answer the following questions: How does one define Authenticity in Education? As educators, how can we incorporate student’s personal interests into lesson design to inject authenticity into the curriculum? What are the positive outcomes of increased student engagement? What do examples of lesson plan designs that incorporate authenticity look like? To find these answers, this study will use quantitative and qualitative research in the forms of case studies, national statistics, and student-answered surveys.

2:45-3:30 Board 68
Kathryn Emery Chamberlain
Mary-Ann Stadtler-Chester (Faculty Sponsor)
Department of World Languages, Framingham State University
A Linguistic Analysis of Classroom Discourse in English and Spanish

The objective of this research is to determine if there is a universal classroom discourse with an expected and unique set of linguistic characteristics, and whether or not this discourse varies from English to Spanish. In determining this, the quality of expected classroom discourse will be evaluated by highlighting the advantages and disadvantages of certain linguistic tendencies. I am to complete and transcribe audio recordings of English and Spanish speaking teachers, in various Massachusetts schools, conducting lessons in science, math, and literacy to students in various Pre-K - 3rd grade classrooms. Transcriptions of the teachers’ language use will help me determine the linguistic qualities of classroom discourse and analyze how it may differ from English to Spanish. My study will be focusing on the lexicon, morphology, and syntax. The lexical analysis will investigate the frequency of positive and negative word, lexical bundles, references to gender, and words of affirmation. The syntactical analysis will focus on the prevalence of expected structures of speech such as initiation-response-evaluation (IRE), initiation-response-feedback (IRF), conditional statements, and commands. Research of prominent linguists and educators regarding productive classroom discourse will help me consider the benefits and drawbacks of certain linguistic tendencies within the classroom. This research will be done in the hopes of improving the linguistic quality of classroom instruction in any and every language, as to better serve students’ academic and social-emotional growth.
This research may also reveal a need for teacher preparation programs to include a sociolinguistics course in their graduation requirements.

2:45-3:30  Board 69
Mariah Lynne Prosansky
Mary-Ann Stadtler-Chester (Faculty Sponsor)
Department of World Languages, Framingham State University
Abandoning Grammar-Centric Instruction: A More Effective Way to Teach Spanish

Is the way we teach Spanish effective? Different textbooks use different approaches – some use a natural approach, in which learning occurs primarily through listening and speaking; others use an approach with greater emphasis on reading and writing and grammatical correctness – but all Spanish textbooks inherently focus on grammar and structured language-based activities. In the U.S., English Language Learners are not taught English through sentence structure and verb conjugation exercises; they learn about math, science, and history in English. Should we teach Spanish, then, with a more interdisciplinary approach? Teaching fun, non-traditional subjects in Spanish (such as astronomy, art history, climate change, etc.) could enhance student interest in Spanish and other subjects while making the learning of the language more natural and fluid. This paper will begin with the history of foreign language teaching in the U.S., then will explore ESL strategies and pedagogy used in the U.S. today, and will conclude with a proposal for how Spanish could be taught more effectively in the U.S. public school classroom.

2:45-3:30  Board 70
Sarah Elizabeth Farnham
Susanna E. Meyer (Faculty Sponsor)
Department of Communication Disorders, Worcester State University
Teaching Jumpstart Classroom Aides: Scaffolding Language for Diverse Learners

Corps members in Americorps Jumpstart Program were undergraduate students trained to provide language and literacy stimulation to preschool children. A Jumpstart instructor provided scaffolding training before members worked in a preschool. Scaffolding is temporary supports to assist the preschoolers in accomplishing new tasks or concepts they could not achieve on their own. These support are put into place when a child is not progressing in the classroom. When the child develops these skills, the supports are removed. Each child’s needs can be met through environmental, manipulative, visual, and oral scaffolding techniques. Scaffolding during storytime stimulates language development in diverse learners. The goal of the study was to determine the impact of the training using a pre- and post- training survey. Data were collected from thirty-one undergraduate students attending four local universities. Most of the the participants were female first-year students with majors in psychology, education, and communication sciences and disorders. Pre and post training surveys were administered and showed a statistically significant increase in the participants’ knowledge after the training. This indicated that the training was successful. A self-assessment rating scale was used to investigate the self perceived confidence and support participants experienced while
implementing scaffolding during storytime. Throughout the study all participants reported an increase in their self perceived support and confidence with scaffolding materials in the classroom. The Jumpstart training was successful and it was noticeable that, when group discussion was included in the training, participant’s retention improved and they seemed to better understand the material.

3:45-4:30  Board 64  
Alicia Elizabeth Thomas  
Kelly Kolodny (Faculty Sponsor)  
Department of Education, Framingham State University  
The Influence of Stress and Anxiety on the Learning and Behavior of Students in the Classroom  

Stress and anxiety affect students’ schooling experiences in a profound way. As educators, parents, and members of society, we must pay attention to how these factors influence students’ performance in school, through their learning and behavior. It is important for people working with children to understand what causes stress and anxiety found in children and ways to help them work through it and make for a better schooling experience. This thesis delves into the reasons why students are affected by stress and anxiety and the ways in which their learning and behavior in school are affected. This thesis draws from scholarly and peer-reviewed articles, as well as interviews from eight teachers. It also examines the ways in which both research and personal accounts from teachers suggest that stress and anxiety create negative classroom environments. The discussion focuses on how issues affect students’ learning and behavior, as well as their interest in learning, motivation, attention spans, and behavior patterns. These elements are analyzed to show the ways that stress and anxiety affect students’ academic performance, as well as their personal interests and behaviors. This thesis sheds light on the obstacles students face in school due to stress and anxiety and highlights the causes of these issues. It offers advice of scholars, researchers, and classroom teachers, regarding the ways to best prevent and help students cope with stress and anxiety, especially for teachers who could start using different methods and techniques to help their students thrive and have more positive school experiences.

3:45-4:30  Board 65  
Jesse James Pozzi  
Laura A. Hudock (Faculty Sponsor)  
Department of Education, Framingham State University  
Graphic Novels in the Elementary Classroom and the Multimodal Representation of Characters  

Graphic novels are an integral part of most elementary classroom libraries and school libraries. To promote twenty-first century literacies, it has become crucial for pre- and in-service teachers to not only recognize the potential of graphic novels as a means to incorporate multiliteracies into the elementary classroom, but for them to also grasp the sociocultural significance of these texts by reading them through a critical lens. Child readers behold the interplay of pictures and words in graphic novels to negotiate and construct meaning. Data collected on graphic novels available to elementary students at a southern New England public
school informed this study’s selection of titles across various genres (e.g., fantasy and contemporary realistic-fiction). During numerous re-readings I explore multimodal representations of gender, namely, the underlying roles of female protagonists, often anthropomorphized as non-human subjects. My findings identify three emergent roles: (1) motherhood [or taking on a motherly role]; (2) coming to terms [with one’s own battles]; and (3) sense making [of the world around them]. By closely examining these roles through a critical feminist lens, elementary-aged readers potentially learn about messages of female empowerment, thus, guiding teachers towards lessons and discussions anchored in social constructivism within the classroom. And so, as a future educator, this study informs my preparedness to encounter a multitude of discourses, including the constitution of gender, that my future students will embrace, consider, dispute and/or dismiss as they collectively negotiate meaning while reading these graphic novels.

3:45-4:30  Board 66
Kalyn Alecia Cochran
Mary Grassetti (Faculty Sponsor)
Department of Education, Framingham State University
Teacher Candidates’ Level of Math Anxiety and Confidence in Teaching Mathematics during a Teacher Preparation Program

For many teacher candidates, mathematics causes feelings of anxiety (Baspinar & Peker, 2016; Gonzalez-DeHass, Furner, Vázquez-Colina, & Morris, 2017; Looney, Perry, & Steck, 2017; Peker, 2009; Stoehr, 2017; Suinn & Winston 2003). This study assesses a teacher candidates’ level of math anxiety and confidence in teaching mathematics during a teacher preparation program. In addition, it looks to determine if and when a turning point occurs during a teacher candidate’s professional preparation program. Participants were recruited from a small liberal arts university in the Northeast. All participants were enrolled in the University’s teacher preparation program. Participants completed the Revised Mathematics Anxiety Rating Scale (MARS-R), one open response question, as well as a demographic sheet after the completion of the questionnaire. The MARS-R is a five-point Likert scale that consists of 24-items. There are two factors in the scale; the first measures anxiety experienced during the learning of math and the second measures anxiety when being assessed in math. The open response question is intended to determine if and when during the licensure program students experience a shift in their attitude towards teaching math. Moving forward, the study could be updated by developing a longitudinal study where the same participants are surveyed numerous times over the course of the teacher preparation program.
Engineering School offers elementary school students weekly opportunities to explore STEM subjects informally in an afterschool program. Students ages 5-9—girls and boys—design, build, and express ideas while creating hands-on projects. In particular, Engineering School seeks to foster girls’ interest in STEM-related fields by encouraging curiosity and confidence while introducing the design process and vocabulary.

Engineering School started one year ago. This year’s activities offer a focus of inventor, designer and builder using accessible materials and self-directed projects supported by adult conversations and ideas. These methods and household good junk materials put the decision making power into students’ control, offer a space to build, collaborate, wonder and think without criticism. The result is an exciting way for children to think creatively, teach each other and MacGyver materials for an end result. Children view each other as equals in creative design, as they create a plan, try it, revise and redesign it. Lack of fear of making mistakes fosters an inventor’s mindset where students feel confident that they can give ideas to others’ designs.

This study examines whether the implementation of an engineering design process and the introduction of engineering design vocabulary will become meaningful and memorable for students as they build their own models and structures. Adults at Engineering School purposefully use engineering vocabulary with students. Written statements by students along with observations by adults will be used to assess how students are learning the concepts of engineering design through project activities.
The main purpose of this research is evaluating the possibility of harvesting the energy of a lightning strike. Aiming to discover the greatest obstacles for utilizing lightning as a source of energy, the research evaluates the experiment of Steve LeRoy in capturing the energy from a bolt of artificial lightning and the attempt of Alternate Energy Holding, Inc. (AEHI) in developing the work of LeRoy. The failure of AEHI is examined to explain why it can be used to indicate that most of the energy carried by lightning strikes is not electrical energy but heat.

Also introduced by this research is another difficulty in harnessing lightning energy, its unpredictable characteristics. For solving those problems, the research suggests a new approach in converting the lightning energy into electrical energy and the application the Van de Graaff's generator for manipulating the lightning. Since the possibility of each suggestion has not been evaluated, these ideas require further practical experiments before being applied. In short, harvesting the lightning energy so far is still a challenging task and its possibility is still vague, but this paper will emphasize that there are reasons and pieces of evidence that can strengthen our belief.

The research on bioelectronics aims to provide analytical devices to digitize the targeted molecular or cellular signals, offering broad opportunities in health monitoring, cancer detection, and genetic testing. The choice of materials in bioelectronics is extremely stringent on their sensitivity and biocompatibility. To this end, graphene, a single atom thick carbon material, holds promise for its carrier mobility, flexibility, optical transparency, electrical conductivity, and in vivo biocompatibility, making it ideal for bioelectronic applications. Here, we develop a high-density array of graphene field effect transistors (GFET) that may ultimately allow us to specifically sense the change in ion concentrations, as well as record electrical signals generated by electrogenic cells. Such GFET arrays can conduct label-free biosensing and/or cell recording in a miniaturized platform, which may serve as a viable alternative to the established electrochemical and optical devices.
Stress is a state describing the human body’s physical response to certain situations. Physical stress is often associated with feelings of pain or physical injuries, while chronic mental stress can lead to serious health problems including hypertension, cardiovascular diseases, increased likelihood of infections, and depression. If wearable devices could be developed to accurately detect the presence of physical and mental stress, then these issues could be mitigated or prevented. There are several different types of body responses that can be measured and analyzed to aid in the detection of stress. Two of the most prominent types include electroencephalogram (EEG) signals and electrodermal activity (EDA). EEG signals capture electrical activity in the brain by measuring voltage levels at different points on the scalp using electrodes. EDA measures skin conductivity changes over time caused by nervous system responses using sensors in contact with the skin. The goal of this research is to find parameters that can be used to compare both EEG and EDA to develop an approach that can be used to identify stress during everyday working conditions using a wearable EDA device. While research has been done on the effectiveness of EEG and EDA as tools for stress detection, they are often analyzed separately and very little has been done to compare the two. My hypothesis is, that by comparing the two types of signals together using EEG as a reference for EDA, a unique approach to stress identification may be discovered.

The healthcare field lacks an accurate, standard method of measuring physical activity (PA): an important factor in tracking the health of an individual. Of the current methods used, Inertial Measurement Unit (IMU) sensors are an objective method of monitoring PA that tends to be the most accurate due to its ability to measure movement continuously over time. My research is aimed to evaluate what combinations of IMU sensors located across the body can provide accurate PA classification. Data was collected by applying six sensors located on the hands, feet, head, and lower back to ten human subjects. The subjects underwent a variety of different activity types, such as walking, sitting while working, laying down, etc. Machine learning algorithm classifiers were then applied to determine which combinations of sensors can provide an accurate classification of the PA type performed. Previous studies involved using different numbers of sensors on different areas of the body. This ranged from a single sensor on the lower back to five sensors on the limbs and back that yielded 97% and 99% accuracy, respectively. My research will not focus on a specific number or specific location of sensors like other studies but instead, will focus on investigating which combinations of the six locations across the body can provide accurate PA classification. A system of IMU sensors across the
body that can autonomously evaluate PA type will allow for accurate energy expenditure
calculation and aid in the development of future PA monitoring devices.

11:45-12:30    Board 69
Jayme Gordon
Laura Quilter (Faculty Sponsor)
Department of Library, UMass Amherst
The Amherst Terms

I hypothesize that a terms of service (TOS) agreement can be both easily understandable and
agreed to by developers and users. Since TOS agreements currently fail to meet the needs of
developers and users, my research aims to develop a standardized, transparent model TOS
agreement, and implement it as a computer application. In this model agreement, terms are
separated into three simple categories: (1) contract, (2) data and privacy, and (3) copyright.
User experience data from a limited test audience will be analyzed to verify or falsify my
hypothesis about the acceptability of the TOS. A successful outcome of my research would
educate developers and consumers, provide a viable choice for startup developers, and serve
as a counter argument against the current standards in contracting.

Room 909    11:45-12:30    Panel 3
Marco Antonio Quezada
Eugenia Ciocan (Faculty Sponsor)
Department of Engineering and Physical Sciences, Bunker Hill Community College
Dynamic Wireless Charging of Vehicles

The electric cars batteries are inefficient for driving long distances. The efficiency of the
batteries of the electric cars cannot be increased by increasing the battery size and this is why a
new method was necessary. This paper will focus on the dynamic wireless charging of vehicles’
batteries, which is an idea that does not replace batteries, but it changes the “traditional”
method of sending and storing electricity and the way they work. This method results in vehicles
that do not need to be stopped to recharge their batteries, as the charging takes place while the
vehicle is in motion along a designated section of the highway. The electric car battery charging
area would be located within a section of the highway along which the vehicles can store
electricity to continue moving to the destination point. The use of dynamic wireless charging will
increase the efficiency of the electric vehicles and modify the functionality of the batteries while
reducing their size. The advantage of using a smaller battery for the vehicles will allow the
designer to add or replace parts thus making possible car’s improvement.
Feasibility Study for Mapping Grids Using Phase Detection on Mobile Cameras

Modern electric grids—especially expanding grids in developing economies—require accurate and up-to-date data about where infrastructure and customers are. However, current methods of collecting this metadata require a great deal of time and money, because they require sending professionals to manually collect it. In this paper, we explore the feasibility of automating this process with a simple vision camera. We use computer-vision tools to identify lights in an image, and then exploit the camera’s rolling shutter (which captures an image line-by-line instead of all at once) to identify the phase of alternating-current lights in that image. Finally, we use location and mapping tools to create a map of light sources in an area, along with how these sources are connected, without manual cataloguing. We show that our tools can identify light sources in images, although the tool may be vulnerable to background noise. This toolset, once completed, will allow for a low-cost system mounted on mobile platforms to monitor electric grids for outages, power quality, power theft, and customer locations.

Evaluating the Impact of Data Offloading in Dense Wireless Networks with Optical Communication

Most of society expects that their mobile devices will operate instantaneously, which has led to congested environments with many devices requiring wireless connectivity. In an effort to eliminate congestion on WiFi networks, optical communication research has been making vast advances towards secure and personal wireless networks that can be densely deployed. With the use of optical wireless cells, the data is offloaded from the WiFi network while privacy and speed is maintained. The analysis of WiFi traffic is a crucial component when evaluating the impact of this data offloading. We aim to evaluate the improvement of network performance and overall quality of service for our wireless devices. In our analysis, we observe several Raspberry Pi processing units that are connected to the WiFi network and programmed to send pings to the available WLANs. This experiment is intended to simulate the network traffic in congested environments. We observe the effect of these Raspberry Pis through Wireshark, one of the primary tools used for the analysis of WiFi traffic. This network protocol analyzer allows users to live capture packets of network data that can be viewed using a graphical user interface(GUI). We explore how per-device throughput is improved as individual devices are offloaded to the optical wireless network.
1:30-2:15  Board 35  
Jason Nguyen  
Michael Rahaim (Faculty Sponsor)  
Department of Engineering, UMass Boston  

Visible Light Communication System

We present an internet-connected Visible Light Communication (VLC) system as well as an open-source library that integrates with GNURadio (a signal processing toolkit that is widely used in communication) in order to assist researchers who are new to the field. The VLC system utilizes LED and photosensor for downlink and Wi-Fi connection for uplink. Signal processing, network routing and LED characterization will be aspects of the project. The open-source library includes modulators, demodulators and model channels functioning as blocks that we have integrated with the GNU Radio library. Students and engineers can use our open-source library for simulation of their optical system or for physical system deployment with software-defined radio hardware.

2:45-3:30  Board 13  
Armani Tayeh  
Jordan Andrew Cecil  
Peter Kungu Gachuki  
Charles E. Montes  
Victoria June Winters  
Dapeng Li (Faculty Sponsor)  
Department of Bioengineering, UMass Dartmouth  

IoT Cardio Vascular Simulation Device

In this paper, we present our design to develop an Internet of Things cardiovascular simulation device for medical learning while reducing the risk to a cardiovascular patient. Through the use of Google Sites and Google Spreadsheets, the user can select pre-conditions to run the system. The proposed model pushes a liquid through three different artificial arterial structures namely the stenotic, elastic, and hyper-elastic arteries generating blood pressure, and electrocardiogram (ECG) signals data. After each run, the generated data is stored and sent to the user email. The device will authorize accessible, testing and simulation of blood pressure, and electrocardiogram signals. Further, the device is integrated with a machine learning model for early detection of ventricular tachyarrhythmias events in real-time. The model aids to provides a platform for pre-clinical testing, assessment, and validation of cardiovascular devices.
Modern manufacturing involves the modern ways of control and monitoring, such as Human Machine Interface (HMI) and remote supervisory control and data acquisition SCADA. The industrial control system supervised and monitored by Human Machine Interface (HMI) and Supervisory Control and Data Acquisition (SCADA). HMI is essentially a touchscreen panel assisting in monitoring and control of manufacturing processes. SCADA is a system that overlays PLC operation and uses for a remote control station. PLC automatically implemented the control system in modern manufacturing. In this paper, we designed and implemented a color recognition, sorting and counting automation control system. The system can be applied to the manufactures that require certain quantity of certain color billets to mix in a batch in order to produce desired parts color such as local plastic manufacturing.
ENGLISH

Room 174  10:45-11:30  Panel 2
Jennifer S. Liddle
Michael P. Jaros (Faculty Sponsor)
Department of English, Salem State University
"The Black Bull": Exploring Celtic Mythology and Romance Fiction Tropes through a Historical Fantasy Novella

“The Black Bull” is a historical fantasy novella set in late eighteenth-century Ireland. It explores traditional Irish folklore and a common romance fiction trope through a feminist lens. Claire Featherfew, a sensible young woman not quite young enough to be unmarried, works as a book-binder for the taciturn Mr. Collins for the better part of a year before he proposes to her. She accepts, and continues restoring his large collection of fairy-tales and books of folklore. Mr. Collins is secretive about the great black bull that has long been regarded as the pride of Collins Manor. Claire’s curiosity gets the better of her, and she uncovers a secret about Mr. Collins and the bull. She makes a difficult choice, and finds herself contending with wild, perilous creatures she thought only existed in the pages of her fiancé’s books.

“The Black Bull” addresses a common trope in both classic and contemporary fiction: the aloof but handsome bachelor whose prickly (and frequently abusive) behavior the heroine endures before redeeming him with her love. Most of the time, these stories also have a significant power imbalance between the brooding male love interest and the heroine. From Hades and Persephone and Jane Eyre’s Mr. Rochester to modern Byronic heroes like Uprooted’s Sarkan (not to mention the endless adaptations of Beauty and the Beast), it is clear that this trope continues to fascinate and entertain readers. “The Black Bull” simultaneously embraces and subverts this trope.

Room 174  10:45-11:30  Panel 2
Randi Elizabeth Thayer
Michael J. Gormley (Faculty Sponsor)
Department of English, Quinsigamond Community College
Witches, Bitches, and Fairies: The Femininity of Fay and the Like

This paper seeks to explore the feminine nature and morality of Fay; Fay being defined as semi-divine creatures with the power to rule and/or influence the natural world, often small in stature, and dwelling in natural spaces untainted by the influence of mankind. I will trace how the fairies evolved in pre-Christian Europe, through the Victorian era and Shakespeare’s works, to modern iterations. Early on the Fay, originally born in Pagan traditions, came to be associated with devils as Christianity became the common religion in the region. During this transition Fay began to embody a “tit-for-tat” brand of morality that is often contrasted with traditional Christian morality. This direct opposition with the male Christian deity also directed the Fay evolution so that regardless of the gender of an individual the entire population was intrinsically feminine. Shakespeare would later redeem fairies to be more human friendly, and laid the groundwork for modern interpretations of fairies as dainty nature-sprites. Here I will show how the use of fairy stories as satire, and the roles that fairies played in these stories mirrored how marginalized
women have been historically treated. This research will also look at the modern spaces fairies occupy. Books such as “The Magicians” and “Johnathan Strange and Mr. Norel,” both being contemporary works that have been adapted into television programs, help to illustrate how the Fay are faring in the new millennium.

11:45-12:30    Board 51
Jamilex Rivas  
Susan McPherson (Faculty Sponsor)  
Department of English, Quinsigamond Community College  
The Loss of Human Interaction  
This presentation focuses on the lack of human interaction that has arisen sharply with the emergence of the internet and social media. The loss of these connections has effects on an individual's mental health and consequently, on humanity as a whole. The overuse of the internet will be explored, along with its connections to empathy, narcissism and other potential effects to human interaction.

11:45-12:30    Board 6
Margarita Cepele  
Michael J. Gormley (Faculty Sponsor)  
Department of English, Quinsigamond Community College  
The Feminism of Death  
The female sex is often portrayed as the lesser one, even in acts such as death, a truth that no person can escape. However, it is clear to see that it is not the female sex that is weaker, but it is society that demotes women instead of empowering them to reach their full potential. In Mary Shelley’s Frankenstein, as in the novel and in the world, two hundred years ago women did not have the chance to come to life. The fear of the full extent of the female power and her sexuality stops Dr. Frankenstein from creating an equal partner for his male creation. However, this fear empowers the female sex to try to reach her full potential. Centuries later, despite their behavior, women are still judged and punished more severely than her counterpart due to the underlying fear that society cannot seem to shed; the fear of a strong independent and sexual woman. It is through death, again, that Belinda Kite in Mark Z. Danielewski’s Fifty Year Sword is punished and struck down before she reaches her full potential because society simply cannot stand her. Reading Belinda as a reincarnation of Frankenstein’s female creature, she comes to life and exerts her independence and sexual powers over weaker men. Regardless of the century, Victor was right: there was no place in society for his strong-willed and able-bodied creature, thus the disembodied pieces of both women lie scattered on the ground.
The purpose of this research is to investigate how, through his novel *The New Magdalen*, Wilkie Collins participates in the ongoing public discussion around the subject of prostitution in the wake of the Contagious Diseases Acts (CDAs). Collins originally published the novel in periodical form in 1872, putting it between the passing of the CDAs and the subsequent feminist movement that led to the repeal of the acts. Though he does not mention the CDAs, which targeted prostitutes and, by extension, all working class women, I will argue that Collins’ presentation of a former prostitute as the heroine of his novel inherently links his work to the CDAs. Collins draws from the language of the acts in his novel.

The CDAs were a series of four laws passed between 1864 and 1869 that allowed police officers to subject any woman they considered a prostitute into taking a medical examination, testing for possible sexually transmitted diseases (Hamilton 14). I investigate the link between these acts and Collins’ commentary on prostitution by closely examining the language of the acts themselves and how Collins adopts and plays with similar language. Related literature, including book reviews and scholarly texts related to prostitution, published at that time will be used to supplement my analysis of Collins’ novel. Similarly, I incorporate literary criticism related to Victorian fallen women, and Collins’s novel, along with recent historical works on Victorian prostitution and the CDAs.

In the works of Jane Austen, men are a commodity to the women of their worlds. Indeed, they are sought by women so proactively that it is easy to look only upon the heteronormative relationships these characters enter into. Think only of who is Darcy without Elizabeth? Despite being so vital to the female plot, the men are largely ignored insofar as they relate with other men. What aspects make up the male relationship in these novels? How do we interpret the world the men of these novels create for themselves and what is the role of their relationship in the defining of their characters? Certainly, there is an element of mutual care, as the men look out for each other’s best interests in love and life. Truly, the best male friends of Austen’s worlds protect each other from the greatest danger of all: a poor marriage. However, there are darker elements to male relationships in her works that damage the reputations of certain men. Through their performance of masculinity within the novels, the men of Austen’s novels define what a successful man is and what he is most decidedly not. In a world where social status and marriage are a matter of life and death, the insight into proper masculine performance dictates who survives and who is relegated to the farthest reaches of the novel.
My research explores the external cultural and historical forces that influenced John Okada’s *No-No Boy* by applying aspects of New Historicist and Feminist Theory. In particular, I focus on the novel’s depiction of emasculated Japanese-American men, and how this emasculation ultimately reinforces a problematic colonist mindset—a mindset that asserts that the West is inherently “masculine,” and the East, because of their ostensible desire to be “culturally dominated,” is portrayed as innately “feminine.” Furthermore, I explore the interconnectedness of “masculinity” and “Americanness,” which ultimately leads me to determine that, because Japanese Americans were not considered “American” in the midst of World War II, the desire of Japanese Americans to be deemed “Americans” is futile, as they cannot attain the Western ideal of masculinity.

Thus, Okada’s *No-No Boy* elucidates the conflicts between two dichotomous groups: no-no boys and Japanese-American veterans. The veterans “perform” their masculinity because they seek to affirm their Americanness; therefore, they attempt to emasculate the no-no boys, which creates intracultural conflicts. As I previously suggested, the efforts of these Japanese-American veterans are pointless, as their “Japanese-ness” inhibits them from becoming masculine and American. After scrutinizing *No-No Boy*’s portrayal of these conflicts, I determine that Okada’s solution to these conflicts is racial solidarity—a recognition that no particular group of Japanese Americans is more “American” than the other. In addition, I explore how the novel’s depiction of first-generation Japanese-American immigrants further illuminates the problematic categorization of the West as masculine and the East as feminine.

This ePoster presentation will detail an ongoing project aiming to impact the administration of my institution to create and maintain a Center for Equity and Identity on campus. The Center will work to advocate for marginalized groups, such as students of color, the LGBTQIA+ community, and students with disabilities. The presentation will include data collected through a survey approved by the Institutional Review Board (IRB). Additional research will also be compiled to demonstrate the growing power that the development of these centers is generating through influencing the academic discourse on the campuses that house them. The persuasive presentation of research as a proposal through powerful visual and written elements will attempt to influence positive change by addressing those in positions of power in our University.
Rhetorical strategies used will include comparison to other competitive institutions and the resources they provide to their student body while also addressing anticipated counterarguments. These centers are powerful methods of increasing retention of marginalized students in universities, especially when enrollment is decreasing. The lack of an accepting space for those who may not feel welcome on campus will, if the proposal is accepted by the institution, be resolved by the creation of a Center for Equity and Identity on our campus.

Room 168    3:45-4:30    Panel 7
Emily Ann Tiedtke
John Joseph Hennessy (Faculty Sponsor)
Department of English, UMass Amherst
Worlds Apart: A Look into the Life of an American Childhood Spent in Nazi Germany

*Worlds Apart* is a memoir written about the early life of Paul Niemeyer. Paul was born in 1932, to parents who had recently immigrated from Germany. He grew up in Brooklyn, New York, speaking only German and seeing little outside of his neighborhood block. At age 7, Paul and his family left for Germany to visit extended family. A few weeks into the vacation, an unexpected emergency at their home in Brooklyn caused Paul's parents to return, leaving Paul and his sister Margarete in the care of an aunt. A month later, World War II broke out, and the two siblings were separated.

This memoir explores Paul's experience as an American child growing up in Nazi Germany, and the conflicting sense of identity that came with watching a war unfold between the two countries that made up his roots.
ENGLISH LITERATURE

Room 174  10:45-11:30  Panel 2
Chelsea Cabral
Shari M. Evans (Faculty Sponsor)
Department of English, UMass Dartmouth
"Some Matching Strangeness": Reconciling Home and Liminal Space(s) in Octavia Butler's *Kindred*

Octavia Butler’s neo-slave narrative, *Kindred* (1978), follows Dana, a modern-day Black woman who suddenly time-travels to the antebellum South to save her white ancestor—the son of a slave owner. Inhabiting both historical and contemporary time, Dana is thrust into an ambiguous space that leaves her susceptible to physical trauma enacted by white plantation owners, while simultaneously attaining a new and embodied lens of perception to the horrors of American racism. Magnifying the term “liminality” coined by cultural anthropologist Arnold van Gennup, which refers to a transitory and fleeting space that is characterized by ambiguity, indeterminacy, and potential for subversion or transformation, I contend that *Kindred* utilizes the liminal to describe being in-between or on the border of two distinct spheres to elucidate the perceived ontological, epistemological, and institutional understandings of American slavery. By blending the familiarity of being “home” in the present time with the horrors and violence entrenched in the historical realities of slavery, Butler unsettles both her protagonist and readers. Drawing upon theories of space, trauma, and memory, my work interrogates the ways in which Butler’s protagonist maintains and cultivates communal and self-agency given her repeated temporal and spatial dislocations. If the liminal period is the parenthesis of time when former routines are abandoned and new patterns are prescribed, what does it mean for Dana if the liminal is the space in which she exists and calls home? My work, ultimately, seeks to underscore how coming face-to-face with historical wounds through disorientation helps ensure progression and understanding.

Room 903  10:45-11:30  Panel 2
Raksa Proeun
Anupama Arora (Faculty Sponsor)
Department of English and Women's and Gender Studies, UMass Dartmouth
Dirty Laundry: Clothing Matters in Monica Ali's *Brick Lane*

Clothing and fashion can signify self-expression as well as economic and cultural differences between groups of people. This theme of clothing as a symbol of agency, consumption, class, and culture finds expression in postcolonial and diasporic literature. Drawing from Monica Ali's 2003 postcolonial novel *Brick Lane*, a story that revolves around Nazneen, a Bangladeshi female Muslim migrant living in London, this paper explores how clothing acts as a signifier within the novel. I examine how Ali's novel demonstrates that clothing is not simply about personal expression and agency, but that these individual choices overlap with larger global issues such as migration, multiculturalism, fundamentalism, female sweatshop labor and exploitation. In the process, the novel forces its readers to reflect on the global and interconnected world that they inhabit.
"What Else is Possible?": Adult Agendas in Children's Trauma Fiction

As a body of work for children written by adults, children's literature often represents adults' idealized versions of childhood. Generally, childhood is viewed as a sacred time during which children remain innocent. However, not all children emerge from their formative years "untainted," a reality increasingly explored in fiction for children. My research explores how tensions between the reality of historical trauma and adult notions of childhood innocence materialize in children's literature. Drawing on trauma theory, I will analyze how adult writers represent historical traumatic events in four middle-grade historical fiction novels: The War That Saved My Life and The War I Finally Won by Kimberly Brubaker Bradley, The Watsons Go to Birmingham by Christopher Paul Curtis, and The Red Pencil by Andrea Davis Pinkney.

I will start with an explication of trauma theory, conversing with scholars such as Cathy Caruth, Shoshana Felman, Geoffrey Hartman, Michelle Balaev and Laurie Vickroy. Next, I will review children's literature scholarship concerning how cultural assumptions about children affect literature written about and for this group of readers. Then, I will analyze how historical trauma is represented in my primary texts. In addition to analyzing how each author recreates the traumatic experiences of children through language, I will explore what messages authorial choices convey to young readers about trauma. Finally, I will compare author agendas to the implications of children's trauma narratives, engaging with Kenneth Kidd's theory that personalizing the experience of trauma in children's literature empties trauma of meaning.

Aphra Behn: The Bawdy Astrea

Female writers have consistently been looked over and ignored. One such author that has only recently come into the spotlight is the author Aphra Behn. Not only were her contributions impactful on the literary community but she was equally impactful on the movement toward women being more respected and heard for their individual voices. But why has an author that has made such a significant impact from the 1680's only recently gotten attention? Referring back to literature and criticism from her time, this paper discusses the possible reasons why Behn has not gotten the attention she has deserved as well as why it is that she should receive that attention. From her revolutionary play The Rover to her bold poem "The Disappointment," responding to "The Imperfect Enjoyment" by John Wilmont Earl of Rochester, Aphra Behn made her voice known and was not afraid to make a powerful statement. The "bawdy" and bold Behn made it clear that she didn't care what people believed she "should" be doing as a woman and
made history by writing exactly what she wanted to say. Aphra Behn made a significant impact on the literary community in making headway for women to be able to express themselves in the way that they want, and she should be remembered for her contributions.

**Room 174  2:45-3:30  Panel 6**
Caitlin Nicole Mayes
Zack Finch (Faculty Sponsor)
Department of English, Massachusetts College of Liberal Arts
**Exploring Home: An Ethnographic Travelogue of North Adams, Massachusetts**

This presentation explores the role of the participant/observer at the intersection of anthropology and the literature of travel writing. It analyzes the compositional techniques and ethical considerations that guide the participant/observer engaging in cultural analysis, and then it applies this research to a hybrid creative writing project I've undertaken this year. This project, “At the Register” explores my experience as a participant/observer in the very community where I live as a student, parent, voter, and gas station clerk. It draws comparisons and parallels between the economic transactions of the workplace and the customary, human interactions that take place simultaneously. By pairing my scholarly analysis of travel literature and anthropological writings with site-specific “thick descriptions” of my own community, this project attempts to describe the diverse culture of the Northern Berkshires from the point of view of someone located simultaneously “inside” and “outside” of it.

**3:45-4:30  Board 68**
Isabella M. Valadas
Andrew Thomas Kozikowski (Faculty Sponsor)
Department of English, Westfield State University
**Spooky, Scary Ghost Stories: 19th-Century America and Their Literature**

“Ghost Stories” is an in-depth investigation into how the rise of spiritualism affected American society, particularly after the Civil War. As loved ones passed away due to the bloody battles of the war, surviving family members felt abandoned by God and held a steadfast desire to speak with their deceased kin again, a thirst in which spiritualism offered solace through seances and the promise of reunion. Its influence can be found predominantly in their literature and which stories were selling well during the era. Various authors, such as Nathaniel Hawthorne, capitalized on the ever-growing and ever-ravenous audience for the supernatural: specifically ghosts, dark magic, and paganism. Evidence of how spiritualism deeply affected the literature of late nineteenth-century America can be found in Nathaniel Hawthorne’s classic short story, “Young Goodman Brown.” The setting of the novel as well as the events that take place throughout its plot are highly suggestive of paganistic rituals and dark magic running amok, paralleled by the character arc in which Young Goodman Brown's experiences can be compared to the shift of tone within the short story. Nathaniel Hawthorne directly incorporated these various elements into his short story due to the hunger of the literary audience for anything along the lines of the supernatural and spiritualistic, including the “darker side” of religion, specifically Christianity.
The salivary glands of insects play a key role in the replication cycle and vectoring of viral pathogens. Consequently, *Musca domestica* L., and the Salivary Gland Hypertrophy Virus (MdSGHV) serve as a model to study insect vectoring of viruses. A better understanding of the structural aspects of this virus, and the tissues it invades, will help obtain a better picture of the pathological impact that the virus has on adult flies. Furthermore, since the virus inhibits mating and egg development in the adult fly, its study can lead to development of novel techniques to control this world-wide pest for food safety improvement. Using scanning and transmission electron microscopic techniques (SEM, TEM), researchers have shown the effects of infection by MdSGHV on the salivary glands; however, the exact location among the glands where the infection was found is unclear (i.e., given that the salivary glands extend throughout the entire adult body). For this reason, this study intends to do a comprehensive examination of the ultrastructural effects of the hypertrophy virus on the salivary glands and the corpus cardiacum/allatum complex, which is in charge of secreting juvenile hormones, which is the major hormone controlling mating and egg development in *Musca domestica*. Preliminary data shows the clear hypertrophy in the salivary glands by the virus, as well as enveloped virus particles in the cytoplasm of infected cells.
ENVIRONMENTAL STUDIES

8:30-9:15   Board 18
Aoife Maria O'Shea
Christine L. Crago (Faculty Sponsor)
Department of Resource Economics, UMass Amherst
Energy Use Behavior of Student Renters

Residential energy use primarily from heating, cooling, appliances, and lighting accounted for over one third of the United States' electricity consumption in 2013. To minimize harmful carbon emissions related to electricity production, there is a worldwide effort to increase household energy efficiency by making significant infrastructure changes and smaller behavioral adjustments. While there has been success with weatherization incentives and appliance rebates for typical homeowners, university-aged student renters represent an underserved population in energy efficiency efforts.

Rental properties generally have outdated HVAC systems, insufficient insulation, and little incentive for landlords to make updates when tenants pay utility bills. Short term leases discourage major physical changes and decrease returns on investment, so renters are more likely to make low-cost investments such as switching to efficient light bulbs. Student renters, however, can have even more difficulty adopting efficiency measures due to a lack of disposable income, poor financial literacy, and little access to energy savings information.

This research focuses on addressing this gap in energy efficiency by developing a resource for students in order to decrease their consumption, reduce associated emissions, and lower their utility bills. Using existing literature about energy efficiency and university students' characteristics, an energy use guide will be created to encourage low-cost behavioral changes. The guide's information and format will be informed by a case study conducted on two participating student households. By guiding student renters' behavior with small but impactful energy use adjustments, meaningful energy savings may be realized extending well beyond their time as students.

8:30-9:15   Board 37
Amar Chunduru
Elsa Petit (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Red Tides: A Growing Threat

Red tides are a worldwide natural phenomenon, and can be generally understood as a harmful algae bloom. The organism specifically considered in this project is Karenia Brevis. While the effects of K. Brevis are negligible when present in normal levels, the overgrowth that occurs during a bloom is harmful to humans and the environment. This is because K. Brevis algae contain and release a poisonous compound known as brevetoxin. Affecting fish, humans, and birds, its hazard profile includes neurotoxicity and respiratory damage. Humans' damage comes via exposure through coastal aerosol presence and consumption of poisoned
fish. Brevetoxins are tasteless, odorless, and cannot be removed from contaminated fish through normal food safety procedures.

While algae blooms do occur worldwide, our research objective is oriented towards their North American coastal presence, particularly within the Gulf of Mexico and Florida areas. We have chosen this geography in order to conduct a more focused study. North American red tides have increased in length, appearance, and severity over the past twenty years. We seek to determine the causes behind this, determine its relationship to climate change, and propose possible solutions to address this growing problem. One theory behind this increase are poor agricultural practices, such as misdirection of water flow and run off from inorganic fertilizer. Here, we will conduct an analysis of available data along with performing a literature review to assess the validity of this theory, answer our aims, and also propose any relevant differential diagnosis found.

8:30-9:15 Board 38
Matthew J. Lyons
Isabella V. Russo
Elsa Petit (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
The Grape Microbiome in Wild and Domesticated Grapes

The cold climate wine industry has recently boomed in the Northeastern America after the successful breeding of cold-tolerant grape varieties. Vineyards harbor a wide variety of microorganisms that play a pivotal role in grape quality and will contribute significantly to the final aromatic properties of wine and vine health. If essential beneficial microorganisms have been identified in traditional wine cultivars, in contrast little is known about cold-climate cultivars. This project investigates how microbial communities vary between wild native grapes and agrosystems such as vineyards of Northeastern America. This will help in the discovery of yeast and bacterial species essential to wine quality and vine health and guide future sustainable farming practices.

8:30-9:15 Board 59
Meghan-Grace Patricia Slocombe
Allison H. Roy (Faculty Sponsor)
Department of Environmental Conservation, UMass Amherst
Working with Citizen Scientists to More Efficiently Count Emigrating River Herring

River herring include two species of fish, blueback herring (Alosa aestivalis) and alewife (Alosa psuedoharensous), that migrate from the ocean to freshwater rivers and lakes to spawn as adults and whose offspring migrate to the ocean the same year. Efforts to count incoming adult river herring using visual and electronic counters have been successful. However, it is difficult to quantify the juveniles exiting rivers because of their small size, large migratory groups, and high frequency of night-time migration. It is important to understand the timing and density of the juvenile migration to improve stock assessments. Historically, citizen scientists, or volunteers
who wish to assist with research, have helped count migrating adult river herring. Our group hopes to continue collaboration with volunteers by enlisting them to count juvenile river herring seen migrating out of freshwater in videos. The videos used for this pilot study are from a site on the Monument River (MA) where a camera continuously recorded 24 hours per day from June through November in 2017. The video was condensed into single frame images known to contain fish before being put onto Zooniverse, a platform which connects projects with citizen science volunteers. Citizen science allows for quicker data analysis with a lower investment of researcher time. Citizen science has the added benefit of educating citizens through involvement in the scientific process and supplemental information. This poster will include examples of our citizen science educational materials, an evaluation of the citizen science progress so far, and future plans.

8:30-9:15 Board 60
Douglas Edward Dillon
Allison Lee Dunn (Faculty Sponsor)
Department of Earth, Environment, and Physics, Worcester State University
Early Successional Dynamics in a Central New England Forest Following Clearcut

Current forest cover in Massachusetts is shaped by the legacy of land clearing for agriculture in the 18th and 19th centuries. Following agricultural abandonment in the middle of the 19th century, most of these farms are gone and forest cover has rebounded and is undergoing succession. This study aims to investigate the successional dynamics of forests in the early stages of regrowth. We do so by utilizing diameter-at-breast-height (DBH) measurements from roughly 800 tagged and identified trees with DBH greater than 5 cm, across five plots at the Harvard Forest in Petersham, MA that were clear cut in 1990. Annual data collection as part of this project began in 2008, with data from other researchers augmenting the record back to 1990. We present a 28-year record of species composition at this forest stand and identify shifts in dominant/subdominant species. We also examine decadal trends in basal area and stems per acre. These patterns across time will allow us to predict species dynamics as the forest stand matures towards an intermediate successional stage. Our results provide insights applicable to regenerating forests across central New England following disturbance.

8:30-9:15 Board 61
Andrew Howe Etheridge
Allison Lee Dunn (Faculty Sponsor)
Department of Earth, Environment, and Physics, Worcester State University
Ten Years of Carbon Sequestration by a Central New England Forest: Long-Term Trends and Response to Climate

The motivation of this research study was to better understand how forests respond to climate. The study analyzed collected tree growth data for response to climate variables such as precipitation and temperature (including annual, spring and summer). The study also examined
species-specific growth response patterns to the climate variables. The forest data was collected from two study sites within Harvard Forest in Petersham, MA: the first being a red pine plantation (control) established in 1925, the second being a former conifer plantation (harvest) which was harvested in 1990 and allowed to begin natural forest succession. Data tracking consisted of tagging over 800 trees, with a diameter at breast height (DBH) greater than 5 cm, within the two stands. The trees were measured annually, beginning in 2008, with tree recruitment and mortality status also collected. Climate data from the Fisher Meteorological Station at Harvard Forest was retrieved from the Harvard Forest Data Archive. Gaining a better understanding of how forests respond to today’s changing climate is of extreme importance. With this information, it may allow for more accurate predictions of forest carbon sequestration in the future.

8:30-9:15    Board 62
Kaleigh Miriam Keohane
Paige Warren (Faculty Sponsor)
Department of Environmental Conservation, UMass Amherst
Grassland Bird Nesting Success in Relation to Rainfall Patterns in Central Montana

Grassland bird populations have been declining in the United States. A main reason for this is habitat loss from human-related practices such as agriculture, livestock overgrazing, urban development, and habitat fragmentation. However, weather patterns also play a major role in nesting success. Heavy rainfall during the breeding season has been associated with low nest success whereas heavy rain during the preceding year has been associated with high nest success. This may be due to the direct effects of rainfall during critical nesting periods and indirect effects of grassland productivity. The University of Montana’s Avian Science Center has been collecting data on avian species abundance and nest success of grassland focal species Brewer’s Sparrow (Spizella breweri), Vesper Sparrow (Pooecetes gramineius), McCown’s Longspur (Rynchophanes mccownii), and Chestnut-Collared Longspur (Calcarius ornatus), since 2013. I assisted with field data collection in the summer of 2018. This project will examine the correlation between rainfall data and nest fate as well as average clutch size for the four focal species compared across six years of data (2013-2018). This information can be useful in informing grassland bird conservation to better understand the causes behind grassland avian population decline.

10:45-11:30    Board 46
Sean Patrick Rabbitt
Amanda LM Hyde (Faculty Sponsor)
Department of Biology, Greenfield Community College
Forest Health

The forest systems in the northeast are vulnerable to many pathogens and insects. Some are naturally occurring; however, the invasive pathogens and insects are typically the most devastating to our forests because there are no native natural defenses against them. According to the USDA forest National Insect and Disease Risk Map (NIDRM), the trees within
the Connecticut River watershed are at 15-24% risk of death from pathogens and insects, with some areas at 25% or higher. The question is: what is the overall health of the forest system on the Greenfield Community College campus? To determine this, an assessment of the basal area and species composition of the forest will be conducted. Tree crowns, trunks, and bases will be examined for the presence of abnormal growths, discoloration, missing bark, insect holes and dying/snapped crowns. Abnormalities will require closer inspection to identify the cause of the abnormality. Tree cores may be required and soil samples to be taken in order to determine the cause of the mortality or environmental factors that may have contributed. Of particular concern would be the presence of beech scale, Asian longhorn beetles, emerald ash borer, southern pine beetle, gypsy moth, hemlock woolly adelgid, and winter moth. After the assessment has been completed a management plan will be developed that will promote healthy productive biomass for the future.

10:45-11:30    Board 71
Taylor Wyckoff
Amanda LM Hyde (Faculty Sponsor)
Department of Biology, Greenfield Community College
A Comparative Study of Dimorphism in Eastern Red-Backed Salamanders (*Plethodon cinereus*) within Greenfield, Massachusetts

The red-backed salamander (*Plethodon cinereus*) occurs in forested regions of the southeastern Canadian provinces and northeastern United States south to North Carolina and west to Minnesota. There are two typical morphs (color variations), red and lead; both are speckled and most have a line down their dorsal side. These morphs may be indicative of stable polymorphism, or of one morph having an advantage over the other in specific populations. Greenfield Community College (GCC) is a SPARCnet (Salamander Population Adaptation Research Collaborative Network) site where *P. cinereus* populations have been continuously monitored since 2016. SPARCnet is a cooperative regional effort which aims to create a broader knowledge of environmental impacts on salamander ecology for researcher, educator, and citizen scientists. The purpose of my study was to analyze population demographics and assess trends for both morphs across sites. There are six 10 x 5 meter plots throughout the GCC forest, each spaced 20 meters apart containing fifty coverboard traps, and salamanders have been individually marked using a color coding system. Mark-recapture population estimates were used to examine proportional differences in sex, size, number of eggs found in females, and number of juveniles observed in each plot organized by morph. Chi square tests were used to evaluate overall differences between morphs. This information provides valuable insight into the demography of the *P. cinereus* population in the GCC forest and will inform the work of GCC students and faculty who continue monitoring the *P. cinereus* population in future projects and internships.
One of the many consequences of human-caused climate change is the recession and disappearance of glaciers across the globe. This recession has been occurring at increasingly fast rates over the past few decades. The Humboldt Glacier in the Sierra Nevada de Mérida mountains of the Venezuelan Andes provides a unique opportunity to observe how a remote glacier in the Tropics has fluctuated over time. In this study I used Landsat satellite images and in-situ GPS data collected in 2009, 2011, and 2015 to determine the spatial extent of the Humboldt Glacier and other nearby glaciers in the Sierra Nevada de Mérida. Glacier area was calculated using two complementary GIS-based approaches: (1) supervised image classification and (2) Normalized Difference Snow Index (NDSI). I also compiled all other glacier area measurements and estimates from available scientific literature. Glacier-cover in the Sierra Nevada de Mérida decreased from 1.19 km² in 1981 to 0.056 km² in 2018 and matches the overall warming and drying of the atmosphere in the region. This study quantified the rate of glacier recession and disappearance for one particular mountain chain in the Andes of South America. Tropical glaciers are particularly important for freshwater stores during the annual dry season and glacier recession has negatively impacted freshwater availability throughout the entire Andes and indeed the world.

The field of Green Building is on the rise as the concept of Sustainability becomes more prominent in our society. Buildings are where we spend most of our time and have major environmental impacts. Much is known about how to build sustainable buildings; however, the design and building processes are not necessarily easy, accessible, or cheap. Finding the technologies and a qualified team of architects, engineers, and builders for a sustainable building project can require more time, knowledge, and capital. This makes sustainable building still a fairly privileged field. As with anything related to sustainability, more exclusivity leads to a less effective outcome because sustainability only succeeds with collective action and impact. Many current sustainability metrics are fairly complicated and require substantial training to master, contributing to the accessibility barrier. The goal of this project is to create a tool that explicitly categorizes various components of buildings and how they can be evaluated for their impacts on sustainability and costs. The objective is to make sustainable building more prolific and normalized in society by making it easier to think about, measure, and accomplish. The purpose of this tool is so more people, building owners, and architects, can think quantitatively about the sustainability trade-offs and impacts of different design options.
12:40-1:25 Board 25
Eric Wuesthoff
Todd Fuller (Faculty Sponsor)
Department of Environmental Conservation, UMass Amherst
iCons: Spatial Distribution of Sympatric Species of Mouse Lemurs across a Habitat Gradient in Northwestern Madagascar

The lemurs of Madagascar are a highly diverse group of primates, represented by over 100 species endemic to the island across a wide range of habitats. Despite the presence of large tracks of mangrove forest in western Madagascar, there have been very few studies on the distribution of lemurs within mangroves. Understanding the ecology of these primates across forest types is crucial for implementing conservation measures, with 94% of lemur species threatened with extinction. We investigated the population distributions of two sympatric species of mouse lemurs, *Microcebus murinus* and *M. ravelobensis*, along a mangrove-dry forest habitat gradient. We employed nocturnal surveys and repeated live trapping along six transects near Mariarano, Madagascar in June-July 2017. We then estimated lemur population densities along the gradient using both spatial capture-recapture and distance sampling techniques. We found that lemur densities were lower in mangrove forests than in dry deciduous forests. This suggests that mangroves may represent lower quality habitat for mouse lemurs, possibly due to dynamic tidal conditions or fewer food resources. Additionally, the two sympatric species displayed variation in their relative distributions across habitat types, with *M. murinus* accounting for 88% of individuals captured within mangroves, while *M. ravelobensis* accounted for 71% of individuals captured in dry forests. This suggests that these sister species may coexist in Mariarano through habitat partitioning. Our study offers new insights into the ecology of these threatened primates and can be used to help perform conservation decision-making in Madagascar.

12:40-1:25 Board 26
Deanna Rose Kenyon
Baoshan Xing (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
iCons: Sulfidation Kinetics of Copper Oxide Nanoparticles (CuO NPs) When Introduced to Rice Root Exudates

The increasing application of copper-based nanoparticles (Cu NPs) as pesticides in agriculture portends their ubiquity in the environment—more than 95% of Cu released will enter soil and aquatic sediments, where it may accumulate to potentially toxic levels. However, even at low concentrations (5-20 mg Cu/plant) doses, there are metabolic effects due to the accumulation of Cu and generation of reactive oxygen species. Once released, Cu NPs can rapidly (hours-to-weeks) oxidize, dissolve, and form CuS and other insoluble Cu compounds, depending on the water chemistry (e.g. alkalinity, organic-matter content, presence of sulfide and other complexing ions). Copper oxide (CuO) NPs however, will transform into other forms of Cu during and/or after their release from direct applications, affecting the release of Cu ions. A
recent study highlighted the exposure of plant roots to CuO NPs resulted in bioaccumulation of Cu$_2$S, Cu-cysteines complexes, and CuO NPs within plant tissue. The fate of CuO NPs within vascular tissue and root morphology has been extensively demonstrated; however a knowledge gap exists in the transformations (e.g. sulfidation) of CuO NPs in agricultural environments, such as rhizosphere. In this study, the sulfidation kinetics of CuO NPs at environmentally relevant concentration and toxicological properties of sulfidized copper products when introduced to rice root exudates (REs) were investigated. Our findings will demonstrate rhizosphere processes which influence the role of REs in response to CuO NPs. Specifically, the present study addresses how REs drive dissolution of the NPs into Cu$^{2+}$ ions, increase colloidal stability, and decrease the rate of sulfidation.

12:40-1:25    Board 27
Elizabeth Clementine Campbell
Baoshan Xing (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
iCons: Triclosan Accumulation in Toothbrushes and Subsequent Degradation by UV Radiation

Toothbrushes are a common household item, and many best-selling brushes in the U.S. have comparable designs and materials. The main accessories of a toothbrush are the bristles and elastomer components, including cheek and tongue cleaners and polishing cups. A common characteristic of these materials is their ability to accumulate lipophilic chemicals. A chemical of interest, which is found as an ingredient in some popular toothpastes, is triclosan (TCS). TCS is a broad-spectrum antimicrobial agent with reported dental benefits; however, it has been banned in hand soaps and hospital cleaners due to its known risks and unclear benefits when used in these products. Our studies on 22 best-selling manual toothbrushes showed substantial accumulation of TCS into toothbrush head components. Over one third of the adult-size brushes had TCS uptakes between 21-37.5 mg after simulated three-month brushing, which is equivalent to 7-12.5 typical doses of TCS used per brushing period. Comparable results were seen on children’s toothbrushes, with brushes accumulating 5-9 equivalent doses of TCS. UV-based toothbrush sanitizers are becoming popular as a way of cleaning toothbrushes after use. As a compound susceptible to degradation, UV radiation may cause the TCS accumulated in toothbrush head components to break down into toxic byproducts. Using gas chromatography-mass spectrometry (GC-MS), most of the byproducts formed will be examined and identified. The degradation of TCS can result in differing products depending on which pathway is followed. The question now is which compounds will form and to what extent, thus uncovering a possible public health risk.

1:30-2:15    Board 41
Jessie Maria Tenaglia
Helen C. Poynton (Faculty Sponsor)
Department of School for the Environment, UMass Boston
A Geospatial Analysis of *Mytilus edulis* along the South Shore
Marine pollution is a pervasive threat to marine life, which may result in endocrine disruption. Endocrine disrupting compounds (EDCs) interfere with normal hormone production and previous work has shown that they disrupt expression levels of genes involved in sex determination. Unlike other emerging contaminants EDCs are not easily monitored because many are present at low concentrations, sometimes this concentration is so low that it is close to the analytical detection limit. For this reason alternate methods of monitoring are being adapted to address EDC pollution. EDCs are often monitored instead by using biomarkers. Our research group has successfully utilized the blue mussel, *Mytilus edulis*, as a biomarker for EDCs, and to contribute new knowledge in this area, we are focusing on 3 objectives.

First we will *(1)* optimize a DNA-based sexual identification method so that larger populations of blue mussels can be tested in the future. Second we will *(2)* visually represent sampling sites of *Mytilus edulis* using geographic information system (GIS) technology. Lastly we will *(3)* determine the sex ratios of blue mussels at the chosen sampling sites along the South Shore.

The results of this survey would be beneficial to other researchers investigating stressors that impact sexual development in mussels such as EDCs by providing a baseline of blue mussel sex ratios in natural populations.

**1:30-2:15 Board 56**  
Cassandra Ann Wright  
Elena Traister (Faculty Sponsor)  
Department of Environmental Studies, Massachusetts College of Liberal Arts  
Climate Adaptation Planning for the Hoosic River Watershed

Climate change, among other anthropogenic disturbances, is currently threatening the integrity of many coldwater systems. We evaluate how these stresses are currently impacting coldwater fisheries within the Hoosic River watershed and what threats climate change could have on this system in the future. Using GIS analysis, an examination of the particular threats to the Hoosic coldwater fishery, and examples of climate adaptation plans for other freshwater systems, we propose strategies for increasing the resistance and resilience of the Hoosic River coldwater fishery to climate change.

**1:30-2:15 Board 57**  
Leanne Rossi  
Krzysztof Jop (Faculty Sponsor)  
Marine Science, Safety, and Environmental Protection, Massachusetts Maritime Academy  
Biotransformation of Gamma-Hexachlorocyclohexane

“Human Health and Risk” is a senior level class at Massachusetts Maritime Academy examining the risk to humans associated with certain chemical exposures in a work setting. A major topic of discussion in this class is biotransformation. Biotransformation is the body’s self-defense mechanism responsible for converting lipophilic xenobiotics into hydrophilic easily excretable
compounds. In the liver cytochrome P-450 is the enzyme responsible for catalyzing biotransformation. Because most chemicals are lipophilic they must be converted into more polar substances so as to facilitate excretion/elimination from the body. Gamma-Hexachlorocyclohexane (γ-HCH), an organochlorine insecticide previously used in various countries including the United States as a seed treatment for barley, corn, oats, rye, sorghum, and wheat, spurs a complex process of biotransformation in the liver via cytochrome P-450 when exposure and subsequent absorption occurs. Due to its tendency to bioaccumulate and its toxicity to both humans and animals as well as the production of less toxic and effective pesticides, the use of γ-HCH is no longer prevalent and in 2006 the EPA issued a cancellation order to cease production\(^1\). The biotransformation of γ-HCH has a variety of metabolic pathways. During phase I biotransformation, γ-HCH undergoes many processes of dehalogenation and oxidation via dechlorination, dehydrogenation, dehydrochlorination, and hydroxylation as the liver breaks the chemical down. As phase I biotransformation works to convert γ-HCH into a more polar substance, phase II biotransformation furthers the process of some pathways through conjugation via sulfonation and glucuronidation effectively allowing the chemical to be excreted. An example of one possible metabolic pathway of γ-HCH is dehydrochlorination into γ-Pentachlorocyclohexene (γ-PCCH) which can either be conjugated through sulfonation and/or glucuronidation and excreted as sulfuric and glucuronic acid or can undergo further dehydrochlorination into trichlorobenzene (TCB). TCB then endures hydrolysis into trichlorophenol (TCP) and TCP is dechlorinated into dichlorophenol which can then be excreted as a free phenol\(^2\). The biotransformation of γ-HCH provides insight into the complex metabolism of xenobiotics that can occur in the liver by way of cytochrome P-450 as the body facilitates the excretion of lipophilic compounds via conversion into hydrophilic compounds.

\(^1\) Environmental Protection Agency Lindane Cancellation Order 71 Fed. Reg. 239 (Dec 13, 2006). Federal Register. \url{http://pmep.cce.cornell.edu/profiles/insect-mite/fenitrothion-methylpara/lindane/lindane_can_1206.pdf}


Understanding of human risk associated with exposure to a particular chemical in a work setting is in the center of our senior class titled “Human Health and Risk”. During this class I analyzed the probability of exposure to Phenol as well as ways to minimize the risk associated with its exposure. Human health and risk is the study of how dangerous a hazard is, the probability of it occurring, and the reasonable minimization of the associated risk. These studies can analyze how a chemical will react in the body and the consequences associated with that reaction. Chemicals can be classified as either a carcinogen, meaning it is a proven cancer-causing
agent, or a non-carcinogen, meaning there has been research done to prove the chemical does in fact cause cancer. Even if a chemical is classified as a non-carcinogen, there may still be adverse health effects correlated with that certain chemical. A perfect example of this is phenol. Phenol was first discovered and used as an anesthetic for field amputations. This method of use utilized the anesthetic properties to numb the skin and allow for the amputation to take place. While this is beneficial, it may also cause the individual to be immune to the pain they are feeling while still receiving harm to their skin. Phenol is classified as a non-carcinogen based on tests performed by the Environmental Protection Agency as well as the International Agency for Research on Cancer. Regardless of this classification, studies have proven that phenol still has health risks for both humans and animals. One study focused on the effects of phenol on lab rats. This study proved that phenol is a tumor promoter in animals. Another study was focused on the leaching of phenol into groundwater when biodegradation of soil in a sunlit water source is relatively low. The water source will then be contaminated with phenol and this is toxic to aquatic life. Water contaminated with phenol can cause reduced fertility in certain organisms. Even with this information available, researchers are unable to develop a solid estimate for a lethal dose. Although not a cancer causing chemical, the risks associated with phenol still impact human health as the chemical reacts within the body promoting adverse health effects.

2 National Research Council (US) Committee on Acute Exposure Guideline Levels; National Research Council (US) Committee on Toxicology. Washington (DC): National Academies Press (US); 2009.

1:30-2:15  Board 59
Courtney Jeanne Toomey
William A. Hubbard (Faculty Sponsor)
Department of Environmental Science, Massachusetts Maritime Academy
Benthic Studies in Upper Buzzard’s Bay, Massachusetts

Municipal water pollution control facilities (WPCF) and residential septic systems are adding nitrogen to Buzzard’s Bay and threatening the long-term health of estuarine systems in southeastern Massachusetts. The upper bay region, including Little Buttermilk Bay and the Agawam/Wareham River, fail to meet water quality standards defined by the Massachusetts Department of Environmental Protection (MassDEP) and the Federal Clean Water Act. Data collected by the Buzzard’s Bay Coalition and Massachusetts Maritime Academy shows how inadequately treated wastewater discharge leads to eutrophication in Buzzard’s Bay and reduces dissolved oxygen and water clarity of the surrounding region. Surveying diversity of macro benthic communities by inventorying the existing species is a valuable indicator of ecological health. Massachusetts Maritime Academy and the Buzzard’s Bay Coalition are inventorying benthic diversity as a baseline assessment for future decisions on waste water treatment plant (WWTP) upgrades in the Buzzard’s Bay estuarine system. Benthic samples from a 1/25 meter Van Veen grab are being sorted and identified to species. Five existing stations were sampled with three replicates each, and an additional grain size grab was taken. Biological diversity indices will be generated, establishing a reference for future monitoring as
the WWTP facilities’ discharges are increased. Within the five stations, there is a variation of substrate type that ranges from eelgrass (Zostera marina) beds, blue mussel (Mytilus edulis) beds, and slipper shell (Crepidula fornicata) beds. Organisms such as amphipods, annelids, and gastropods found in these communities are showing minimal signs of ecological stress.

2:45-3:30    Board 14
Katie L. Sullivan
Haley B. Flannigan
Kimberly Ann Amaral Newton (Faculty Sponsor)
Department of Biology, Bristol Community College
An Investigation of Pollinators Inhabiting a Historic Cranberry Bog Prior to Restoration

This study will involve the collection and identification of pollinators to investigate the species inhabiting a former cranberry bog in Freetown, Ma. We will work to gather baseline data on the pollinators currently inhabiting the area, and the plants/pollen that the pollinators are utilizing. Pollinators will be collected and identified following protocols generated by our collaborators at Massasoit Community College. Pollen will also be sampled and preserved for future DNA sequencing to identify pollen sources.

This site has been heavily manipulated for agricultural purposes, and is slated to be restored to its natural state by the Massachusetts Department of Ecological Restoration. Our baseline study will provide for future comparison to pollinators in the area both during and after restoration. The data collected will be shared with our collaborators at Massasoit Community College, adding a new element to their existing pollinator dataset, as no pollinator data of this kind exists for Bristol County. This work is intended to continue in future years to follow the ecological restoration of the cranberry bog site, and to decipher if there is a change in the variety and/or number of pollinators, as well as types of plants being used primarily by those species.

2:45-3:30    Board 72
John Veneziano
Nabin K. Malakar (Faculty Sponsor)
Department of Earth, Environment, and Physics, Worcester State University
Examining Seasonal Surface Temperature Variations and Extremes in New England

In the Northeastern United States, more specifically New England, air and land surface temperatures are known to fluctuate based on the season. The two seasons where this phenomenon can be most notably measured is during the cold winter months (December, January, February), and during the warm summer months (June, July, August). Both hot and cold temperatures are shown to have large impacts on human health and survival, which is why it is important to monitor these seasonal temperature variations and fluctuations. In order to conduct this study, temperature data for New England was taken from NASA’s MODIS satellite, which spanned the years of 2001 to 2011. After obtaining this data, a program was designed using MATLAB that both read the data and generated images of monthly temperature variations throughout New England. These images were generated and saved in a png format, and were
color coded to illustrate where the hottest and coldest areas were in the region. What was discovered from the data analysis was that regardless of time of year, temperatures were always higher in urban environments. The cities of Boston, Worcester, Springfield, Hartford, and Providence were all shown to have this effect, which can most likely be attributed to the presence of an urban heat island. When nighttime temperatures were also observed, it was apparent that these had increased in both the winter and summer months throughout the period of time that was measured. The greatest increase in these nighttime temperatures was in the summer, where there were significant changes in warming air temperatures during the later years of the study. This shows a possible impact of global climate change in the region of New England. Overall, this data is significant because it shows both where and when cold and heat related health concerns will most likely occur, which could have an impact on future policy decisions and further research into air and land surface temperature at the local level in New England.

3:45-4:30  Board 52
Devyn Antonio Manzi
Reena Randhir (Faculty Sponsor)
Department of Biology, Springfield Technical Community College
Energy Conservation for Sustainable Agriculture

The agricultural industry uses fossil fuels as a primary source of energy in farming. In 2012, all of US agriculture used an estimated 800 trillion British Thermal Units (BTU). Fossil fuels are attributed to the high carbon footprint. There is potential to use renewable energy sources in farming to improve farming sustainability. This study aims to review costs and benefits of improving farming sustainability through adoption of renewable energy. Using information from literature, farming sustainability between energy efficient farm and farm with conventional energy can be compared to evaluate the advantage of renewable energy. It was observed that improving the energy efficiency of machines, switching to renewable energy, and reducing energy loss have the potential to improve the economic and environmental sustainability of the farm. There is a need for education and policies that promote energy efficiency in agriculture. Alternate energy sources include wind power with wind turbines, solar power, hydropower, and biofuels. These energy sources can be used in heating livestock, drying, and processing in farms. Incentive policies that encourage renewable energy can be in the form of cost-sharing, rebates, and technical assistance in sustainable farming.

3:45-4:30  Board 60
Adam Lesieur
Timothy O. Randhir (Faculty Sponsor)
Department of Environmental Conservation, Springfield Technical Community College
Impacts of Dams on Watershed Ecosystems

There are more than 57,000 large dams worldwide that have negative impacts on stream ecosystem, including impediment to fish migration, aquatic ecosystem change, flow regime alteration, and impaired sediment movement. The objective of this study is to quantify the impact of dams on watershed ecosystem; specifically, to study the nature of flows in different
dams in the study area, and to evaluate the potential impacts of dams on upstream and downstream ecosystems. A preliminary literature review was conducted using Google Scholar. The study area is the Deerfield river in New England, which runs for 76 miles from southern Vermont through Massachusetts and has 10 hydro dams. Combination of field visit and USGS Streamstats modeling is used to evaluate stream fluctuations above and below dams. Monitoring data from USGS gaging stations is analyzed as time series. It was observed that in rivers with dams, the primary agent of alteration to the watershed ecosystem is through changes in stream discharge. Factors that need to be considered include impacts the dam on streamflow before and after dam release and the associated physical risks, the buildup of sediment in dam reservoirs, and the impediment of fish migration. To mitigate these effects; streamflow should continue to be monitored, dam releases regulated and posted for public safety, allow for fish migration, and restore natural flow of sediment.

3:45-4:30    Board 61
Cynthia Hester
Timothy O. Randhir (Faculty Sponsor)
Department of Environmental Conservation, Springfield Technical Community College
Impacts of Urban Tree Canopy on Energy Use of Buildings

Urban tree canopies can offer significant benefits in reducing building energy demand. Trees affect energy use in buildings through many processes. The direct effects include the reduction of solar heat gain through windows walls and roofs by shading and the reduction of radiant heat by shading. The indirect effects include reduction of outside air filtration by lowering ambient wind speeds and reduction in heat gain in buildings by lowering ambient temperature. The purpose of this study is to study the impact of urban tree canopy on selected buildings on the campus of Springfield Technical Community College in Springfield, Massachusetts. I-Tree design modeling software is used to simulate ecological effects along with data analysis of specific trees species on the STCC campus. Best tree species are identified for optimum ecological effects using hardiness as determined by state and city, mature height, functionality, and environmental factors such as building energy conservation, air temperature reduction, and wind reduction as well as ease of maintenance, soil conditions, and pest problems. GIS was used for mapping and display of aerial photographs of campus buildings. It was determined that the urban tree canopy can reduce energy consumption in buildings on the STCC campus. Moreover, additional benefits were also observed, which include an interception of 90,598 gallons of water with a savings of $725 through new trees planted near Building 2. In addition, carbon dioxide emissions can be reduced with a savings of $268 as well as a general reduction of allergens that contribute to better air quality.
Role of Vegetation in Mitigating Water Crisis

Millions of people still don’t have clean water to drink and is a leading cause of more deaths than all wars combined. Sanitation is one of the world's leading cause of disease and child death, the most common illness associated with poor sanitation is diarrhea. Forests help in managing storm water, increasing water supplies and protecting water quality. Trees are most beneficial land use for protecting water quality, due to their ability to capture, filter and retain water, as well as reduce air pollution. Vegetation is also essential to the provision of clean water in urban and rural areas. There is a need to study the role of trees in mitigating water scarcity. Aim of this is to assess the role of trees in mitigating water scarcity. I-Tree Canopy Modeling software was used to simulate the tree’s effects, as well as data analysis of specific trees species in Chicopee, and investigated the water supply sources. I-Tree Hydro software was used to analyze the impact of trees on Chicopee hydrologic system. Results show that planting trees is necessary to increase canopy cover and to replace trees lost to natural mortality and other threats like invasive pests and impacts of weather events. City-wide tree planting can focus in areas to promote economic growth, shade and energy conservation and increase canopy cover. Trees can improve infiltration to ground water and reduce runoff thereby reduced stormwater flooding. This will help in improving water resources of the city. Vegetative cover should be a part of overall water management strategy of the city.

Avian Ticks Found on Breeding Forest Birds in the Northern Berkshires, Massachusetts

Extensive research has been dedicated to understanding the risks ticks pose to humans as vectors of disease. Less attention has been devoted to understanding how tick parasitism affects birds. We sampled breeding songbirds in a forest in northern Berkshire County, Massachusetts. During June 2018, we found at least one tick attached on 41 of the 122 birds we captured. We failed to detect a relationship between bird body condition and presence of ticks on birds. Male and female birds were infected with ticks at similar rates (male mean = 0.72 ticks/bird; sd 1.2; female mean = 0.66 ticks/bird; sd 1.5). While ticks attached to birds were exclusively larvae and nymph stage ticks, the ticks sampled directly from the forest vegetation were primarily adults. *Ixodes scapularis* was the most common tick we found on birds and in vegetation, and all tick species we detected were already known to occur in western Massachusetts.
Assessing Range-Shifting Invasive Species in the Northeast US Using the Environmental Impact Classification for Alien Taxa

Invasive species threaten ecosystems and can have many detrimental ecological and socio-economic effects. In addition, invasive plant species are expected to shift ranges under future climate scenarios, and many novel species are predicted to shift into the Northeast. However, the severity of impact is species-specific, ranging from irreversible (e.g., causing extinction) to minor (e.g., having sublethal impacts on individual plant fitness). Given the limited resources devoted to invasive species management, it is important to prioritize species with the greatest impacts. The Environmental Impact Classification of Alien Taxa (EICAT) is a standardized protocol developed for invasive species prioritization that utilizes published literature to evaluate the invasion mechanisms and their associated magnitude of impact for each invasive species. I applied EICAT to a list of 101 invasive plant species that are expected to shift into the Northeast in order to supplement risk assessments and prioritize these species according to their impacts. I was able to identify 24 (23.8%) high priority species, 25 (24.6%) medium priority species, and 7 (6.9%) low priority species. The remaining 45 (44.6%) species were data deficient, as they did not have enough literature for a confident prioritization. The large percentage of data deficient species suggests that there is a need for further invasive plant impact research. Overall, EICAT is a user-friendly protocol that can contribute insightful information to risk assessments and can also highlight gaps in data about invasive species impact. Moreover, EICAT can help invasive species managers by directing management efforts on species with the greatest impacts.

Analyzing the Effects of Coccolithophore Concentration on the Relationship between Vertical Absorption Coefficient and Secchi Disk Depth

The study of how light passes through water, known as ocean optics, is useful in determining the constituents suspended at the surface of a water body. Understanding the composition of the water over time can answer questions about how the oceans have changed with global climate change and ocean acidification. The vertical absorption coefficient in ocean waters is an indicator characterizing how deeply light penetrates into the water column. Using this information, scientists can better understand and predict the amount of primary productivity occurring in the area. Here we examine the relationship between vertical absorption coefficient and secchi disk depth to determine if the concentration of a type of calcifying phytoplankton, coccolithophores, causes the relationship to deviate from the findings of a pivotal historical study conducted in 1929 by Poole and Atkins. Data was collected during July, 2018 aboard
the *R/V Endeavor* on the EN616 “Cocco-Mix” cruise in the Northwest Atlantic Ocean. Diffuse attenuation was determined using downwelling irradiance measurements gathered from a HyperPro that measures electromagnetic energy through the water column. Diffuse attenuation values were compared with secchi disk depth measurements taken at the same time and location as the HyperPro casts. Results will contribute to our understanding of how the relationship between light extinction and secchi disk depth changes between water bodies. This knowledge can be used to relate light extinction and secchi disk depth in historical studies in the Northwest Atlantic that did not have access to more modern equipment to measure light extinction.

4:45-5:30 Board 17
Shannon O'Donnell
Cassandra Uricchio (Faculty Sponsor)
Department of Veterinary Science, UMass Amherst
Compaction of Various Equine Footings and the Effect on Water Drainage

In the equine industry, water drainage in paddocks is affected by the compaction of the footings and subsoil. Compaction, which is the effect of force on a substance to make it more dense, contributes to poor drainage and increase runoff. Water drainage is water draining through soil which replenishes groundwater. Water runoff is when water does not drain or evaporate quickly. Runoff is a key part of erosion and contributes to non-point sources of pollution.

This study analyzes how the compaction of footing affects paddocks and their drainage capacity. The footings used were pea stone, gravel, native soil, limestone sand mix and native grass with soil (sod and native soil). Uniform containers were set up with 18in of footing; 3in of water were added to the footings, as per average rainfall readings from 2018. Data collected was the time it takes the water to drain, and soil moisture level was measured with a penetrometer. Measurements were repeated after compaction, to simulate how footing would be around high traffic areas (e.g. water and feed sources).

In conclusion, the experiment showed that compaction will cause more runoff and less drainage. Recommendations include treating footing regularly to prevent compaction, and therefore prevent erosion.

4:45-5:30 Board 72
Madeline Anne Patrick
Bethany A. Bradley (Faculty Sponsor)
Department of Environmental Conservation, UMass Amherst
The Distribution of Invasive Species by the US Plant Trade Industry

Invasive plant species are a growing threat to native biodiversity in the United States as they outcompete natives and alter ecosystem functions. The nursery industry is the primary pathway of invasives into the U.S. and while regulations should prevent the distribution of listed invasives, enforcement is resource-limited; additionally, there is no comprehensive list of which
regulated invasives are available for sale in the United States. We therefore seek to provide a database that identifies which regulated invasive species are being sold, and the location of these sales in the U.S. We created a comprehensive list of regulated invasive plants using the USDA, the Invasive Plant Atlas, and individual state government websites, which resulted in a total of 1,567 species. We have used two methods to search for sales of the species: 1) a Google search using the scientific name and common names, with the phrases, “for sale,” “plant for sale,” and “seeds for sale,” and 2) a search using the scientific name in the Plant Information Online (PIO) database of nursery catalogs. Of the 1,382 species that have been searched using Google thus far, we have found 56% for sale. The PIO method has been completed, with a total of 654 species (44%) found for sale by a total of 653 nurseries. Our research highlights a large percentage of known invasive plants that are still available for sale in U.S. nurseries. This suggests that current regulations are inadequate for preventing the continued spread of invasive plants via nurseries.

4:45-5:30  Board 73
Rachel Bratton
Michelle Dana Staudinger (Faculty Sponsor)
Department of Environmental Conservation, UMass Amherst
Investigating Pre-breeding Foraging Ecology of Maine Seabirds through Stable Isotope Analysis of Eggshell Membrane

In the Gulf of Maine, climate change is shifting the timing of the seasons, impacting the reproductive life cycles of sensitive coastal species including the Common tern Sterna hirundo, Arctic tern S. paradisaea, and Roseate tern S. dougali. In this study, analysis of stable carbon (δ13C) and nitrogen (δ15N) signatures was performed on 271 eggshell membrane tissue samples collected from these species nesting on 7 Maine seabird islands from 2016-2018. Patterns reflect the foraging ecology of adult females just prior to egg laying, which represents an energetic refueling period; prey resources are critical during this temporal window to support successful reproduction after migrating from southern latitudes. Preliminary results indicate variation in general foraging areas (e.g., inshore or offshore) and in the trophic level of prey consumed. For example, Arctic terns nesting on Matinicus Rock Island had more enriched δ13C values (n=10, mean=-19.52±1.16) compared to those on Seal Island (n=10, mean=-17.14±0.13, p<0.001), suggesting birds nesting on Matinicus Rock Island foraged in more productive inshore areas. δ15N signatures of Common and Arctic terns nesting on Seal Island in 2016 showed Arctic terns (n=10) had significantly (p<0.001) depleted δ15N values (10.40±0.32) compared to Common terns (n=10, mean=11.48±0.58), suggesting Arctic terns forage at a lower trophic level than common terns. Data on the pre-breeding diets of adult terns is poor, and results will provide new insights into factors affecting inter-annual foraging habits that may have implications for conservation as climatic impacts continue in years to come.
FINANCE

8:30-9:15  Board 19
Andrew Ross Price
Christine L. Crago (Faculty Sponsor)
Department of Resource Economics, UMass Amherst
Is Pursuing a Sustainable Business Model a Viable Way for a Company to Stay Profitable?

With climate change and regulations for social justice influencing business, leadership of companies must realign their business strategies. No longer can CEOs ignore sustainable business practices, government and society are calling for action to be taken. In the past, drifting a company’s focus away from profit, and onto the people and the planet was seen as expensive and poor business strategy. But this is no longer the case with recent social and environmental issues. My research question asks if it is profitable for a business to pursue a sustainable business strategy. To answer this question, I will use statistical analysis to compare American public companies’ ESG Manager sustainability ratings to their financial performance over the past five years. The financial metrics will be net income, stock price, and total revenue. After the statistical analysis, I will perform case studies of selected companies in different industries. This research hopes to influence investors to look into funding sustainable companies. It also hopes to show corporate leaders the benefit of focusing their company on sustainable practices.

10:45-11:30  Board 1
Mambo Forfang Stephanie
Zaur Rzakhanov (Faculty Sponsor)
Department of Accounting and Finance, UMass Boston
The Role of Auditors in Industry Spillovers around Lehman Brothers Collapse and Bankruptcy

This paper will be examining the role of an auditor in facilitating intra-industry spillovers around Lehman Brothers collapse. Previous research studies argue that the financial meltdown of 2008 could not have been averted due to the commonality of risky securities traded by firms in the financial industry. This research paper will explore and focus on a specific industry spillover channel: negative externalities that one firm has on other industry peer firms sharing the same auditor. Specifically, whether having the same auditor can lead to financial contagion and if so, how strong that effect is. I will use regression analysis to identify characteristics that such firms share, such as stock price movements and dividend changes during 2008 and thereafter.

10:45-11:30  Board 2
Conner Lang
Zaur Rzakhanov (Faculty Sponsor)
Department of Accounting and Finance, UMass Boston
Why Corporations Avoid Taxes and the Consequences of Tax Avoidance

The purpose of this research is to collect and evaluate 10-Q financial documents of five of the largest US-based multinational corporations to determine how and why they avoid taxes, as well
as to determine the effect this avoidance has on the corporations. A natural conjecture is that companies avoid taxes in the US because the corporate tax rates are too high. They predominately avoid it by investing in foreign countries or moving their money to low- to no-tax haven countries. Tentatively, the effect on the corporations seems to be that they are less able and less willing to produce in America and struggle to invest in their state side sectors. With the recent changes in the tax codes with the passage of the “Tax Cuts and Jobs Act of 2017” there seems to be a large shift in the way corporations operate. However, the full effect of this shift requires further investigation.

10:45-11:30    Board 28
Jared Millstein
Sanjay Nawalkha (Faculty Sponsor)
Department of Finance, UMass Amherst
Using Differential Tuition in Public Universities as Economic Policy to Shape Labor Markets

The United States labor economy is not perfectly self-sorting and the country may, in the near future, find itself with labor shortages in industries like nursing, computer science, or even in the humanities. This paper examines the proposal for state and federal government to influence labor markets by subsidizing public college costs for certain schools and majors. Using the precedents set by ongoing differential tuition policies at many universities and by previous analysis of the value of higher education, this paper demonstrates the potential for such a proposal to shape student choices and labor markets. Based on these findings, this paper will fit the proposed model to keystone examples, such as the nursing industry, in order to illustrate the proposal’s potential for effectiveness across industries.

10:45-11:30    Board 38
Brandon Helgason
Sanjay Nawalkha (Faculty Sponsor)
Department of Finance, UMass Amherst
A Solution to the Insolvency of America's Social Security Program

The foundation of America’s retirement system is comprised of employee pensions, Social Security benefits, and personal savings. These three pillars form the base of the “three-legged stool” which upholds the financial stability of those nearing retirement. The main leg of the stool, Social Security, has experienced a host of problems stemming mainly from insolvency issues. To assess the severity of the fund’s insolvency, I constructed a simulation to see if it is as precarious as the program claims it is. Currently, the fund’s dollar reserves are invested in low-yielding Treasury securities, roughly 2% to 3% percent. However, these reserves are being distributed faster than they are growing. With the semi-privatization of the Social Security Trust Fund, these current low-yielding government securities can be invested in assets that provide a higher average annual rate of return. By doing so, the Social Security program will be restructured to account for current retirees and their posterity. This study examines the
programs insolvency and provides several solutions to better current retirees by increasing the program’s longevity.

10:45-11:30  Board 39  
Michael George Oliveira  
Sanjay Nawalkha (Faculty Sponsor)  
Department of Finance, UMass Amherst  
An Exploration into the US Dollar’s Present Status and Future Prospects as a Reserve Currency  

The United States dollar has been the global reserve currency since the beginning of the Bretton Woods international monetary regime at the end of World War II; since underpinning a vast majority of international trade and having a dominant presence in the reserves of central banks. The world has seen a series of currencies fill this role over the course of history, placed there by the confidence of international system in the stability of that currency and the entity backing it. The aim of this paper is to explore where that confidence in the U.S. dollar came from, starting in the mid-twentieth century, and assess the state of it today, including its likelihood to remain. As part of this ladder aim, alternatives and the roads that lead to them must be considered, as the world will continuously remain in need of a reserve, though that need not be the dollar. Thus, under consideration due to their significance are the Euro and the renminbi, though the paper also aims to briefly explore other ideas like the IMF’s SDR and a form of global crypto currency.

10:45-11:30  Board 40  
Katherine McKeon  
Sanjay Nawalkha (Faculty Sponsor)  
Department of Finance, UMass Amherst  
Barriers to Diversifying Out of a Commodity-Based Economy  

My thesis will look at the history of past protectionist policies enacted by developed countries to protect their industrial growth, and how these same protections are not given to countries who are trying to develop now. The focus is on countries whose economies depend on pure commodities. These countries are unable to secure the funds or protections that would enable them to build the industrial base necessary to manufacture these commodities into final goods. Having manufacturing capabilities would keep more of the profits in their respective countries. With more money coming into the country, governments could work on diversifying their economy away from pure commodities. I will go through a brief history and global overview of the status of the rules and regulations currently in place that hinder development of poorer countries. The paper will then go into a case study of Malaysia and see how they have successfully transformed their country into one that has diversified its economy out of relying solely on commodity exports, and compare it to Ethiopia, a country that has thus far been unable to diversifying its economy. I will make suggestions for Ethiopia on how to proceed. This paper will also highlight how organization such as the World Trade Organization, the World Bank, and the International Monetary Fund structure international policy in a way that stacks the odds against developing countries that are trying to industrialize their economies.
Battle of the Banks: Online Banking and the Player Taking the Industry by Storm

The financial industry has seen recent disruption from massive digitization in all fronts. FinTech continues to revolutionize everything from the back-office processing of transactions to financial advising in wealth management firms. There is no question as to whether or not FinTech is changing the financial landscape; however, who the major players will turn out to be in this technological shift is still uncertain. This thesis will focus on online banking (one of the biggest industries being impacted by financial technology today) and its primary participants: the traditional big banks, the pioneering big tech companies, and the disruptive startups. Through interviews with industry professionals, analysis of industry reports/outlook, analysis of the barriers to entry in the financial industry, and an overview of the social impact of FinTech on the broader economy, this thesis will answer the following question: Will big banks maintain their position in the digital banking industry, or will startups/tech companies take over financial services?

The Risks of Orphan Drug Production and FDA Weakness

Large pharmaceutical companies have traditionally focused their operating model on the research, production and distribution of “blockbuster” drugs. A blockbuster drug is typically defined as an extremely popular drug that annually generates at least $1 billion in revenue by targeting a disease or condition with a large population such as high cholesterol, diabetes, high blood pressure and cancer. However, factors such as growing R&D and clinical trial expenses, patent expirations resulting in competition from generics and biosimilars, and increasing price scrutiny and health care reform, have resulted in pressures making the blockbuster model less feasible. As an industry that has time and time again proven its ability to cope and even thrive with increased regulatory burdens and public criticism, pharmaceutical manufacturers have steadily increased their efforts towards incorporating drugs for rare diseases (also known as orphans) into their portfolios. The FDA has successfully incentivized orphan drug production through initiatives and legislation, but with these have come loopholes utilized by pharmaceutical companies. Additionally, the FDA has experienced an increasing institutional weakness with regards to prescription drug regulation, fueling concerns that the orphan drug market is ripe for abuse at the expense of patients and the scientific progress of pharmaceutical drugs as a whole.
Can Robo-Financial Advisors Establish Trust?

Industries are continuously replacing their human employees with technological advances that are more cost-effective and efficient. Ever since the financial crisis of 2008-2009, the automation of financial advising took off because it reduced the need for human labor and greatly reduced cost in comparison to the more expensive traditional brokerages. Robo-advisors have continued to grow at a rapid pace and now collectively manage hundreds of billions of dollars in investor assets. This research investigates whether robo-advisors can really establish trust and forge social connections with investors.

How a Nation’s Financial System Contributes to the Happiness of Its People

The goal of this paper is to examine the role that the economic policies of a nation’s government play in affecting the happiness of its people. It focuses on how the Nordic Model in Scandinavia allows governments to provide financial stability at every stage of a person’s life, freeing them to pursue experiences that will contribute to their life satisfaction. A major discussion point will be how money is a tool to drive the more valued experiences in these countries and the modern world. According to the 2018 U.N. Happiness Report, the Scandinavian countries of Denmark, Finland, Iceland, Norway, and Sweden are the happiest in the world. These rankings are determined based on six measurements: GDP per capita, social support, healthy life expectancy, social freedom, generosity, and absence of corruption. In this thesis we expand on this happiness index to create a more comprehensive measure by adding two additional measures of family support and future expectations. Research from the 2018 U.N. Happiness Report, books, research articles, academic reports and other sources will be combined with our own survey to better establish how factors determine happiness. Based on these interpretations, the paper will recommend how the governments of countries can improve their citizens’ lives through active policy decision-making.

Legal Marijuana: The Impact on Firm Value Resulting from Regulatory and Strategic Decisions

An event study analyzing the strategies of cannabis companies will evaluate the importance of branding, economies of scale, and supply chain during the early stages of the post-prohibition cannabis market by understanding the consumer base, comparing stock price after a merger,
acquisition, or partnership, and the value of data analytics. By understanding the consumer base, companies will gain a competitive advantage from the first mover effect by establishing brands through patents and trademarks which offer intellectual property rights protection. Increasing economies of scale will give companies a competitive advantage by strategically aligning themselves through either a merger, acquisition, or partnership with an appropriate beverage distributor or research and development facility. Investing in supply chain management, allows companies to establish competitive advantage through cost reduction with data analytics. My study will attempt to quantify the absolute and relative impact of these factors on firm value. By applying the core principles and analytics associated with previous new markets and then studying the new, intriguing, and this particularly opaque and volatile market created by the end of prohibition, investors can dramatically improve their ability to identify the companies that have the best chance of delivering growth, value and profitability.

Room 908    1:30-2:15    Panel 5
Syuzanna Melkonyan
Zaur Rzakhanov (Faculty Sponsor)
Department of Accounting and Finance, UMass Boston
Integration of ESG Factors in Portfolio Construction and Its Impact on Performance

The ESG (Environmental, Social and Governance) integration in investment decision-making process has been an industry trend in the recent decade which sparked a lot of debate among investors in terms of its impact on performance. The objective of this paper is to investigate whether the integration of ESG (Environmental, Social and Governance) factors in major asset managers’ fixed income portfolio construction process has led to outperformance or risk mitigation benefits. The research uses MSCI ESG ratings as the basis of analysis. The study has identified that there is statistically significant risk reduction benefit to investments in high ESG score versus low ESG score portfolios. However, there is not any statistical evidence supporting the hypothesis of outperformance of high versus low ESG score portfolios, except when the Governance scores are considered only. Some implications of the study include the lack of convergence of reporting standards which can materially impact the ESG scores, as well as the limited timeframe for which historical ESG scores are available to support the analysis.

2:45-3:30    Board 37
Michel A. Fleurime
Luis Daniel Rosero (Faculty Sponsor)
Department of Accounting, Economics, and Finance, Framingham State University
A Comparative Analysis of Venture Capital in United States Economic Landscape

Given the importance of venture capital to the existing financial system, it is essential to identify key characteristics of this sector. Using time series quarterly data from 1995 to 2018, this paper explores the drivers and outcomes of the venture capital industry in a set of selected states. Moreover, through the use of firm case studies, the successes and potential threats of representative investment syndicates in the United States are comparably analyzed based on
their arguable relation to major macro-economic indicators. Finally, policy implications are strategically evaluated for the industry and state economy in general.

2:45-3:30  Board 73
Bryanah Haeleigh Johnson
Frances M. Skypeck (Faculty Sponsor)
Department of Accounting, Framingham State University
Financial Planning: An Understanding in How to Plan for Success

Knowing how to create a financial plan is an important skill in the modern world - a skill that many college students are unaware of how to even start. By creating financial plans for a range of individuals over a life cycle, this study will present the reader with an understanding as to the level of detail needed in creating a financial plan, from short-term goal planning to long-term retirement planning. This project aims to study three individuals in a multitude of living situations, from a recent college graduate, to an individual in their mid-life, all the way to an individual planning for their retirement. Both an in-depth financial plan for each individual will be provided, as well as a thorough explanation of any and all decisions in relation to the topics covered.
GEOGRAPHY

10:45-11:30 Board 30
Joseph C. Perry
Laura Lamontagne (Faculty Sponsor)
Department of Economics, Framingham State University
The Role of Geospatial Technologies in Mitigating the Spread of Measles

Geographic Information Systems (GIS) a framework that is responsible for the gathering and interpretation of spatial and geographic data. Over the course of time, various types of GIS software developments have allowed for the advancement and rapid growth of both economic and environmental transformations. One crucial component of the advancement of GIS software has been the ability to track health trends across the globe, particularly its role in mitigating the spread of disease. In the United States, both the Center for Disease Control (CDC) and the Bureau of Infectious Disease and Laboratory Science have been able to track such diseases, particularly the spread of measles. Research has proven there is a positive correlation between individuals who have not received the measles vaccination have a higher likelihood of contracting the diseases versus those who are vaccinated. This paper will examine how the role of GIS software has tracked the spread of measles and the externalities and additional health costs that are attributed to those who choose not to receive a measles vaccination.

10:45-11:30 Board 73
Bridget Taylor Venezia
Carsten Braun (Faculty Sponsor)
Department of Geography and Regional Planning, Westfield State University
Climate Change and Social Conflict; The United States’ Most Vulnerable Communities

Climate change as an amplifier of social conflict is a relatively new concept. Often times many misinterpret the concept as climate change as the direct cause of conflict or as an excuse of all other factors which may incite social conflict. My objective in this study was to find lines of evidence to show how climate change amplifies already existing social conflicts, specifically focusing on Native Americans and gentrification in the United States. I conducted a comprehensive review of the available literature including news articles, peer-reviewed publications, figures, and books and found clear evidence that climate change amplifies dislocation, gentrification, and food insecurity in the United States. These social conflicts impact some of the most vulnerable communities in the country, yet they are amplified by a nation which is supposed to protect and support them. This not only disproportionately impacts vulnerable people within the United States, but also people around the world – those most responsible for climate change as well as social inequities typically do not have to bear the consequences of their actions or inaction.
GEOLOGY

8:30-9:15  Board 63
Kurt Robert Lindberg
Isla S. Castanea (Faculty Sponsor)
Department of Geosciences, UMass Amherst
Reconstructing Arctic Climate from 800,000 to One Million Years Ago Using Bacterial Membrane Lipids

The ability to reconstruct past temperatures using organic proxies is critical to our understanding of Arctic climate during the glacially active Pleistocene period. Such proxies can be found and analyzed from lake sediment cores allowing us to measure temperature changes across individual glacial-interglacial cycles as well as overall trends towards modern times. Our knowledge of Arctic climate has been restricted by the lack of a continuous sedimentary record due to large swaths of the northern hemisphere being periodically covered by ice sheets. In this study, we analyze bacterial membrane lipids (branched glycerol dialkyl glycerol tetraethers; brGDGTs) contained in sediment drill cores from Lake El’gygytgyn in eastern Siberia. This lake bordering the Arctic Circle has remained untouched by glacial processes providing us with a unique 3.6 million year record of sedimentary and biological activity. Using liquid chromatography and previous GDGT-based temperature calibrations, we reconstructed arctic temperatures from 800,000 to 1 million years ago at a 2,000 year resolution in order to compare results to previous Pleistocene climate models and to present the first arctic continental temperature reconstruction during this time period. We find a clear pattern of alternating warming and cooling trends consistent with interglacial-glacial climate cycles with an average temperature of 7.4 degrees Celsius and a range from 2 to 16 degrees over the 200,000 year time frame. This new temperature record provides us with the opportunity to examine how biological proxies have historically responded to local and potentially global climate change.

8:30-9:15  Board 64
Solveig Schilling
R. Mark Leckie (Faculty Sponsor)
Department of Geosciences, UMass Amherst
Behavior of the Kuroshio Current Extension during the Mid-Pliocene Warm Period

I am examining the degree in which the subtropical southern section of the Kuroshio Current Extension (KCE) warmed during the mid-Pliocene Warm Period (~3.3-3.0 million years ago), an interval of geologic time when atmospheric CO2 was slightly elevated compared to today’s values. This interval is often studied as an analog to determine how our oceans will behave under increased warming. To date, no studies have characterized in detail how the KCE responded in the geologic past to warming events. I hypothesize that the KCE became warmer as a response to expanded warm waters in mid-latitude regions. Deep-sea sediments from Ocean Drilling Program (ODP) Hole 1209A, located near the southern edge of the modern KCE, will be used to investigate the behavior of the KCE. Stable isotopic analyses (δ13C and δ18O) from surface-dwelling plankton (planktic foraminifera) will be used to track the sea surface temperatures (SST) from 4-2.5 Ma. By monitoring SST, I will be able to interpret the movement...
of the KCE during the study interval. If low δ18O values are present, it can be concluded that the KCE had shifted north bringing warmer waters over Site 1209, while higher δ18O values will indicate an equatorial shift that brought cooler waters over the site. Understanding western boundary currents, like the Kuroshio Current, are important since they play an essential role in ocean/atmospheric exchange and are responsible for regional weather patterns and climate. This research project will provide valuable information about western boundary current migration and their response to warming climates.
“Networks of Puerto Rican Power: Building Bilingual Education in Holyoke Schools 1960-1990” explores the links between the Puerto Rican communities of Holyoke and New York City in the 1960s and through the 1980s. Political operatives from each Puerto Rican community have historically used the expansion of bilingual education in public schools to galvanize fellow community members, create political capital, and, in turn, break into their respective political establishments through school board positions. Archival materials reveal that some operatives from New York City's Puerto Rican and Latinx community who succeeded in pushing bilingual education there also helped facilitate the process in Holyoke as well. Dr. Luis Fuentes and Dr. Francisco Chapman were active in building bilingual education programs and services in the public education system of Holyoke. Each of them was also active in the movement to push bilingual education in New York City, Dr. Fuentes being the first Puerto Rican to serve as Superintendent of Schools in New York City. The processes of expanding bilingual education in New York City through breaking into electoral politics was the blueprint for Holyoke, in fact.

This paper will examine the history of lesbian, gay, bisexual, and transgender representation in mass media and go on to explore the effect that said representation had on the public’s perception of these groups, ultimately leading to policy changes regarding governmental treatment of said groups. The LGBT rights movement came after the civil rights and suffragette movements partly because sexual orientation and gender identity are not as visually obvious as race or sex, and thus groups which differed from the mainstream were simply never discussed publicly. With the rise of mass media, however, what was once thought of as taboo became acknowledged and inevitably accepted in the realm of media which led to acceptance in the real world. This paper will analyze this process and the resulting changes that came from it using examples such as the coming out of celebrities such as Ellen DeGeneres as well as the introduction and acceptance of gay characters in media such as on the television show “Will and Grace”.

MASSURC
While making significant advancements beginning in the 1960's, historic preservation and rehabilitation have never truly reached the forefront of national dilemmas. American citizens first noticed a need for preservation in the mid-19th century—with the formation of the Mount Vernon Ladies Association in 1853—which sought to restore the first president's home back to its original opulent grandeur from the shambles it diminished into. Yet it was not until 1949 that the government passed the National Trust for Historic Preservation, and not until 1966 was the National Historic Preservation Act set in place to provide funding. With such a large time frame between the formation of small preservation societies to large-scale government operated organizations, many historic buildings and landmarks have been reduced to ruin or even completely destroyed. This presentation will provide the economical, environmental, and educational benefits that historic preservation and rehabilitation provide, as well as addressing some of the detriments and seeking to provide a solution.

This research focuses on the study of Christian Moral Ethics in the United States, and questions if it will be passé by the year 2050. It includes a review of the founding fathers and their declaration of the United States being a Christian nation. By utilizing current events, I have developed a study describing where Christian Moral Ethics lay currently, its effect on society, and its advancement. The research also looks at the relationship between moral ethics and human emotions, continuously shifting social norms, diverse perspectives, and the “salad bowl” theory. Furthermore, when the founding fathers began to establish the ideals of our nation, they used the Bible and considered a higher source, God, to determine moral ethics and regulations. Now if this is no longer the case in determining the nation's standards for what is considered as morally correct, where do we as a nation derive our morals from? If determined that morals are based on us and our feelings, will morals be temporary thoughts that fit the status quo of the moment? Or if perhaps they are left to be determined by us individually, meaning we have the right to live according to our own moral compass, how will this effect society and what it looks like in 30 years? This presentation will attempt to answer these questions.
The Freedom of Information Act was established in 1966 by President Lyndon Johnson. It provides individuals with the right to access information from any federal agency. The act was created in order to reduce government secrecy; however, it also contains a list of classified information that cannot be accessed through a request. Additionally, since its inception, there have been amendments to the act that reflect the evolution of the media, ultimately limiting accessible information. The purpose of this paper is to discuss the role of the Freedom of Information Act in the restriction of the press through analysis of information requests and compliance under various presidents.

In this work, I explore the growing problem of recidivism in the United States. With mass incarceration rates and reoffense rates rising hand-in-hand, many offenders are stuck in a revolving door of arrest and reincarceration. With this in mind, throughout this thesis I look to scholars and first person narratives to get some sense of the underlying problem leading to these high re-offense numbers. As one will see throughout the research, it is impossible to detect the single root of the problem. High recidivism is the result of the numerous issues found in our criminal justice system. It is the culmination of stricter and longer sentencing, abysmal prison treatment, a lack of rehabilitation or care for offenders, a focus on monetizing crime instead of solving it, and then the release of offenders back into their communities with restrictive rights, and no job or housing prospects. While these problems cannot be solved overnight, a move from our current punishment structure to a more rehabilitative structure, programs that are put in place to help offenders with their reintegration back into society, and a focus on shorter sentencing for low level crimes, can all lead to lower recidivism rates and better treatment for offenders. This research serves to refocus attention to a dire issue in the United States: the criminal justice system needs to change, and it needs to change now.

My research focuses on the experiences of women in colonized communities in Tunisia and Algeria between the 1920s and 1960s when resistance to colonialism began to emerge as a
political force, bringing with it new forms of organization at the grassroots level. The status and role of women in both countries became central to many discussions of colonialism. French colonialists, feminists, and missionaries, as well as players in the nationalist movements developing in Tunisia and Algeria presented and fought for their political agendas from a variety of perspectives. Decades later these debates and political manoeuvres have left a legacy of silencing the North African women they claimed to champion. Despite a deliberate effort to refocus histories onto the experiences of the subaltern, much of this moment remains to be uncovered in the academic context. In my thesis I identify the varied perspectives that emerged in the late 19th and 20th century focusing on French feminist, French missionary, and Tunisian and Algerian nationalist arguments from newspapers and writings at the time. I then turn my attention to written sources from a variety of Algerian and Tunisian women, separating the reality of their experiences from the narratives that have been constructed. By doing so, this research gives agency to people often cast as passive victims of two patriarchal structures, one foreign and one indigenous.

Room 165  1:30-2:15  Panel 5
Ashley Jennifer Timmons
Tona Hangen (Faculty Sponsor)
Department of History and Political Science, Worcester State University
More Than Suffrage: Early Feminism in Comparative Perspective

Early feminism, which in some locales included women’s suffrage, is often seen through rose-colored glasses, when in reality it was built on ideals of racism, classism, prejudice and in some places, nationalism. In America, the women’s suffrage movement was built and strengthened by racist rhetoric, especially after the Civil War. In the UK feminism grew out of a desire to be equal to men, and if not equal, then at least having a right to exist as more than property. In countries that were colonized by Imperial forces, feminism was a force of nationalism and used to fight back against the colonizing powers. What these movements all have in common was that they were built and made strong by upper-class women, who were able to read and write, a freedom not often found in the lower classes of the time. First-wave feminism as it is sometimes referred to, had as many problems as the feminist movements of today. The majority of the sources referenced are primary sources with some secondary sources used for contextual information.

2:45-3:30  Board 38
Henry Robert Anderson
Hilary Fink (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Chasing Carson: Trust, Doubt, and Popular Science

Science, humanity’s long-reliable toolkit, still suffers from growing pains as it interacts with the general public. Rachel Carson’s groundbreaking work, Silent Spring, created a new genre of “popular science,” the strange hybrid of scientific research and journalism. In a time when we
are forced to interact with science on a daily basis, our reliance on the middle-men of media swells into a dangerous cocktail of fear mongering and misinformation. Climate change denialism and GMO and vaccine demonization are examples of this attitude. Yet, the public must still have meaningful interactions with science and scientists. In this paper, I trace our path down the road Carson helped set us upon, and evaluate the tenuous link of trust between science and the public. I argue that the powerful lens of scientific doubt, applied equitably by the public and scientists alike, is the key piece that will finally bring the scientific world into bear with the rest of the population.

2:45-3:30 Board 39
Viviane M. Goese
Howard Tinberg (Faculty Sponsor)
Department of English, Bristol Community College
Brazil's Response to the Shoah from 1932 to 1945

Most modern-day Brazilians view their country as open and humanitarian given that the country accepted immigrants looking for freedom. Despite such a reputation, the events that occurred between 1932 and 1945 suggest an acceptance of some elements of dictatorial ideologies dominant at that time in Europe. German national socialism seemed to be a source of inspiration for the political-diplomatic Brazilian scenario. Sharing similar ideologies - at some level - Germany and Brazil had a friendly relationship during the first period of the Vargas regime. Considering such a picture, what was Brazil’s response to the Shoah from 1932 to 1945? How did the relationship between Germany and Brazil affect the national immigration perspectives and policies? To what extent did Brazilians accept Nazi-style antisemitism? What means were used to stand by or against the Jews under Vargas regime? During such a critical period of world history, Brazil adopted policies and ideologies that had serious consequences for Jews seeking a host country. This research will be conducted based on documents obtained from LEER - Laboratory of Studies on Ethnicity, Racism and Discrimination. In addition, the database of the Arqshoah - Virtual Archive on the Holocaust and Antisemitism - among other digital archives from private institutions.

2:45-3:30 Board 40
Timothy R. Jarvis
Tona Hangen (Faculty Sponsor)
Department of History and Political Science, Worcester State University
Renaissance-Era Humanism and the Struggle for the Soul of the Western World

One of the most encompassing debates in western intellectual history is that of religion versus rationality. It has shaped modern western thought, and the debate itself it the struggle for the essence of what it means to be western. By examining the Italian Renaissance philosophy, humanism, this struggle in Western intellectual history becomes clear as humanism is the source of the argument. Cases such as Michelangelo Buonarroti and Niccolò Machiavelli, demonstrates how humanist thinkers strived to solve societal issues and find inspiration by studying the human being, not the supernatural. As humanist scholars, such as Brian Jeffrey
Maxson, have noted, the problem humanism runs into in scholarship is a gap between intellectual and socio-cultural history. By examining specific humanist figures of the Italian Renaissance through their lives, art, and ideas, it is the intention of this thesis to close this gap Maxson has noted. Also, the examination of these figures demonstrates the dilemmas they encountered in their day such as their work being exploited for cultural and material capital by the Medici family and Church. As these political entities became adverse to humanists their struggle in turn emphasize the overall Western struggle that was unfolding—religion versus rationality—as their ability to study the human being was contested by these structures. Finally, this argument is not to claim religion or rationality is a better philosophy for the West, but rather that it merely is a defining, if nuanced, argument of it.

2:45-3:30 Board 74
Nicole O'Connell
Hugh Wiese (Faculty Sponsor)
Department of English, Worcester State University
Discovering Class Diaries in the Archives

This project centers on class diaries in the Apprenticeship Materials from the Worcester State University Archives and combines public history, women’s history, and local history. The diaries are being transcribed and compiled into a book where the entries will be interspersed with historical context, insights, and reflections on the subject matter.

There are six class diaries from 1875-1880. The texts are written by a multitude of authors and provide details on day-to-day life in the Worcester Normal School. There is also a collection of apprenticeship diary entries from 1903 and 1904 which describe student experiences while apprenticing as teachers in local schools.

The class diaries are written in Victorian script and reading them can be a difficult and painstaking process. Transcribing the diaries will make them more accessible to other researchers or readers interested in their content. Furthermore, the diaries are fragile and falling apart; transcribing them may increase their longevity as they may not have to be handled as much. A complete transcription of the diaries will be made, but the entries included in the book will be selective.

The second part of the project involves choosing entries to include in the book and writing about them. Historical context will be provided about aspects of the entries which may not be well-known to average readers. Insights and reflections will help modern readers to further understand the entries and be able to connect to these writers from the past.
2:45-3:30  Board 75
Suzanne Rachel Wright
Maria Bollettino (Faculty Sponsor)
Department of History, Framingham State University

The Charitable Irish Society of Boston and Irish Benevolent Organizations in Colonial,
Revolutionary, and Early National America

Boston’s Charitable Irish Society was the first benevolent organization established for the
benefit of the Irish immigrant population in the region that would become the United States.
Although the Charitable Irish Society is still an active organization today, it performed especially
important work for Boston’s Irish immigrant population during the eighteenth and nineteenth
centuries. This project, which is based upon original analysis of the Charitable Irish Society’s
archival records, examines how the society changed, from its establishment in 1737 to just after
Ireland’s Great Famine in the 1840s, within the contexts of Irish immigration patterns, partisan
politics, sectarian religious divides, and the public perception of Irishmen in the country. This
project also examines the society in relation to other Irish benevolent organizations that
developed in the eighteenth century, such as Philadelphia’s Hibernian Society for the Relief of
Emigrants from Ireland. Examining the Charitable Irish Society within the context of other Irish
benevolent organizations leads to an understanding of how partisan politics and sectarian
religious divides impacted local Irish communities and how assistance was distributed to those
requiring aid during the colonial, revolutionary, and early national periods in American history.
Irish benevolent organizations evolved to accommodate the changing needs of their
communities over time, but they also played a crucial role in shaping how their communities
acted in response to local and national conflicts.

Room 174  2:45-3:30  Panel 6
Thomas Joseph Howard V
Erica Morin (Faculty Sponsor)
Department of History, Westfield State University

A Dangerous Road to Success: Thomas Sheldon’s Quest to Research and Finance the
Westfield Canal

In conjunction with the City of Westfield’s Celebration of their 350th Anniversary, for my History
Research Methods course, I had a choice from several options on the topic of Westfield History
to base my semester long research paper on. I chose to focus on Thomas Sheldon, the man
responsible for constructing the Westfield Canal in 1826, and his experiences traveling south
along the United States Atlantic Coast visiting and analyzing canals. After his journey, Sheldon
would take his research back with him in order to construct the proper schematics to build the
Canal, with the project being finished in the 1830’s. Sheldon catalogued his entire expedition
through a 60 page journal, which I made a complete transcription of in order to properly
research Sheldon’s journey.

Although Sheldon’s diary contained details of every single day he spent traveling, Sheldon only
had small portions of his writing set aside that detailed the logistics of canal building, which
shifted my focus away from the construction of the Westfield Canal, and rather the journey itself.
Along his journey, Sheldon was forced to overcome trials manifesting in the forms of illnesses, the lack of civic structure along the American Frontier, and long distances in between cities, almost ending his journey several times. Despite this, the drive that entrepreneurs and local governments had for the construction of canals to serve as trade hubs, subsequently improving both state and national economies, compelled these benefactors to fund explorers like Sheldon, making expeditions like his possible to succeed.

Room 174  2:45-3:30  Panel 6  
William M. Sennott  
Jennifer Fronc (Faculty Sponsor)  
Department of History, UMass Amherst  
Stone Walls: A History of Martha’s Vineyard

This thesis will discuss the history of stone walls as a lens to understanding the construction of and changes within the American Identity. Broad themes of New England agricultural and social history will be localized in relation to Martha’s Vineyard in order to ground the focus of the research and allow it to be understood on a micro, and more personal level.

The first section will be a scientific understanding of how the stones that are used to build these walls first arrived in New England soil. The second section will examine the history of enclosure movements in the early days of European settlement, reflecting themes of settler interactions with the land and Native American populations. The next section will explain the sprawl out of Puritan communities and into the ‘wilderness,’ contextualizing the themes of ‘rugged individualism’ and the shift away from the use of ‘common land.’ The next section will explore how the Revolutionary War ushered in the first wave of stone wall construction and how this relates to the post-war American Identity. The next section will focus on the economic decline of the mid 19th century, how the shift away from agrarian life led to the abandonment of stone walls, and the role this played in the reimagining of the American Identity. In the final section, I will explain the importance of stone walls in the modern day through the examination of a court case, in which stone walls played an important role.

3:45-4:30  Board 69  
Sarah Morgan  
Nicholas J. Aieta (Faculty Sponsor)  
Department of History, Westfield State University  
Race in American Public Education

This study provides information on the importance of teaching about racial segregation. Racial segregation is by no means a new phenomenon and this study looks at how it has evolved in America through the last 80 years. Not only does this research delve into the topic of racial segregation but also into how it has been taught in the last 30 years as well as ways to improve on those teachings. Through the use of many historical, geographical, and statistical texts it was found that students are not aware of the severity of racial segregation in modern society. This research provides information on the way that racial segregation has been
approached in the classroom and offers new ways for teachers to discuss this topic in order to enlighten students on the severity of the issue.

Room 165    3:45-4:30    Panel 7
Madeleine Grace McKeon
Anthony Daly (Faculty Sponsor)
Department of History and Political Science, Massachusetts College of Liberal Arts
The Archbishop and the King: Thomas Becket, Henry II, and Church-State Relations in Twelfth-Century England

On December 29, 1170, Thomas Becket, Archbishop of Canterbury, was stabbed to death by four knights in the middle of his cathedral. It was a brutal conclusion to a seven-year feud between Thomas and his one-time friend, King Henry II, that had shocked Europe and the Catholic Church. Thomas’ rapid canonization and the explosion of a religious cult at Canterbury halted Henry’s controversial agenda to establish legal strictures on the Church. This project will analyze the relationship between the English state and the Catholic Church in the twelfth-century using the conflict between these two men as a case study to examine the layered history between the two institutions. The thesis views the controversy through four lenses: Henry and Thomas’ personal dynamic, their economic relationship, their differing expectations of power, and the wider context of European church-state disputes. This project draws on the rich primary sources (in translation) of the many Lives of Thomas Becket that were published after his death, the published volumes of Becket’s letters, and aspects of material culture such as medieval pilgrim souvenirs. In addition, the extensive secondary literature on these two figures and the era will be used to provide context and trace some of the ways that portrayals and understanding of Thomas Becket have changed in the centuries after his death and in more recent times.
HOSPITALITY AND TOURISM MANAGEMENT

Room 809  8:30-9:15  Panel 1
Amy S. Weiner
Jessica Fang
Muzzo Uysal (Faculty Sponsor)
Department of Hospitality and Tourism Management, UMass Amherst
Case Study of Deerfield Inn – Creating Efficiency

The goal of this research is to assist The Deerfield Inn in attracting more guests and increasing their profits. Objectives of the study include (1) to find ways of increasing occupancy, customer base and retention by advising on marketing, advertising and overall operations, (2) to enable The Deerfield Inn to be financially self-reliant, (3) to improve efficiency of food production and (4) to increase the annual profit margin. A C-PEST and SWOT analysis are conducted for a full-comprehensive understanding of the business. In addition, a customer feedback form is used to gather information about restaurant clientele. Secondary sources and general trends in visitation are analyzed from the existing financial and marketing data. Ideas are generated from the analysis in a case study format. The scope of these suggestions are mainly to improve occupancy rate, pricing, staffing, inventory levels, environmental efficiencies, event space usage, and marketing. The Deerfield Inn, a small independently run Bed and Breakfast, is attached to the Historic Deerfield Museum and Champney’s Restaurant & Tavern. Implementing strategies for the Deerfield Inn are offered. Findings expand the pool of knowledge for all small businesses, filling a research gap.

Room 165  10:45-11:30  Panel 2
Eliza Wendel
Muzzo Uysal (Faculty Sponsor)
Department of Hospitality and Tourism Management, UMass Amherst
Motivations and Factors Determining Study Abroad Decision

As the popularity of travel increases, so does the number of college students who decide to travel abroad for educational purposes. This trend of study abroad has led millions of students to various countries across the world with a multitude of motivations supporting their decisions. As the number of student travelers continues to grow, the motivations and factors that drive college students to study abroad cannot be ignored by the tourism and hospitality industries. Due to the difference in lengths of stay and the purpose, studying abroad involves some motivations different than leisure traveling, although some may overlap. Tourism companies, including study abroad programs, need to understand the motivators and how to best market to the students that are creating a huge market segment. This study has two main objectives. The first is to determine common motivations among college students who choose to study abroad. The second is to analyze student responses to establish any patterns in demographic factors that may influence study abroad decisions. This study examines these relationships through a survey given to participants who have studied abroad during college. This study contributes to the body of knowledge surrounding traveler motivations by establishing a relationship between
the decision to study abroad and the reasons driving the decision. The study of college students traveling has not yet been thoroughly examined.

4:45-5:30   Board 26
Hannah Elizabeth Kennedy
Muzzo Uysal (Faculty Sponsor)
Department of Hospitality and Tourism Management, UMass Amherst
College Students’ Interest in Digital-Less Vacations

As technology continues to advance, the amount of time spent on devices increases. The constant need to check digital devices does not stop while on vacation, decreasing the amount of time individuals have to enjoy their time away from everyday life. This has created a trend in the hospitality industry for digital-less vacations. Destinations offering digital-less amenities are aiming to have travelers truly disconnect. These vacation destinations are advertising these experiences toward young professionals who are subject to excessive, daily technology use. The purpose of this study is to determine if there is a market for digital-less vacations among student travelers. By administering a survey to college students at the University of Massachusetts, Amherst, the amount of time college students spend on their devices and what amount of this time is spent productively can be determined. Next, it aims to determine if there is an interest in digital-less vacations among college students. The study used both descriptive and inferential statistics to analyze the study data. This study concludes with insight for managers and developers on behaviors and desires of technology usage by consumers looking for a destination location.

4:45-5:30   Board 46
Keegan N. Eller
Muzzo Uysal (Faculty Sponsor)
Department of Hospitality and Tourism Management, UMass Amherst
Dark Tourism: An Analysis of Motivation and Implications

Dark Tourism may refer to locations that are related to bad occurrences such as death or other disasters. This research explores the reasons behind why people are attracted to places associated with danger and tragedy. Controversy surrounds Dark Tourism, which is why this research proves beneficial in comprehending the rise in popularity of these destinations as well as the public perception of tourist visits to sites affiliated with Dark Tourism. The results of the study is favorable to travelers, consumers, companies, proprietors, etc. and suggests a deeper understanding of the topic that could help in destigmatizing Dark Tourism itself. Methodology used in this study consists of content analysis and empirical studies performed on published works and documentaries that assist in determining the meaning and motivation behind Dark Tourism. In addition, quantitative analysis is utilized by method of survey procedure of participants in order to reach a conclusion on the motivations, implications and perceptions of Dark Tourism. The survey includes questions meant to determine participant’s level of understanding of the concept of Dark Tourism, as well as questions regarding their perceptions.
and opinions on the subject. The survey aims to develop a scale that can be used to measure participants’ level of interest in popular Dark Tourism locations. The study provides a conclusion based on the results of an in-depth literature review of published educational papers, survey results, documentaries on the subject and analysis of dark tourism travel blogs.
INTERDISCIPLINARY STUDIES/BDIC

8:30-9:15   Board 20
Yulia Suvorova
Christine L. Crago (Faculty Sponsor)
Department of Resource Economics, UMass Amherst
Millennial Awareness of Sustainability Labels and Standards Used by the Fashion Industry

The fashion industry is one of the most polluting industries in the world. In order to counteract
the fashion industry’s negative environmental impact, many consumers are willing to use their
buying power to support environmentally aware businesses. However, today’s diversity of
standards make it difficult for consumers to remember which standard or label stands for what
sustainability content. Millennials are one of the most powerful buying groups in today’s
consumer market. How educated are they in regards to sustainability standards? My research
question is: Are Millennials’ perceptions about sustainability labels in the fashion industry
consistent with what labels actually represent? To answer this question I designed a survey to
identify personal awareness in relation to environmental and sustainability issues and
importance of different factors identifying buying behavior. The survey also tests knowledge
about the most common sustainability standards in fashion industry. This questionnaire was
distributed among Millennials-students of UMass, Amherst majoring in a variety of disciplines,
and collected data was analyzed using a variety of statistical approaches and descriptive
statistical tools. This research informs educational strategies to raise a new generation of
environmentally and socially responsible consumers. The obtained results may also inform the
industry about existing demand for sustainable fashion and help to devise sustainability
strategies for the development of new standards and marketing. Ultimately, this research may
help to combine efforts of all market players to reduce environmental impact of the fashion
industry and make it more socially responsible in the most transparent and clear way for the
consumer.

8:30-9:15   Board 65
James A. Mazarakis
Ellen J. Pader (Faculty Sponsor)
Department of Sustainable Community Development LARP, UMass Amherst
An Assessment of Discourse Styles between Campus Political Groups: Defining Challenges in
Community Engagement

“Freedom of Speech” has been at the center of tense political divisions across the country and
on college campuses. Current interdisciplinary research explores how conflicting moral
frameworks and discourse styles underlie the hostility between political groups. I am conducting
field research focusing on student-run Registered Student Organization (RSO) meetings,
including those of the UMass Democrats and UMass College Republicans, in order to compare
issue framing, language, behavior, and meeting dynamics. Relevant data collected include the
nature of the gatherings, implicit and explicit principles, reactions to disagreement, power
hierarchies, and use of space. I will then interpret the data and discuss how differences in
cultural norms can complicate planning or policy advocacy, effective debate and dialogue, and
community engagement. As an extension of the regional planning class “Framing Solutions: Effective Advocacy for Planning and Policy,” the findings will be put in context with literature by Tali Sharot and that of other disciplines such as neuropsychology, socio-linguistics, planning, political discourse, and statistics.

Room 165    8:30-9:15    Panel 1
Gabrielle Loria Mathews
Ellen Correa (Faculty Sponsor)
Department of Civic Engagement & Service-Learning, UMass Amherst
The Politics of Belonging: Claiming Latinidades*

The question of belonging- who we belong with, and why - is inherently political and linked to our understanding of identity. During a semester long independent study, I chose to explore my hybrid ethnic identity as a white person with Mexican roots using contemporary readings on Latinx storytelling and identity-making. The purpose was twofold; to understand my identity development, and to disrupt a narrative of Self by combining Latinx theory and the voices of my family into a final paper. Rina Benmayor’s definition of “latinidades” as a socio-political-cultural group formed “in terms of lived cultural experience and political commitments” lays the foundation for my paper. My methodology is inspired by the fields of Autoethnography and Performance Studies. I draw on interviews with my mother and grandmother to complicate my own experience of identity. Through a mix of performance pieces, I suggest how and on what terms we can seek to claim belonging (to Latinidades). This work is an example of Stacey Holman Jones’ argument for autoethnography as a methodological approach that asks how our personal accounts count. I am currently continuing my investigation of belonging, by expanding the lens of analysis I use in this paper and further developing my conclusions. My purpose in this research is to suggest a way forward in creating personal accounts that guide us in our work as researchers, teachers, and people seeking to effect social change.

11:45-12:30    Board 54
Vanessa Anne Hanger
Susan McPherson (Faculty Sponsor)
Department of English, Quinsigamond Community College
The Trip Treatment: Psychedelic Drug-Assisted Psychotherapy

This presentation will explore the modern renaissance of psychedelic research in the field of psychiatry, specifically psilocybin and lysergic acid diethylamide. Before being placed in Schedule I of the U.S. Controlled Substances Act of 1970, classical psychedelics were being experimented in the treatment of a number of difficult-to-treat conditions of the brain. This research suggested that psychedelics were not helpful in the treatment of psychotic disorders; however, the altered-state effects that the drugs elicited caused researchers to begin to consider possible biological bases for schizophrenia and psychotic disorders. Due to legal sanction, decades have passed with little research being done on these substances. A recent resurgence in interest for psychedelic drug assisted psychotherapy and a shift in sociopolitical attitudes on these molecules beginning in the early 2000s have provided an opening for
researchers investigating a potential breakthrough treatment for people struggling with mental illnesses, such as anxiety; depression; PTSD; and alcoholism, that are refractory to current evidence based therapies. Data from early clinical trials have provided results that show promising evidence for the safety and efficacy of these drugs; however, more research and funding is needed to perform Stage 3 clinical trials. The hurdles to medical licensing and the ability to conduct research on a Schedule I substance are formidable, but mental health conditions have become so pervasive, destructive, and costly to our society that increased scientific research investigating the potential therapeutic applications of psychedelics for those who are refractory to current evidence based therapies merits serious consideration among the other pharmaceutical and therapeutic efforts that are being pursued to address the growing need.

11:45-12:30   Board 9
Luidgi Lalamne
Ester Shapiro (Faculty Sponsor)
Department of Psychology, UMass Boston
Unapologetic Triple-Threats: Tales of Undocumented Queer Minorities

Typically raised in and constantly subjected to patriarchal, hetero-normative, and supremacist environments, research has noted the impact of stressors, continuously and individually outlining the uncertainties and difficulties of immigrant, black, or LGBTQ lives, but doing so in single variable discussions. Combined through an intersectional lens to create the ultimate experience of oppression, undocumented LGBTQ people of color experience increased mental distress which inevitably leads to deteriorating physical health. Through qualitative data collection, a series of interviews will examine this population at UMass Boston. Furthermore, the individual interview approach will be augmented by focus group sessions with DACA/TPS LGBTQ students, with a view to obtain more information that may otherwise be left unshared due to the sometimes restrictive nature of interviews. The data collection process will focus on exploring the nature of difficulties faced by this population in maintaining mental and physical health in the face of both oppression and limited access to formal therapeutic resources. Common themes, as well as the underlying factors which significantly impact the extent to which these themes manifest, will be identified and examined. Using the data obtained in conjunction with the exploration of theoretical frameworks, the project will seek to develop mental and physical exercise strategies and coping mechanisms for promoting overall health among this population. Anticipated findings will also be used to further assess other needs of this population in order to inform the creation of safe platforms of equitable resources. The results will also be used to educate the general population.
The following study seeks to examine how Brazil could create alternative strategies to combat not only the current right-wing administration but the existing neoliberal system that supports it. To do so, I will analyze the historical context that has allowed neoliberalism to thrive in Brazil since the 1980’s, focusing specifically on the redemocratization process marked by debt, inflation, and impeachment, among other setbacks. This democratization did not involve redistribution of power or resources to create a truly democratic society. In actuality, it led to the systemic incorporation of neoliberal ideals and strategies, particularly privatization, government deregulation, and cuts to social spending. My presentation will also provide additional historical context for the story of the left in Brazil—both its successes in the social and economic arenas and its indisputable shortcomings. I will also examine the uncompromising position the left finds itself in each time it has come to power and its attempt to bring change in spite of neoliberal ideals that remain embedded in Brazilian institutions. In the last section of my presentation, I will focus on Brazil in the present: under Jair Bolsonaro. In this section I discuss how neoliberalism has not only allowed, but facilitated the suppression of the left and, consequently, led to the rise of the far right. Utilizing the frameworks of world systems theory and neoliberalism, I will provide an analysis of the intersecting factors that have shaped Brazil’s past, bringing clarity to the actions that must be taken in the future to replace neoliberalism.

This presentation will detail a two-tiered index that I have created to analyze poverty, and will present an overview of how this index could be used in tandem with artificial intelligence, specifically unsupervised machine learning. Portions of the presentation will delve into how the index works as well as why it is important. The index aims to improve upon existing methods that are currently being implemented. The PI and RPI indices I've created are metrics that can be used together with various forms of unsupervised machine learning in order to identify the most urgent needs and obstacles in a poor community. Another goal of the index is to help humanitarian organizations in their efforts to maximize the efficiency of aid distribution as well as to develop more efficient and geographically-specific social programs.

No, Indy, It Doesn’t Belong in a Museum: Photogrammetry for Repatriation
In the age where social justice has made academia critically examine the foundations and work, we still struggle with the question of what to do with the cultural legacy and landscape of the colonized land that is the Americas. Many scholars who's work is around collections and its management worry that this shift means museums will shut down, become extinct - however, there is an alternative. By using technology, collections can exist in a digital world and be recreated to our physical one. Photogrammetry can assist archaeologists, historians, and conservators in making replicas of inanimate collections and giving back originals. The research in the Dr. Jessica Linker's photogrammetry project of Benjamin Franklin's print blocks that he used for currency provides a foundation for further development in digital humanities and interdisciplinary work across the fields of history, archaeology, art, and conservation. Analysis on the photogrammetry project created by Dr. Jessica Linker, how does photogrammetry work, and its applications and implementation will be explored.

2:45-3:30    Board 42
Carol Joan McPherson
Kevin Taylor Anderson (Faculty Sponsor)
Department of Communication, UMass Amherst
Music as a Mode of Human Communication: A Documentary Project

Music is a little examined mode of communication that can create and strengthen a sense of community, initiate temporary and solidify pre-existing social bonds, and communicate aspects of the human experience that are difficult or impossible to convey through spoken language. Through the medium of experimental documentary film, my project demonstrates that music's communicative capacity is a universal phenomenon that plays out in culturally specific ways. I explore this topic through a holistic framework, consulting experts in the fields of ethnomusicology, communication, musical psychology, and neuroscience as well as professionals in the music production industry, musicians, and music enthusiasts. The braiding together of personal experience with academic knowledge pays respect to the universality of music as a communicative tool. The three interlacing movements of the film emulate those of a standard concerto, dividing it into sections that guide the viewer through the multiple viewpoints discussed in the documentary. Editing the film in such a way mirrors the subject matter, allowing the audience to engage in a communal musical experience as such experiences are being dissected. My project consolidates multidisciplinary perspectives on music as a mode of communication, providing a new lens through which to view a shared human experience and creating a final visual product that is publicly accessible.

4:45-5:30    Board 22
Vaishali Malik
Juan M. Jiménez (Faculty Sponsor)
Department of Mechanical and Industrial Engineering, UMass Amherst
Flow-Dependent Modulation of Tight Junction Permeability in CLDN 5

Interactions between blood flow and the vasculature play an essential role in development, homeostasis and disease initiation and progression in blood vessels. Blood flow elicits biochemical and physical response in endothelial cells (ECs) potentially causing phenotypic
changes. Phenotypic changes to the endothelial cells and the vasculature play a central role in the onset of atherosclerosis where cholesterol transport increases to the inner wall of arteries. Although one of the primary functions of the endothelium is to maintain selective permeability between the blood and the inner wall of blood vessels via junction proteins, arterial sites susceptible to atherosclerosis experience greater cholesterol transport. In addition, atherosusceptible regions are more likely to experience disturbed blood flow, while atheroprotective regions experience undisturbed blood flow. We hypothesize that the local blood flow field in atherosusceptible regions may be driving the regulation of tight junction proteins, specifically claudin 5, and as a result the permeability of the endothelium. Claudin 5 (CLDN 5), a tight junction protein, is highly active in the process of paracellular permeability in ECs. This study will aid in the understanding of why specific regions of the arterial vasculature are more susceptible to the development of atherosclerosis.
Ethiopia is one of the largest arabica coffee producing countries in the world. Coffee is of great economic importance in Ethiopia. Wet processing is a typical system for coffee-processing, where farmers extract the pulp from the coffee cherries and wash the cherries to eventually take out the coffee beans. In wet processing, coffee cherries are poured into a huge vat. Then, they are separated into two piles: high quality or low quality. This depends on the size of the cherries. Although wet processing has been used for many years, the residues that are left behind from the coffee cherries are very toxic, and as production has increased over time, these toxic substances have contributed to serious environmental issues in Ethiopia. Extracting coffee beans through wet processing leaves behind organic residue that kills plants and animals, and dangerously pollutes local sources of drinking water. The purpose of this project is to explore how artificial intelligence can help the wet-processing system produce less toxicity in its environment.
Yoshiya Nobuko was a founding figure in the early 20th century Japanese literary genre of girls' literature, the themes and motifs of which reverberate in contemporary Japanese fiction to this day. Different critics hold notably divergent readings of Yoshiya's work. Some see her portrayal of relationships between girls with lesbian undertones, as well as girls explicitly declaring independence from men and patriarchal society, as reason to characterize her as a "hidden feminist." Others, however, view her as ultimately conservative and reproducing bourgeois ideals of femininity in her work, despite the lesbian content of her early fiction. In this study, I have translated a portion of her first novel, *Two Virgins in the Attic*, and performed a close textual analysis of the work. The linguistic elements of the text are highly marked, and sometimes syntactically bizarre, a characteristic which encourages the reader to ignore the logical-linguistic elements of the text and instead focus mainly on the novel's imagery and interpret it in a primarily affectual manner. I argue that reading the text with this focus on language and affect will lead one more easily to a conservative reading, whereas a more straightforward narrative approach will encourage the "hidden feminist" reading. The text is then also discussed as a case study in translation and how to effectively convey such dual readings in a target language, with examples of relevant translation problems that were encountered.
How Clickbait Has Influenced Digital Media

With the prevalence of printed media steadily declining in the past decade, many news sources have shifted to sharing information digitally. The main source of income for these digital media sources is advertising, with the company earning revenue depending on the number of views a page gets. Thus, there has been a shift in the focus for many news sources: instead of valuing reliability and accuracy above all else, the new priority is getting clicks and views on articles in order to generate revenue. This has contributed to the spread of false information and ignorance, issues that have contributed to the intense polarization present in the United States. This paper will investigate the prevalence of clickbait as it relates to incorrect information and polarization in modern America.

Journalism Roles in the Modern Era: News Creation and Consumption in a Participatory News Culture

The modern news industry faces multiple problems. Newspapers continue to die off, get bought out by conglomerates, or witness major layoffs (Knibbs, 2019). Readership of and engagement in news seem to be declining (Lepore, 2019) Fake news and the rapid spread of misinformation have been aided by the increased use of social media as means of disseminating news (Marwick, 2018). Recently, Russian misinformation campaigns polarized the U.S. public and interfered in elections, creating information chaos (Howard et al, 2018). Consequently, while people lose trust in the news, the case for journalism has never been stronger: our society needs an institution to rely on for trustworthy information (Patterson, 2013; Postman, 1992).

This thesis explores how news creation and consumption--including journalism roles, newsroom practices, news products, and the media landscape--have changed since the more recent emergence of participatory journalism and news culture (Bruns, 2017; Singer, 2011). I look for these changes through textual analysis of magazines Adweek and Newsweek. I question how a participatory news culture through social media use is changing the news industry, journalistic standards and practices, and journalism roles. I also question how participatory news cultures are changing to address problems with misinformation and fake news.

In this paper, I suggest that the participatory news culture that has been emerging from social media use could very much revive news engagement. I then argue that dealing with misinformation is the role of journalism itself and is part of how journalism serves the public.
Multiple Sclerosis (MS) is an autoimmune neuroinflammatory disorder that can be categorized into two core phenotypes: Relapsing-remitting (RRMS) characterized by symptom relapses with full recovery, and progressive (PMS) with worsening symptoms overtime. Balance and stability requires accurate and fast-conducting somatosensory, vestibular, and visual input as well as central integration, and is commonly impaired in MS. Recent studies have found that when compared to RRMS, PMS has worse balance, especially when standing with their eyes closed (Cimino, Chisari, Raciti, Pappalardo, Zappia, & Patti, 2018). The purpose of this study is to examine if sway angle and sway acceleration quantified by inertial sensors during static standing tests are different between RRMS (n=32), PMS (n=31), and non-MS controls (n=30). An inertial sensor was placed on the participants' lower lumbar spine (L5) to measure the angle and acceleration of trunk sway during two static stance conditions for 20 seconds each: quiet stance eyes open and quiet stance eyes closed. Due to preliminary analysis, we hypothesize that individuals with PMS will show a greater sway angle and acceleration than those with RRMS in both stance positions, especially in the eyes closed stance. Additionally, we believe that both MS groups will sway more than the control participants. These findings may show whether performance during static standing tests quantified by inertial sensors can be used to track neurological impairments in MS.

Multiple sclerosis, a progressive neurodegenerative disease, results in reduced balance/coordination and increased fatigue due to impaired central motor function. Tai Chi (TC) and Mindfulness-Based Stress Reduction (MBSR) have improved motor function in diverse populations, however it is unknown whether improvements occur in people with MS (PWMS). Purpose: evaluate whether motor function improves in PWMS after an 8-week TC/MBSR intervention, and whether benefits last through a washout period. Participants: n=5 women w/MS (46±9.7years; 64.9±2.2inches; 146±23.9lbs); randomized into TC/MBSR group. At the data collections Pre/Post intervention a timed foot tapping test, Fatigue Severity Score (FSS), and Timed Up and Go (TUG) mobility test assessed motor function. Opal inertial sensors quantified foot tapping/TUG times; an FSS questionnaire was used to indirectly measure motor function. Foot tap quantity was analyzed via a custom matlab program, with the ‘more impaired’ foot results listed below as percentage change, mean ± SD. Results-TC taps: -14.9% change from PRE: 26±4 to POST: 22±6.8. MBSR taps: 69.8% change from PRE: 29±14.3 to POST:
37±4.3. FSS (both groups): -41.1% change from PRE: 46.0 to POST: 32.6. TUG: -3.2% change from PRE: 8.0s to POST: 7.80s. The reduced fatigue and faster TUG times POST intervention indicate increased motor function. The foot tapping results POST intervention showed no improvement for TC, but a large improvement in the MBSR group. TUG/FSS scores improved for both groups so further analysis is needed to determine if individual results differed due to MS symptoms, or if MBSR has a greater effect on motor function in PWMS.

10:45-11:30    Board 75
Aditya Parmar
John Ronald Sirard (Faculty Sponsor)
Department of Kinesiology, UMass Amherst
Classification of Resistance Training Using Hip and Wrist Accelerometers

BACKGROUND: Accelerometer-based sensors are frequently used to assess physical activity (PA). However, these sensors do not accurately identify resistance training (RT) exercises.

PURPOSE: To use machine learning models to identify types of RT from accelerometer data.

METHODS: Twenty-three participants (Age: 20.8±1.3, 43.48% male) were video-recorded for one-hour exercise sessions while wearing ActiGraph GT3X+ accelerometers on the right hip and non-dominant wrist. Periods of RT were identified and annotated for specific types of RT exercises performed (e.g. squats). Three features from the raw hip and wrist acceleration data (i.e. mean, standard deviation, angle) were computed in 1-second intervals and used as predictors in two classification models (gradient boosted tree (GBT) and random forest (RF)) to classify type of RT exercise. We will use the hip, wrist, and a hip-and-wrist combined dataset for the models. Models will be trained using 75% of the total participants and evaluated on the remainder as a test set. A true positive classification rate of >0.85 will be considered acceptable.

RESULTS: Analyses are ongoing. The following are hypothesized: a) the GBT models will classify RT exercises more accurately than the RF models, and b) models that utilize the hip-and-wrist combined data will demonstrate the highest classification accuracy.

CONCLUSION: We expect to develop a model to accurately classify RT exercises from accelerometer data, to improve estimates of an individual’s physical activity. Future research should use additional RT exercise data and optimize the combination of hip and wrist datasets to improve model performance.
INTRODUCTION: Engaging in physical activity and exercise can result in muscle damage and soreness. When muscles lengthen under tension during eccentric contraction, which can happen during daily physical activities, can cause exercise-induced muscle damage (EIMD). When you repeat those movements at a high intensity, intracellular muscle damage can occur leading to a 24 to 48-hour delay in the onset of muscle soreness (DOMS) (Choi, 2014). There have been products invented to enhance the recovery of DOMS created by EIMD. Laser therapy (LT), in this case, is a non-invasive clinical technique commonly used to treat muscular injuries. The purpose of this study is to examine the effectiveness of LT on EIMD compared to a control condition (CON) during an eight-day trial. METHODS: Participants will be divided into two groups (LT & CON) not knowing which group they are in (single-blind experiment) to be tested on their range of motion (ROM) on their hip flexion and abduction, their perception of muscle soreness (GLMS scale), vertical jump, and agility (T-test). To induce muscle damage, participants will run 40 15-meter sprints with a 5-meter deceleration zone, thereafter, commencing the LT treatment on the fourth day on. LT will be applied on the quadriceps and calf muscles on both legs. We hypothesize LT following EIMD will neither influence perceptions of muscle soreness, flexibility, vertical jumping ability, nor agility, compared to a control condition. RESULTS/CONCLUSION: DATA WILL BE AVAILABLE APRIL 2019.

A Systematic Literature Review of How Aerobic Exercise and Resistance Training Can Influence Mood Boost and Behavior Change

The purpose of this systematic literature review will be to examine research studying the effect of induced aerobic and resistance exercise on young adolescents with autism spectrum disorder. Search procedures using key words will be applied to locate articles published in PubMed, Google Scholar and Science Direct. Based on inclusion and exclusion criteria generated from reviewing the abstracts of all autism and exercise articles found within these databases, a subset of qualifying research will be selected for further analysis. In this study the findings from these articles will be reported as results. Several outcomes can be indicated by, specifically moderating positive effects that can be observed from the participants that were exposed to the induced exercise. Significant and practical results may include improvements in mood and a difference in behavior towards others. Some specific observed results from the articles can show a significant difference in behavior within the participants within each given study but will be determined in further readings.
**Presentation Details**

**11:45-12:30   Board 75**  
Sandra-Lily Lirfe Lantum  
Sofiya Alhassan (Faculty Sponsor)  
Department of Kinesiology, UMass Amherst  
**Influence of Parents Physical Activity Levels on Preschool-Aged Children**

**Background:** Preschool-aged children should be physically active throughout the day to experience health benefits. However, it has been reported that they are not engaging in the recommended amount of physical activity (PA). Studies have shown that there is a positive correlation between children's PA and parental PA. Children may adopt health behaviors early in development through observing their parents' health behaviors. Therefore, the purpose of this project was to examine the association between preschool children's PA and parental PA.

**Methods:** This project was a secondary cross-sectional analysis from the Preschool Activity, Diet, and Sleep (PADS) study. Children (n = 23, age = 3.6 ± 0.8) and parent/guardian(n =29) were recruited from two preschool centers. Children’s PA was assessed using an Actigraph accelerometer which was worn on the lower back for seven days. Parental PA was self-reported using the International Physical Activity Questionnaire (IPAQ). A Spearman correlation was used to assess the association between parental PA and children’s PA. Results: In this sample, there were no significant relationships between children’s and parents’ moderate PA (r = 0.03, p = 0.86) and children’s and parents’ vigorous PA (r = -0.04, p = 0.85). Conclusions: There were no relationships between parental and children’s PA in this sample. One reason for this could be using two different methods of assessing PA between the parent and child. Further research using objective measures of assessment between the parent and child is needed to determine if parental PA is related to children’s PA.

**11:45-12:30   Board 76**  
Riley Rainville  
Sofiya Alhassan (Faculty Sponsor)  
Department of Kinesiology, UMass Amherst  
**Relationship between Sedentary Time and Snack Food Consumption in Preschoolers**

**Background:** Most preschoolers spend the majority of their day sedentary. With the negative health effects of increased sedentary time and decreased physically active time, time spent sedentary has been linked to increased prevalence of overweight and obesity. This could also be related to the amount of snack foods children consume while sedentary. Therefore, the purpose of this study was to investigate the relationship between preschoolers’ sedentary time and snack food consumption.

**Methods:** Participants (n = 26, age = 3.7 ± 0.9 years) were recruited from two preschool centers as part of the Preschool Activity, Diet, and Sleep (PADS) study. Accelerometers were worn on the lower back to assess physical activity and sedentary time for seven consecutive days. Snack food consumption (i.e. potato chips, pretzels, other salty snacks) was measured using a modified version of Young Children’s Food and Drink Study questionnaire. Data were
analyzed for normality with the Shapiro-Wilk test and for association using a Pearson correlation.

**Results:** There was no statistically significant association between preschoolers’ percent time spent in sedentary activities and snack food consumption ($r = 0.34$, $p = 0.09$).

**Conclusions:** In this sample, there was no relationship between sedentary time and snack food consumption. This could be due to difficulties associated with parent-reported snack food consumption, as parents may not be aware of their children’s snack habits while at preschool. Future studies should examine this relationship using more objective measures of snack food consumption.

**Background:** Working memory is important for learning as it enables an individual to store information for a short period, plan and carry out behaviors. One factor that influences working memory is sedentary behavior which has been predicted to have a negative correlation with working memory in children. Increased sedentary behavior has also been linked to academic difficulties in children, which is problematic. Therefore, the purpose of this study was to examine the relationship between sedentary behavior and working memory in elementary school children.

**Methods:** This project was a secondary analysis from the Strong Minds with Aerobic and Resistance Training during Recess (SMART Recess) pilot study. Participants ($n= 53$, age $= 9.1 \pm 0.7$ years) were recruited from two elementary schools. Working memory was measured with the NIH Toolbox’s List Sorting Test and sedentary behavior was measured using an accelerometer worn for seven days. A Spearman correlation was used to examine the relationship between sedentary behavior and working memory.

**Results:** There was no statistically significant relationship between working memory and sedentary behavior ($r = -0.02$, $p=0.90$). **Conclusions:** In this sample of third and fourth grade students, there was no relationship between sedentary behavior and working memory. This may be because the List Sorting Test used to measure working memory was done in an environment where distractions were present. Further studies that improve the environment where working memory is measured could lead to a more accurate evaluation of the relationship between working memory and sedentary behavior.
A Comparison of Heart Rate and Physical Activity Enjoyment in a Self-Selected Treadmill Run versus a Prescribed Treadmill Workout

Previous researchers have found contradicting results regarding heart rate change and enjoyment of exercise between self-selected and prescribed workouts in subjects. Thus, the purpose of this research was to determine if there is a difference in exercise enjoyment and/or heart rate for subjects when they complete a self-selected treadmill run versus when they complete a prescribed treadmill workout. The current study included 15 male and female subjects from ages 18 to 40 who were recruited by word of mouth. The subjects participated in two different testing sessions that consisted of a 10-minute exercise bout on the treadmill. Upon arrival of their first session they had to sign an informed consent form and fill out a health history questionnaire and physical activity questionnaire to ensure they were healthy enough to complete the workouts. For the first session, the subject was allowed to exercise at whatever pace and grade they desired. For the second session, a treadmill workout was created based off of their 10-minute treadmill speed. During both sessions, RPE and heart rate were taken every two minutes and recorded. The test was terminated if either the subject indicated they wished to stop, or if they reached their maximum heart rate combined with an RPE of 10. Following each workout, the subject then had to complete the Physical Activity Enjoyment Scale Questionnaire. The questionnaire was then scored so that it could be compared between the two different workouts to see which one was enjoyed more. Preliminary results will be discussed.

The Obesity Epidemic

Obesity has reached epidemic proportions throughout the world. Populations are at an increased health risk due to overnutrition (Prentice, 2005). Despite global awareness of the epidemic, there is not a single country in the world that has been able to reduce its number of obese and overweight individuals. In 1989 only 10% of Mexico’s population was obese. However in 2006, over 60% of the population was obese or overweight (Popkin, 2007). What is different about this deadly disease that makes it so difficult to manage? This topic is extremely relevant, particularly in the US, as it is one of the most obese countries in the world and is where the epidemic began (Prentice, 2005).

The purpose of this project is to answer the following questions: how and when did the epidemic begin, why is it still worsening today, what are possible ways to better the situation, how have people’s views of food changed from the past, what is different between countries that have the highest percentage of obesity and the countries with the lowest, and any other relevant
information that can be found. A review of the literature will be conducted to answer the previous questions and will contain the following sections: History/Beginning of the Epidemic, the Epidemic Today, Potential Futures of the Epidemic, and a Summary.

Room 165  11:45-12:30  Panel 3
Tuong Thai
Chris Schoen (Faculty Sponsor)
Department of Sport and Movement Science, Salem State University
Influence of Exergaming on Adult Physical Activity Levels

The purpose of this study is to understand the effects of exergaming on adult physical activity levels in comparison to traditional aerobic exercise one can do at a gym. With the advances in today's technologies, active video-games (exergames) have become more commonplace. Virtual reality (VR) exergames have begun to emerge with more readily available, affordable technology that can be bought online and in stores. This study will focus on the popular VR game *Beat Saber* and its influence on individuals’ enjoyment of and motivation to exercise in comparison to a treadmill condition. The study will have a two-condition balanced, controlled trial using a within subject design and will take place in the O'Keefe Center at Salem State University. A minimum of ten and a maximum of twenty students (either male or female) from Salem State University will be asked to participate in a two-day study. Participants will undergo two conditions in a balanced order, with half completing the exergame condition first, and half completing the treadmill condition first. Participants will complete the remaining test condition during their second visit. Once all participants have completed both conditions, results will be compiled to determine whether exergaming can be considered a viable form of exercise. It is hypothesized that participants will have higher heart rates, less perceived exertion, more motivation to exercise, and will have spent more time exercising in *Beat Saber* in comparison to the treadmill exercise.

Room 803  11:45-12:30  Panel 3
Andrew Francis Granata
Jason Gillis (Faculty Sponsor)
Department of Sport and Movement Science, Salem State University
The Influence of Menthol on Maximal Isometric Strength and Counter-Movement Jump Performance

**PURPOSE:** To date, the research assessing menthol’s influence on measures of muscular strength and power remains equivocal, and so this experiment will test the null hypothesis that acute application of menthol will influence neither measures of muscle strength nor power compared to a placebo gel. **METHOD:** This within-participant repeated-measures study will take place in the Human Performance Laboratory in the Department of Sport and Movement Science at Salem State University. Fifteen participants will be recruited and complete three familiarization sessions consisting of maximal isometric knee extension manual muscle test and the counter-movement jump. Following this, they will complete the aforementioned tests under two separate conditions in a balanced order; once with a menthol gel applied to their lower body, and again with a placebo gel application. **DATA ANALYSIS:** A paired t-test will assess
significant differences between conditions with an alpha level of 0.05 and magnitude-based inference will be employed to classify small, moderate and large effects between conditions. **Data Collection:** Data collection is currently taking place with participants still volunteering. It is expected that data collection will conclude before the conference at the University of Massachusetts Amherst.

Room 803   11:45-12:30   Panel 3
Jacob C. Moriarty  
Jason Gillis (Faculty Sponsor)  
Department of Sport and Movement Science, Salem State University  
The Impact of Body Surface Area Exposure to Menthol on Human Temperature Regulation and Perception

BACKGROUND: Skin surface application of the cold-receptor agonist menthol increases cool sensations and can cause a heat storage response, but little research has focused on the factors that characterize this response; namely, the menthol dose, body surface area (BSA) exposed, and body region studied. The purposes of this experiment is to explore the influence of BSA exposed to menthol, and its impact on body temperature regulation and perception. It’s hypothesized that the forcing function exerted by menthol is proportionally related to the body surface area exposed, whereby larger surface areas will result in greater perturbations to both temperature regulation and perception. **METHOD:** Using a within-participant design, 15 participants will undergo three different BSA-based menthol exposures (left middle finger, left arm, left upper and lower body), and one exposure to a placebo condition with a minimum of 24-hour separating visits. During each exposure participants will rest supine in an environmentally controlled tent (30°C, 50% rh) for 30-minutes before their intervention is applied and 30-minutes thereafter. Perceptual measures include thermal sensation, thermal comfort, and irritation. Thermoregulatory measures include skin blood flow (laser Doppler flowmetry at middle finger), rectal temperature, and skin temperature (Left and right chest, forearm, thigh, calf). **ANALYSIS:** The Area Under the Curve from minute 30 to minute 60 will be calculated and analyzed using a one-way ANOVA (if parametric) or Friedman’s test (if non-parametric), with post-hoc testing used to detect the direction of any significant effects. The alpha level for all statistical testing will be set at 0.05.

Room 803   11:45-12:30   Panel 3
Nicholas Miguel Remillard  
John Ronald Sirard (Faculty Sponsor)  
Department of Kinesiology, UMass Amherst  
Energy Expenditure Discrepancies between a Criterion Measure and Accelerometer Prediction Algorithms during a High Intensity Interval Exercise Session

BACKGROUND: Accelerometers are objective monitors that give researchers a more accurate representation, as compared with self-reported measures, of subjects’ physical activity (PA) levels and energy expenditure (EE) in relation to chronic disease risk. This line of research will inform improved algorithms to estimate EE from research-grade accelerometer data.
OBJECTIVE: The aim of this project is to discern the differences between criterion-measured EE and accelerometer-estimated EE during a high intensity interval training (HIIT) session.

METHODS: 10 participants (mean age=20.5 yrs, Body Mass Index (BMI)=24.6 kg/m², males=9), completed a preliminary and HIIT session within 2 weeks. The preliminary session resulted in heart rate data from 3 consecutive treadmill speeds to calculate sprint velocity for the HIIT session. The HIIT session comprised of 5 bouts: each bout a 45-second sprint and 90-second rest interval. Data analysis was conducted using custom R scripts to determine significant differences between criterion measure and existing accelerometer estimates for EE during the HIIT session.

RESULTS: 6 of 10 participants’ data have been calculated thus far. On average, the accelerometer underestimated EE compared to the criterion measure by 3%. Of the participants (4 of 6) within a healthy BMI (18.0-24.9), the accelerometer underestimated EE by 16%. Of participants with overweight/obese BMI, the accelerometer overestimated EE by 21%.

CONCLUSION: Compared to the criterion measure, the accelerometer underestimated EE for participants with normal BMI but overestimated for participants with overweight or obese BMI. These findings indicate that current accelerometer EE prediction models must be improved for a broader range of activity types and sub-populations.

12:40-1:25    Board 28
Lila Elizabeth Hoachlander-Hobby
Sofiya Alhassan (Faculty Sponsor)
Department of Kinesiology, UMass Amherst
iCons: Preliminary Effect of a Health Behaviors Intervention on Sleep Quality in Preschoolers

Background: Physical activity (PA) and sleep are crucial factors in a healthy childhood. However, children lack sufficient quantity and quality of both aspects of development, posing serious health risks. Therefore, the purpose of this study was to perform a secondary analysis on the Physical Activity, Diet, and Sleep (PADS) pilot study to 1) investigate the relationship between PA and sleep quality at baseline and 2) assess how a preschool-based health behaviors intervention impacted sleep quality.

Methods: Children attending two preschools were randomized to the PADS intervention (n=26, age=3.7 ± 0.9) or control group (n=26, age=3.6 ± 0.7). The 12-week PADS study consisted of academically-tailored PA and sleep lessons in the classroom, and online educational resources for parents. Measurements were collected at baseline and post-intervention using accelerometers to assess PA, and a parent-completed Sleep Disturbance Index questionnaire to examine children’s sleep habits. The baseline relationship between moderate-to-vigorous physical activity (MVPA) and sleep quality was assessed with a Pearson correlation, and change in sleep scores by group were calculated using a two samples t-test. Results: There was no significant relationship between MVPA and sleep quality at baseline (r=0.22, p=0.27), and no significant change in sleep quality between the PADS and control group (t=0.56, p=0.58). Conclusion: PADS did not impact sleep quality in this sample. Missing data was prevalent for sleep quality (via self-report) at post-intervention.
so strategies should be explored to increase compliance. Objective measures of sleep quality are also needed to better understand this relationship.

1:30-2:15  Board 60
Diandra Gillis
Katrina Gallagher
Joseph Gallo (Faculty Sponsor)
Department of Sport and Movement Science, Salem State University
An Analysis of Wrist and Forearm Musculoskeletal Characteristics in Female Overhead Athletes Compared to Healthy Controls

Context/Background:
Chronic wrist and forearm injuries are known to occur in overhead sports such as tennis and softball. The persistent nature of these musculoskeletal injuries can affect an athlete’s ability to compete, which in turn could compromise their overall health and have potential long-term impacts on their function. Research has not yet identified the musculoskeletal characteristics of female tennis and softball athletes. In order to better understand these musculoskeletal injuries patterns in overhead female athletes, the musculoskeletal characteristics associated tennis and softball must be identified.

Objective/Purpose:
The primary purpose of this study to describe musculoskeletal characteristics of the elbow, hand, wrist, and forearm in tennis and softball players. The secondary purpose is to determine if there is a difference in range of motion and isometric strength within groups.

Participants:
A total of 30 female participants will be included in this study.

Procedures:
Participants were allocated to the athlete group or the control group based on the Noyes Sports-Activities Score. Range of motion of the elbow, wrist, and forearm was assessed using a standard goniometer. Isometric strength of elbow flexion, forearm supination and pronation, and wrist flexion and extension was assessed using a manual muscle test dynamometer (Lafayette, IN). Isometric testing positions were standardized for all participants. Isometric grip strength was assessed using the Jamar Grip Strength Dynamometer (Bolingbrook, IL). Each isometric test was performed three times with a 60 second rest between all trials.

Results:
Results are pending due to data collection still being conducted.
The Effects of Reward and Punishment on Locomotive Learning

Performance feedback is integral for motor learning and can be categorized into different types of stimuli used: reward increases the frequency of a behavior by adding a positive feedback, while punishment decreases the frequency of a behavior by adding a negative feedback. The objective of this study is to measure the acquisition and consolidation of locomotor sequence learning with reward vs. punishment feedback. Based on previous research on the effects of reward and punishment on learning upper extremities tasks, we hypothesize that reward feedback will lead to greater learning and retention of the task compared with punished feedback or no feedback (control). In this study, healthy participants will be randomly assigned to a control group, reward group, or punishment group. Each group will undergo a training session in which they will learn a step length sequence during treadmill walking. During training, the reward group will gain a point for each successful hit, the punishment group will lose a point for each unsuccessful hit, and the control group will not receive points feedback. Six hours after the first session, each subject will be tested again without feedback. The effect of reward and punishment on the acquisition and consolidation phase will be evaluated by analyzing the success rate of hitting the targets. We predict that the reward group will show a greater improvement in offline learning (i.e. consolidation), and subsequently show greater offline learning between sessions, compared to the control and punishment groups. If so, it would suggest that the concepts of reward can be implemented in gait rehabilitation for those impaired by locomotor dysfunction.

Where Should I Live: The Effect of Altitude on Functional Status in Cardiovascular Patients

Cardiovascular disease is one of the leading causes of death in America. Research has shown that living at higher altitudes improves cardiovascular health and overall well-being. We consider altitude when discussing athletic performance; why not do the same when it comes to cardiovascular diseases? By measuring oxygen consumption and cardiac output, we can see the impact of living at altitudes on the functional status of individuals diagnosed with a cardiovascular disease. A search was conducted for current literature related to cardiovascular disease and altitude and the five most relevant studies were considered. Researchers considered the variables of living at altitudes, functional capacity, and cardiovascular disease. Results were mixed with regard to the impact of living at higher altitudes on functional capacity but health status was not standardized. These results identify the need to do further research to clarify if altitude has an impact on functional capacity of a specific health status. A potential direction to look at is at a specific cardiovascular disease and the effects of...
varying altitudes. The clinical bottom line, is although there is evidence to show that there is an impact of increasing altitude on functional status, more needs to be done. Additional research needs to be conducted to investigate the effect of living at different altitudes on the functional status of someone with a cardiovascular disease specifically. Through gathering this information, an improvement in quality of cardiac rehabilitation, exercise, and lifestyle choice in where they live and what they do may be seen.

3:45-4:30   Board 37
Liam Gross
Catrine Tudor-Locke (Faculty Sponsor)
Department of Kinesiology, UMass Amherst
Aerobic Physical Activity and Memory

There are many known benefits of aerobic physical activity (defined simply as the number of accumulated steps per day someone takes). Growing evidence suggests that it may have a positive impact on memory. The purpose of this study is to determine the effect of increased volume of aerobic physical activity on a simple measure of memory function. College-aged participants (3 men, 3 women) will be measured for basic anthropometric characteristics including height, weight and body mass index (BMI) in addition to being informed of the study goals and details in a preliminary lab visit. The participants will be given pedometers to keep track of their steps per day and will be asked to take at least 15000 steps on the first day and 5000 steps on the second day. Before retiring for bed each day, participants briefly will complete the mnemonic separation test (MST), an online episodic memory test which automatically compiles a results file for data analysis. Results from the daily memory test will be compared and analyzed with the recorded daily step counts. We expect to see an increase in self-reported memory ability on the day when the participant engages in more aerobic physical activity. We expect the data will present evidence that memory is related to aerobic physical activity. This expected finding provides a platform for future, more in depth, studies to characterize the exact relationship. Future interventions to increase aerobic activity on a daily basis may be important for supporting simple memory functions.

3:45-4:30   Board 38
Brayden Woods
Catrine Tudor-Locke (Faculty Sponsor)
Department of Kinesiology, UMass Amherst
Effect of Positive Partner Interaction on Cardiovascular Reactivity during Exercise

Cardiovascular reactivity, which is associated with cardiovascular health, has been linked to psychometric variables such as hedonic and eudemonic well-being, each of which are considered components of overall psychological well-being. Systolic blood pressure, diastolic blood pressure, and heart rate responses to speaking tasks and non-exercise stressors have been found to be attenuated when the task responder receives verbal feedback from a friendly partner—which increases eudemonic well-being, or a sense of accomplishment—or when the task responder receives warm contact with a friendly partner, which inspires the perception of comfort and joy of hedonic well-being.
The purpose of this study is to examine the effect of positive partner interaction on the cardiovascular reactivity to exercise.

Positive interaction will be defined as physical or verbal contact intended to inspire hedonic or eudemonic well-being. The FitBit Charge HR and the Misfit Shine will be used to measure heart rate, and a digital blood pressure cuff will be used to measure systolic and diastolic blood pressure during five half-mile walking trials. Participants will establish a baseline measure, then walk after receiving physical encouragement, then walk after receiving verbal encouragement, then walk in dyads or pairs with both unfamiliar and familiar partners.

The unpartnered baseline trial is expected to result in the highest cardiovascular reactivity. The unfamiliar dyad trial is expected to be similar because of the anticipatory effect related to partner contact. Physical interaction is expected to result in higher reactivity than verbal interaction.

3:45-4:30    Board 39
Shannon Marie Nagle
Catrine Tudor-Locke (Faculty Sponsor)
Department of Kinesiology, UMass Amherst
Effects of High-Heeled Shoes on Daily Step Count in College-Aged Women

Background: Research shows that walking in high-heeled shoes cause biomechanical and physiological changes in human gait. There is limited research on the effects of high-heeled shoes on daily step count.

Purpose: To investigate whether or not wearing high-heeled shoes has an effect on daily step count in college-aged women.

Methods: Six women, 18-22 years of age, will be recruited for a two-day (48-hour) monitoring period. They will be asked to bring their own pair of high-heeled shoes (≥2 inches in height). Anthropometric characteristics and height and width of the heel will be assessed. Participants will be fitted with a wrist-worn ActiGraph GT9X accelerometer and instructed on its daily use. During the first 24-hour period participants will be asked to wear high-heeled shoes for a minimally consecutive 6-hour time frame, followed by flat shoes the rest of the waking day. Participants will be asked to only wear flat shoes during the subsequent 24-hour period. Steps/day, steps during the 6-hour high-heeled wear time, and time spent in moderate-to-vigorous physical activity (MVPA) will be assessed.

Results: Hypothetical results include that fewer steps/day but more time spent in MVPA will occur during the first 24-hour period compared to the second 24-hour period. It’s hypothesized that less steps will be taken in the 6-hour time frame of high-heeled wear compared to the same time frame the following day.

Conclusion: The results from this study are important for assessing the effects on daily step count for the 40% of women that wear high-heeled shoes daily.
Physical Activity and Stress in College Students

Background: Research into the benefits of physical activity on mental health and well-being shows that mood and mental health increases for those who increase their amount of ambulatory movement and physical activity. However, there is a research gap in the college age demographic, and a campus of busy students serves as an interesting environment to explore this relevant research question. It is appropriate to explore the relationship between physical activity and mental health, specifically daily stress, in this population that is seemingly ‘always stressed’.

Purpose: To explore the relationship between physical activity and daily stress levels as an indicator of mental health in college students.

Methods: This study investigated the effects of stress on physical activity and steps per day. A convenience sample of 6 college students will be asked to wear an Actigraph GT9X accelerometer on a waist belt for 24 hours a day, for the three consecutive days of the test period duration. In addition, participants will be instructed to complete the Depression Anxiety Stress Scale (DASS) at the end of each test day as a subjective reflection of the participants’ perceived stress.

Results: We anticipate that participants will report a higher DASS score (indicating higher amounts of stress) related to lower steps day.

Conclusion: We predict that the more stressed an individual is, the more likely they will be to display sedentary behavior, either as a byproduct of having so many tasks to complete or as a coping mechanism.

Purpose: Past researchers have examined the relationship between physical activity and stress in college students, however, the lack of use of wearable technology and study within a general college population are noticeable research gaps. Future research needs to address these gaps in order to understand possible interventions that can help college students handle stress. The purpose of this study was to understand the relationship between physical activity and stress in the average college student.

Methods: Participants will wear a wrist-worn Fitbit Charge for three consecutive days while going about their normal routine. In the evening of each day, participants will be asked to
complete a short survey rating how often they experienced stress. Higher scores on this survey indicate higher levels of stress.

**Results:** The average number of steps per day for the three days for each individual participant is expected to range from 5,000 to 13,000 steps per day. The average perceived stress score for the same three days will range from 5 to 35 points. We hypothesize that participants who walk a higher number of steps per day will score lower on the perceived stress survey.

**Conclusion:** College students who walk a higher number of steps per day will report lower levels of perceived stress than college students who walk less steps per day. Future research should examine this association over a longer period of time.

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**3:45-4:30 Board 42**  
Samantha Marie Runshaw  
Catrine Tudor-Locke (Faculty Sponsor)  
Department of Kinesiology, UMass Amherst  
Relationships between Energy Consumption and Expenditure in Habitual Runners

Background: Rising obesity rates in the U.S. have sparked research surrounding factors that may play a role. One possible factor is a link between energy consumption and expenditure. Research surrounding this topic thus far is based upon primarily subjective data with very limited objective data. This study will use both subjective and objective data collection methods when exploring the possible correlation between energy consumption and expenditure.

Methods: Participants in this two-day study will include habitual runners (self-reporting running 3 times/week for at least a 15-minute duration). Participants will be asked to run for exactly 15 minute duration on the first day of data collection, track their steps at the end of the day (via NL Digiwalker SW-200) and track their energy consumption frequency (via My Daily Plate). They will not perform any type of energy expenditure on the second day, but they will still track their steps at the end of the day and track energy consumption frequency. This will allow a statistical comparison between energy consumption on days with higher energy expenditure to days with lower energy expenditure. Results: It is expected that the day with more energy consumption will have a higher energy expenditure, and the day with lower energy expenditure will result in less energy consumption. Ideally people who are habitual runners can keep a balance between consumption and expenditure. Conclusion: This pilot study can be used to guide future research comparing energy consumption and expenditure.

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**3:45-4:30 Board 43**  
Edwood Vladmy Brice  
Catrine Tudor-Locke (Faculty Sponsor)  
Department of Kinesiology, UMass Amherst  
Step Count and Intensity in Virtual-Reality Exergaming and Traditional Physical Activity

It is commonly known that physical activity (PA) is beneficial to health. Unfortunately, despite the apparent benefits, obtaining adequate PA is not feasible for all people. Fortunately, a burgeoning alternative option is virtual reality (VR) exergaming (i.e. gamified exercising). It is
often conducted with VR and/or modified exercise equipment. It can be done in short bouts at
the user’s convenience and the necessary technology is accessible. The study will benefit
college students (the target demographic) in their effort to incorporate PA in their
schedules. PURPOSE: To analyze step count and step intensity (vector magnitude) differences
between VR exergaming and traditional PA. METHODS: 3 men and women (aged 18-23 years)
at UMass Amherst will be recruited. Before data are collected, a warm-up will be conducted and
the protocol will be reiterated. Step count and step intensity data from 3 traditional PA exercises
and 3 VR exergaming activities will be recorded with an ActiGraph GT9X (a wearable
accelerometer and pedometer). Each game and exercise will be conducted for 5
minutes. RESULTS: Data produced will show that VR exergaming elicits PA that is objectively
comparable to traditional PA in terms of step count and step intensity. It will also provide
subjective insight via the Borg Rating of Perceived Exertion Scale and questionnaire
data. CONCLUSION: The benefit of objectively verified PA is particularly relevant to college
students and their structured lives. In their pursuit of PA, exergaming has the potential to
galvanize future efforts to carry out some form of PA regularly.

3:45-4:30 Board 70
R. Anthony Martin
Jane Kent (Faculty Sponsor)
Department of Kinesiology, UMass Amherst
Old Age is Not Associated with Increased Fat Deposition in Human Quadriceps Muscles

Typically, muscle mass is smaller and intramuscular fat content is greater in older
adults. However, the variability of fat deposition in older muscle is not known, and could affect
its function. Purpose: To quantify age-related differences in peak quadriceps muscle cross-
sectional area (CSA) and volume, and slice-to-slice variability of fat deposition using magnetic
resonance imaging (MRI). Methods: The dominant leg of 14 young (27.2±4.1 years;
BMI=24.4±3.5 kg m⁻2; 8 men) and 9 older (73.6±4.9; BMI=25.2±3.1; 4 men) adults were
evaluated using a 6-point Dixon imaging technique in a 3T MRI system. Images in which all 4
quadriceps muscles were visible were analyzed. For each 6-mm slice, a region of interest (ROI)
was drawn around the quadriceps, and peak fat-free CSA and volume, as well as fat fraction
(%) and the coefficient of variation (CoV) for fat fraction for all ROIs were quantified. Group
differences were evaluated by t-test. Results: Peak muscle CSA (74.1±22.2 vs. 56.2±15.0cm²,
p=0.046) and volume (3,690.7±1,123.5 vs. 2,774.6±807.2cm³, p=0.047) were larger in young
compared with older adults. However, neither fat fraction (young: 8.2±1.2 vs. older: 9.1±1.9%,
p=0.147), nor the CoV for fat fraction (young: 9.9±3.7 vs. older: 9.4±3.5%, p=0.773) differed
between groups. Conclusions: Although fat-free muscle mass was lower in our older group,
this loss of muscle was not accompanied by greater fat deposition. Likewise, the variability of
fat deposition along the muscle did not differ between groups. Thus, old age does not
necessarily result in the replacement of muscle with fat in humans.
Dogs may have a positive effect on dog owners’ mental health. This study examined the relationship between dog-owner bond strength, stress, and depressive symptoms.

Eleven individuals fostered a dog for 6 weeks as part of a study examining how taking a dog into one’s home affects health. Participants completed the Center for Studies on Epidemiological Depression (CESD) scale, Perceived Stress Scale (PSS) at baseline and 6 weeks and the Comfort from Companion Animals Scale (CCAS) at 6 weeks. Change scores were calculated (6-week minus baseline) and Pearson’s correlation analyses were conducted in Excel to examine associations between changes in stress, depressive symptoms, and human-animal bond strength at 6 weeks.

Participants were all female (39±15yrs). Foster dogs were a mixture of male and female (1.4±0.6yrs) with energy levels averaging medium-high. Most dogs (8 of 11) were of medium size. The CESD scale had an average change of -4.92 from baseline to 6 weeks; 9 of 11 participants scores decreased from baseline to 6 weeks. The PSS scale had an average change of -0.81; 6 of 11 participants scores decreased from baseline to 6 weeks. CCAS scores at 6 weeks averaged 39.3±5.5 (max 44). Correlations between bond strength at 6 weeks and change in stress and depressive symptoms were -0.49 and -0.43, respectively.

Dog owners that feel a stronger bond with their dog may experience less stress or depressive symptoms as compared to those feeling less bonded with their dog.

Kaleigh Swainamer, Katie Potter PhD, Last Hope K9 Rescue, BuddyStudy Participants

Background: In physical activity research accelerometers are used to measure activity levels. Studies have compared grade point average, cognitive abilities, and stress levels to physical activity levels. The relationship between stress from academic examinations and physical activity has not been evaluated.

Purpose: To investigate stress from academic examinations and physical activity levels in undergraduate college students.

Methods: Before an examination, participants arrive at the lab, receive information about the study, and are asked to sign an informed consent form. Anthropometric measurements will be collected. An ActiGraph GT9X will be calibrated and participants will be taught how to properly wear the device. Participants will also be taught how to properly complete the journal that
measures stress level and academic load (classes, examinations, and study habits) for the day. The participant will wear the ActiGraph GT9X and complete a journal for an exam day and a non-exam day, either: the day before and day of, or the day of and the day after an examination.

**Results:** The results will undergo statistical analysis, including means, standard deviations and t-tests. The results will be presented in tables, scatter plots and bar graphs. The activity counts are expected to be lower on examination days compared to non-examination days, and highest when the non-examination day is second. The values for stress levels are predicted to follow an inverse pattern.

**Conclusion:** The expected conclusion will be that students are less physically active on days with high stress levels due to academic examinations.

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**4:45-5:30 Board 11**

Thomas Michael Martin  
Catrine Tudor-Locke (Faculty Sponsor)  
Department of Kinesiology, UMass Amherst  
*Validity and Reliability of Activity Monitors during Treadmill Interval Training*

**Introduction:** Interval training is a common practice for athletes who seek to maximize their time, training, and overall promotion of health. Likewise, activity monitors are designed to help users optimize their training time. For this study three activity monitors (Fitbit Surge, SW-200, and NL-1000) were evaluated for validity and accuracy during interval training.

**Methods:** Six college-aged participants (3 men, 3 women) were recruited to perform interval training on a treadmill. There were three different maximum speeds of 7.5, 8, and 8.5 miles per hour (MPH) assessed and these trials were subsequently repeated on a later date to evaluate reliability. The total time for each speed assessed was three minutes and twenty seconds. The criterion standard for evaluating validity was manual step counting and a camera was used to measure step count at high speeds. Mean absolute percentage error (MAPE) will be used to evaluate validity.

**Results:** In relevant literature, waist worn activity monitors have proven to be more accurate than wrist worn devices. Based on this it was hypothesized that the NL-1000 would be the most valid and reliable while the FitBit Surge would be the least valid and reliable.

**Discussion:** There is currently minimal research that assesses the use of activity monitors in interval training. The data found in this study will help close this knowledge gap and provide the public with information about the validity and reliability of activity monitors for this specific exercise.
**Presentation Details**

**4:45-5:30    Board 12**
Taylor R. Blow
Catrine Tudor-Locke (Faculty Sponsor)
Department of Kinesiology, UMass Amherst

**Variances in Steps/Day Due to High Intensity Physical Activity in Collegiate Runners**

**Background:** With the current obesity epidemic and the associated rise in chronic disease in the United States it is critical to monitor and understand the current state of physical activity (PA). Current research has explored variances in steps/day due to changes in location, day of the week and time of year as well as the consistency of steps/day over different weeks. However, there is a knowledge gap regarding the relationship between intense PA and incidental steps/day.

**Purpose:** To investigate the relationship between steps/day and engagement in high intensity PA in collegiate runners (18-22 years of age). Although previous research suggests that people take more steps/day on working days due to occupational demands, it is hypothesized that on days of high intensity PA, collegiate runners will take fewer incidental steps (steps taken at <120 steps/min) and limit their incidental steps/day to compensate for the high intensity PA.

**Methods:** Six participants, 3 men and 3 women, will wear an Actigraph GT9X following a 24-hour wear protocol on a day with no planned high intensity PA and on second day with planned high intensity PA. Participants will also be asked to fill out a questionnaire to give insight into the PA they engaged in.

**Conclusion:** This study will contribute to an understanding of PA tendencies following certain activities and will add to an understanding of the daily habits of athletes beyond their sport.

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**4:45-5:30    Board 13**
Jacob R. Smith
Catrine Tudor-Locke (Faculty Sponsor)
Department of Kinesiology, UMass Amherst

**Waist versus Wrist Worn Accelerometers during Treadmill Walking with Simulated Pregnancy**

**Background:** A decreased cadence (steps/min) and an increased accelerometer tilt and Body Mass Index (BMI) occur during the 3rd trimester. It is unknown exactly how waist and wrist accelerometers are influenced by these physical changes. Research is needed to identify the most accurate location to wear an accelerometer while pregnant.

**Purpose:** To determine how physical changes occurring during pregnancy impact accelerometer accuracy in terms of step counts during a controlled treadmill protocol.

**Methods:** Six full time college students between 19 and 23 years of age will be recruited. Participants will complete a treadmill protocol consisting of 3 bouts at 3 minutes each at speeds of 1, 2 and 3 mph while wearing a pregnancy simulator and 2 ActiGraph GT9X Link accelerometers (hip and wrist). Mean accelerometer step count will be compared to a manual count as a measure of validity.
**Results:** Both accelerometers will underestimate average step count by an average of 15% when compared to the manual count. Waist worn is predicted to underestimate step counts when compared to wrist worn by 25%, 10%, and 6% for speeds of 1, 2, and 3 mph, respectively.

**Conclusion:** This study will identify how waist and wrist worn accelerometers are impacted during pregnancy. It is expected that wrist worn will be the more accurate location for accelerometer placement in this population. This study will provide information that will be beneficial for future research surrounding the physical activity habits of pregnant women in order to ensure accurate accelerometer data.

**4:45-5:30 Board 7**

Shefali Mangtani  
Catrine Tudor-Locke (Faculty Sponsor)  
Department of Kinesiology, UMass Amherst  
The Association between Physical Activity Habits and Oral Hygiene Habits

The clustering of health-related behaviors suggests that the same factors may be impacting people’s likelihood of performing different behaviors. Studying physical activity (PA) behaviors and oral hygiene behaviors is of significance because low levels of PA and poor oral hygiene can lead to pain, discomfort, and costly healing procedures. Though existing studies have found that poor PA habits are often associated with poor oral hygiene habits, the studies are limited in that they rely on subjective self-report as a measure of PA levels. This study seeks to solve this limitation and examine if there is an association between objectively measured PA habits and oral hygiene habits. Three male and three female full-time students at the University of Massachusetts Amherst who are healthy and have normal to overweight BMIs will be recruited. Over three days, participants will wear the PiezoRxD pedometer, which will record how many steps participants have taken per day and how many minutes of moderate-to-vigorous PA (MVPA), defined as minutes during which they took at least 100 steps, they have performed per day. At the end of each day, the participants will complete a questionnaire to report how many times they brushed their teeth, used mouthwash, or flossed on that day. Based on the results of previous studies, it is expected that students with higher daily step counts and daily minutes of MVPA will also brush their teeth, use mouthwash, and floss more often than students who perform low levels of daily PA.

**4:45-5:30 Board 8**

Nicole Elisabeth Tschuor  
Catrine Tudor-Locke (Faculty Sponsor)  
Department of Kinesiology, UMass Amherst  
The Effects of Different Types of Exercise on Steps per Day

Purpose: Total steps per day has become an accepted indicator of overall health with the rise in wearable technology specializing in step tracking. Different exercise routines can lead to higher overall step counts throughout the day. This study aims to observe the difference between the number of steps accumulated during days involving dance vs. strength training exercise.  
Methods: Six female students (19-22 years of age) at the University of Massachusetts Amherst
will be recruited to wear an Actigraph GT9X on their non-dominant wrist over two 24-hour periods to track their total steps per day. Each of the days, participants will complete one hour of either strength training or dance while wearing the Actigraph and maintaining a Bouchard Activity log. All participants will meet with the researcher to engage each type of exercise to maintain uniformity across individuals. Results: Based on self-collected data we hypothesize that participants will show a dramatic increase in total steps on days when they complete one hour of dance in contrast to days with strength training exercise. Overall the majority of these daily steps will be obtained during the hour of dance. Conclusion: Through this research, we hope to understand how dance and strength training impacts a person’s overall steps per day. With this information and the widespread availability of step tracking, clinicians, personal trainers, and the lay public can determine the best exercise type to increase overall physical activity.

4:45-5:30  Board 9
Jake L. Marcoulier
Catrine Tudor-Locke (Faculty Sponsor)
Department of Kinesiology, UMass Amherst
The Effects of Non-academic Activities on Students’ Daily Step Count

Physical activity (PA) is defined as any bodily movement resulting in energy expenditure. The purpose of this study is to see if students’ daily average steps is affected by unstructured non-academic activities by either increasing it or causing compensating activities to decrease it. Compensating activities include staying in bed later than normal, spending more time catching up on homework, etc. Devices that measure steps per day and questionnaires can be added to the objective measure to give a rounded picture of total PA. Six healthy undergraduate students will be recruited who can complete their normal daily routine. Participants will be equipped with a Fitbit One accelerometer from a Thursday through Saturday and be administered a questionnaire at the end to compare the three days. The hypothesis is that students will be more likely to accumulate more daily steps during an unstructured, non-academic day than their structured, academic activity filled days. This will be in conjunction with a questionnaire where they will be asked to recount their recent activities. The devices will be worn except during a water-based activity such as showering. For example, the Fitbit may report step counts of 10,245 on Thursday, 10,136 on Friday, and 15,511 on Saturday. The Thursday data will provide a benchmark for a normal academic day for analysis. The Friday will show a mixed day, and Saturday will show a solely unstructured day. These data will help show how activities outside of their normal academic ones contribute to daily step count.
LANDSCAPE ARCHITECTURE

8:30-9:15    Board 21
Phoebe E. Hagberg
Christine L. Crago (Faculty Sponsor)
Department of Resource Economics, UMass Amherst
Evaluating Stormwater Management Systems in Post-industrial Cities

Stormwater management strategies can vary greatly in different cities, from smart landscape design to vegetated swales to riparian buffers but they all aim at the goal of reducing polluted water runoff. Systems like these are especially important in highly polluted areas, as the runoff impact is greater if not dealt with appropriately. This issue is particularly pressing in cities that had large manufacturing industries (to be referred to as post-industrial cities) in the past, as they have the compounding effect of being both heavily polluted and economically distressed. This paper seeks to compile data from a web survey to be completed by city managers of post-industrial cities that will inquire about their current and planned stormwater management practices as well as the barriers they are facing and the best way to ameliorate them. Through the data, I hope to be able to synthesize the most common barriers and subsequently present possible solutions that would provide these cities with the most effective solutions.

11:45-12:30    Board 7
Olivia Shaw Horte
Theodore Stephen Eisenman (Faculty Sponsor)
Department of Landscape Architecture, UMass Amherst
Urban Greenways: A Systematic Review

Greenways are a prominent topic in landscape planning research and practice. In 1990, Greenways for America inspired greenway planning in the United States (Little 1990), and three Special Issues of Landscape and Urban Planning subsequently advanced international scholarship on greenways (Fabos and Ahern 1995; Fabos and Ryan 2004, 2006). In practice, linear green corridors are now prominent expressions of landscape planning in urban areas, which assumes added significance as three-quarters of people will be living in cities by the end of this century (Angel 2012).

But to the best of our knowledge, there has been no systematic literature review on greenways. To address this gap, we undertook a systematic assessment of peer-reviewed literature on “urban greenways.” We searched for this term in Web of Science (n=23), ScienceDirect (n=77), and the Avery Index to Architectural Periodicals (n=6), yielding 96 total articles after eliminating for overlap between databases. Drawing upon scholarly precedents in systematic literature reviews (e.g., Bentsen, Lindholst, and Konijnendijk 2010; Luederitz et al. 2015), we then assessed the articles based on 12 review categories including research focus, geographic extent, methodology, location of study, and journal discipline.

This presentation will deliver results of the research. By depicting the contours of greenway scholarship and potentially uncovering gaps, we hope to illuminate opportunities to advance research on this topic. These findings should be helpful not only to urban planners and
landscape architects, but also to researchers and practitioners across a variety of disciplines who are interested in urban greenways.

Room 165  2:45-3:30  Panel 6
Claire Wixted
Mark Thomas Hamin (Faculty Sponsor)
Department of Landscape Architecture and Regional Planning, UMass Amherst
Cycling for All

The benefits of widespread bicycle use in cities are generally undoubted—such use has positive implications for public health and the environment. My project serves to highlight these benefits while advocating for a bicycle culture that is truly sustainable. I begin by looking back at the bicycle’s influence on American culture, particularly during the bicycle craze of the 1890s. Although bicycle use advanced the interests of the middle-class during this time, helped immigrants assimilate into American culture and promoted women’s causes, exclusive bicycle clubs and class divisions among cyclists resulted in a cycling culture tainted by prejudice. I move to the present era, and discuss the relationship of bicycle infrastructure with gentrification to make the argument that the dream of the American cycling city will never be truly realized unless it works for all. I present Northampton, MA, as an example of a bicycle city, and document its Valley Bike Share program, which has aimed to make bicycle use more accessible to members of all social-strata. Finally, I move to initiatives from other cities which have aimed to make cycling more inclusive, less destructive, and therefore more prolific. My project consists of roughly 60 pages of literary journalism (including photojournalism) and a digital story-map which stands to help audiences imagine, and get excited about, the potential of an inclusive bicycle culture. In this way, I hope to encourage public interest in bicycle infrastructure.
LEGAL STUDIES

Room 903   2:45-3:30   Panel 6
Maximilian M. Roemer
Douglas Rice (Faculty Sponsor)
Department of Political Science, UMass Amherst
Legal Language of Race

A growing body of literature establishes that African Americans face continued unequal and discriminatory treatment from the legal system, from longer and more severe sentences to higher probabilities of being targeted. Traditional approaches have demonstrated these biases at either the micro-level -- that is, individual cases -- or the macro-level -- that is, aggregated case outcomes. Instead, in this paper, I examine the difference of treatment of racial groups as reflected in the language judges actually use in their written opinions. Using a corpus of over one million legal decisions, I apply an approach for automated text analysis from computational social science to examine linguistic differences in legal writing and focus on the differences in the treatment of African Americans and whites over time and across U.S. regions.

4:45-5:30   Board 74
Caroline Eve Collis
Rebecca Hamlin (Faculty Sponsor)
Department of Legal Studies, UMass Amherst
How European Integration Policies Affect the Legal Consciousness of Ethnic Minority Immigrants

In this paper, I explore how different types of immigrant integration policies affect the legal consciousness of ethnic minority (and particularly Muslim) immigrants in Europe. I compared integration policies in France, the United Kingdom, and Austria, hypothesizing that France’s prohibition against collecting data on ethnic and religious minorities would lead to differences in the way that immigrant populations related to the law. I spent months researching all three countries’ immigration histories and integration strategies for a comprehensive and comparative review. I also explored social media platforms of legal advocacy organizations for immigrants to gain information about how immigrants feel towards the law. Yet, France’s expansive law banning surveying reached social media platforms too. Consequently, my research has highlighted the multitude of starkly divided debates surrounding citizenship identities in ethnic minorities, and integration strategies. Some of those discussions include what it means to be Muslim and French, Austrian, or British, how recent terrorist attacks have molded Islamophobia, and whether multiculturalism is successful as an integration tactic. I further explore how the debates affect Muslim populations in the three states, and conclude that because the multiculturalist approach allows space for expression through multiple identities, Muslim immigrant populations in states that adopt multiculturalist integration policies are more likely to feel that they have a positive relationship with the law.
I will be researching animal symbolism in literature across different cultures. I have narrowed the cultures down to Japanese, Hispanic, African, and English. Depending on how my research goes, I may find myself changing the cultures, but as of now, they seem the most promising and rich in my endeavors. My desire is to use the differences between the cultures to exemplify the different, though at times similar, perspectives people have on many topics. It will be interesting to see which cultures share the most commonalities. The animals I plan on looking into, as of now, are cats, bears, and snakes. Each of these animals has a flip side to them; they can be seen as gentle and rough. That duality is sure to bring interesting results within each culture’s literature, especially in the local folklore. Literature is truly a broad category, and I tend to use that to my advantage.
MANAGEMENT

8:30-9:15    Board 67
Alex Erwin
Borga Deniz (Faculty Sponsor)
Department of Management and Business IT, Framingham State University
An Analysis of the Subscription Business Model in the 21st Century

The subscription business model is a concept that has been established for centuries. With predetermined periodic payments, it becomes more convenient for consumers to manage expenses for services or goods they receive. Due to advancements in modern technology, the subscription business model has been revitalized and has shaken up a multitude of industries such as retail, cable/TV, and food. This study will focus on several successful companies that offer subscription in order to investigate success factors for the business model.

10:45-11:30    Board 3
Casey Anne Gilmore
Zaur Rzakhanov (Faculty Sponsor)
Department of Accounting and Finance, UMass Boston
Niche-Marketing in the Film Industry: The Impact of Firm Size and Vertical Integration on Marketing Effectiveness

Niche streaming sites are becoming increasingly important within the SVOD (subscription video on demand) industry. These sites are not interested in being competitors with the industry leaders (Amazon, Netflix, Hulu) but instead aim to carve out a smaller market share in the niche or boutique markets within the streaming industry. They aim to develop a more specific product for a smaller audience. The study focuses on the two primary business structures within this niche market: one is the subsidiary of a major conglomerate media corporation and the other is a small independent singular streaming site. We select Mubi as an example of an independent streaming site and Shudder which is owned by AMC Networks as an example of a subsidiary structure. Using personnel interviews, marketing documents and data as well as student surveys the study would compare media and marketing strategies to determine if business structures have an impact on the effectiveness of marketing of streaming services.

10:45-11:30    Board 4
Jaden Connor Visconti
Zaur Rzakhanov (Faculty Sponsor)
Department of Accounting and Finance, UMass Boston
The Impact of Government Regulation on Corporate Social Responsibility

The purpose of this research is to investigate whether government regulation impacts corporate social responsibility and if so, in a positive or negative way. As American society increasingly expects companies to be more socially responsible, we want to know if greater regulation helps or hinders this objective. To this end, we will seek to examine the relationship between changes in government regulatory policies and the level of social responsibility of companies. Using data
collected from the KLD database and Bloomberg, we will examine changes in the level of corporate social responsibility (CSR) before and after particular regulatory actions (implementations or repeals) are taken. We anticipate that more proactive regulatory policies have a positive effect on the level of corporate social responsibility.

1:30-2:15  Board 55
Julitza Rivera
Karen Druffel (Faculty Sponsor)
Department of Management and Business IT, Framingham State University
Employer Provided Benefits: Child Care

A presentation based on results obtained during my independent study at Framingham State University. Focusing on employer provided benefits in the US, specifically a benefit that all working parents need: child care. The study compares employer provided benefits between companies that operate, at least partially, in the US. It also examines the skyrocketing cost of child care and attainability for low income families, who are part of the middle class, earning "too much" to gain financial help, but making too little to afford what is necessary. What options are available for those that do not receive an employee benefit for the care of their children?

1:30-2:15  Board 61
Fredna Pierre
Kenneth Mullane (Faculty Sponsor)
Department of Management, Salem State University
Breaking the Concrete Wall: The Challenges Facing African-American Women in the Workplace

The glass ceiling is a term that refers to the barriers that prevent women from attaining top corporate positions within a company. This business term is used to describe the difficulties that all women face. In particular, the barriers that inhibit black women from advancing in their careers are so significant that they have been described as a concrete wall rather than a glass ceiling. The purpose of this research is to identify factors that exist within the corporate hierarchy that have led to the glass ceiling and to compare these factors with those that contribute to the concrete wall and negatively affect African-American women from attaining top managerial positions. Through an extensive literature review, this research intends to explain the work and efforts being done to reduce the disadvantages faced by black women.

Keywords: Concrete Wall, Black women, Management, Glass ceiling, Barriers
Mergers and acquisitions are two words for when companies come together and become one. A merger takes place when two similarly sized companies join forces and form one single entity. An acquisition happens when a larger company purchases and takes over a smaller company, absorbing it and becoming one. One of the main reasons for a merger or acquisition is that two companies believe they are more valuable together. Mergers and acquisitions can be challenging, so the implementation of combining two separate entities into one requires great care. This study aims to determine the critical role human resource management plays in the successes of lasting mergers and acquisitions. The goal of this study is to figure out if correct implementation of human resource practices can turn around problematic mergers and acquisitions.

As the popularity of entrepreneurship grows, the opportunity for women to enter this exciting industry increases. Although this is the case, very few women are entrepreneurs and this may have to do with personality traits common in women. Are there entry barriers for women to enter the field of entrepreneurship or do personality traits play a role in being a successful entrepreneur? Harvard Business School created a list of eleven personality dimensions that are rated based on how common they are in entrepreneurs. These personality traits will help further the research on this topic. The big five personality traits will also play an important role. These traits are extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Each of these were researched among entrepreneurs to find a difference. Finding the connections between personality traits and the success of entrepreneurs will be key to finding the possible barriers of entry for women in entrepreneurship.
MARKETING

8:30-9:15  Board 14
Jamie C. Cocco
Christine L. Crago (Faculty Sponsor)
Department of Resource Economics, UMass Amherst
Using Video Marketing to Strengthen the B-Corp Movement

Most companies are not monitoring and improving their carbon footprint and government has
taken the focus off the clean energy push that could reduce the cost and increase the
proliferation of clean energy. The purpose of my thesis project is to aid the climate change
movement through guiding a person to purchase from, seek out to work for, and start a B-Corp,
because B-Corp businesses go through a rigorous accreditation process with an already
established label that focuses on people, planet, and profit holistically.

I chose to focus in on Millennials and Gen Zers, because these generations are going to
become a majority of the workforce by 2025, and they both have reflected that social
responsibility and sustainability are core values. To craft the right message to drive B-Corp
business proliferation, I have created a B-Corp Marketing Video to target these demographics
based on feedback from in person interviews with Millennials and Gen Zers, local footage, and a
compelling storyline focusing on the desire to be in a sustainability movement.

In the research phase of this project, I created two surveys completed by Millennials and Gen
Zers. These surveys are aiming to find out if video marketing can increase the likelihood that a
person will purchase from, seek out to work for, and start a B-Corp of their own in the future
through quantitative results.

10:45-11:30  Board 5
Vasil Duka
Zaur Rzakhanov (Faculty Sponsor)
Department of Accounting and Finance, UMass Boston
The Paradigm Shift: The Power of Advocacy Marketing, and Its Usefulness as a Tool for
Building a Music Brand

In this study, the current role advertising plays in marketing is discussed and assessed. In
particular, the study explores how consumer opinion of advertising has changed over the years
and for what reasons. An alternative, word of mouth marketing, is then proposed and analyzed
using previous studies as well as current data collected from a survey.

11:45-12:30  Board 20
Pallas Hayes
Monica Poole (Faculty Sponsor)
Department of Interdisciplinary Studies/BDIC, Bunker Hill Community College
Let’s Get Personal: How AI Is Revolutionizing Social Media Marketing
We’ve all been there: we’re scrolling through social media and suddenly an ad pops up about something we were just searching for online. This is a prime example of artificial intelligence (AI) at work. In the past, market analysis relied on humans’ manual supervision, and only limited customizations of advertisements were possible: for instance, beer companies would run advertisements during the Super Bowl because those who are watching the game were likely to be drinking. Nowadays, very specific customization of ads is possible thanks to machine learning. Our phones, tablets, and computers constantly collect and rapidly analyze data about our personal browsing and show us personally-targeted advertisements as we scroll through our social feeds. By optimizing individualized content, AI has radically changed the practice of social media marketing. This research will delve deep into how exactly social media marketing uses AI to target content to specific users, and will explore future possibilities and applications of this technology.

1:30-2:15   Board 62  
Ariel Olivia Hamilton  
Nisreen Bahnan (Faculty Sponsor)  
Department of Marketing and Decision Science, Salem State University  
The Power of Sensory Marketing in Controlled Consumer Sales

Have you ever wondered why you are drawn to certain products over others? The use of our senses is something which cannot be controlled and is often taken for granted, yet sensory stimulation is what shapes both how we perceive the world around us and how we react to it.

This thesis studies how visual, auditory, olfactory, and tactile appeal can be used in a point-of-purchase retail display to positively influence consumer perception of a product or company and push the consumer to make a purchase. By setting up two mock retail displays with contrasting sensory stimuli, the thesis determines 1. Whether appeal to one sense evokes a stronger response from the consumer than appeal to other senses and 2. Which characteristics, such as a particular color or product arrangement, have the greatest impact on increasing positive perception of the display and ultimately leads to more sales. By determining what consumers best respond to, businesses will be able to adopt more effective sensory practices which may increase their profit while consumers will enjoy a more comfortable shopping experience.

2:45-3:30    Board 78  
Robert Smith Snider  
Renee M. Scapparone (Faculty Sponsor)  
Department of Business, Fitchburg State University  
The Effects of Rebranding Strategies of Legacy Brands on Consumer Behavior

The thesis topic I will be completing in-depth research on is about the effectiveness of several legacy companies rebranding tactics and the impact on consumer behavior. My research will have a primary focus on several individual legacy companies, such as L.L. Bean, Reebok, and Timberland that are going through rebranding efforts. My initial research will focus on the current situation of each company by investigating the fundamental reason for the company’s
rebranding efforts. The intent of this research is to identify a potential phenomena as to whether or not a company was forced to rebrand due to the risks such as facing bankruptcy, losing their [brand] loyal customers, and if there were any organizational changes such as the restructuring of the marketing department. After my initial research and analysis of the current situation for each company, I will then analyze the actual content of the rebranding activities that are underway at each company. The intention of this thesis research project is to attempt to identify key factors of rebranding legacy brands, the consumer’s perceived image of the brand, the promotional efforts & activities by the legacy brand, as well as the social and cultural factors impacting consumers. To conclude my research, I will analyze all of the information I gathered to identify any correlations in rebranding tactics amongst the mentioned legacy companies.

2:45-3:30  Board 79
Samantha Marie Henderson
Mackenzie Lyons
Morgyn E. Slingerland
Sandra S. Rahman (Faculty Sponsor)
Department of Marketing, Framingham State University
Competitive Analysis for Framingham-Area Consulting Firm

Researchers: Morgyn Slingerland, Samantha Henderson, Mackenzie Lyons, Molly Berard
Presenters: Morgyn Slingerland, Samantha Henderson, Mackenzie Lyons

We conducted a competitive analysis of a small marketing consulting firm in the Framingham area. The purpose of this study is to evaluate ten small marketing consulting firms located throughout the U.S. and identify firm marketing practices. We will evaluate the data collected and make recommendations on best practices.

2:45-3:30  Board 80
Kyle Dowen
Zahra Tohidinia (Faculty Sponsor)
Department of Marketing, Framingham State University
Personal Branding – Why Is It Important?

By technicality, the concept of personal branding has existed since businesses and buildings have been named after people. However, growing competitiveness in the workplace and the advent of modern technology have transformed personal branding into a multi-faceted exercise in creating a lasting brand equity and unique selling proposition that places one’s individual talents and offerings above their contemporaries. In many circumstances where public figures are of high profile, modern-day personal branding has the ability to match and supersede branding of corporations in reach and long-term competitive advantage.

Discussed in the following text is the history and evolution of the term “personal branding” into its present-day form, its usefulness in the present-day business and corporate settings, the most
successful elements of a personal branding campaign, and an example of personal branding used effectively to revitalize and extend the longevity of a brand with worth to prove.

3:45-4:30 Board 8
Tyler Ashby Morgan
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
What is a "Sneaker Head" and Who Are They?
The rise of sneaker culture is at an all time high with many generations steering companies to create a concept that is so enticing to the human eye in which consumers will spend hundreds of dollars in order to get their hands on that shoe. Every individual that buys a sneaker and collects them has some sort of reason for doing so. There is little research as to what brings people back for more and who in fact is collecting them.

Through extensive research and interviews with sneaker heads, I will find out the different reasons behind sneaker collecting and how it has affected their lives. What does collecting mean to them on a personal and intellectual level. Everybody has their own personal story and being able to talk with them will bring to light the different reasonings behind sneaker collecting. Outsiders of the sneaker community don’t understand why this culture even exists so by sharing these personal stories it will hopefully help others to get a better idea of why we do it. Retro sneakers for instance give the older generation a reason to reminisce and look back on their life at that time. Any of us can pick up a shoe and remember where we got it from, how many people were waiting with us, what their names were and the general bond we all had over that sneaker.

Room 174 3:45-4:30 Panel 7
Colleen Kelly
Renee M. Scapparone (Faculty Sponsor)
Department of Business, Fitchburg State University
A Researched Assessment of the Correlation between Generational Differences in the US and Marketing Communication Strategies

Marketers know the difficulties associated with appealing to the consumer, specifically when trying to promote a product to differing demographics such as age. The five most important consumer generations in the U.S. are the Silent Generation, Baby Boomers, Generation X, Generation Y or Millennials, and Generation Z; generational marketing has the potential to connect a brand to these generations through the utilization of the most effective marketing communication strategies based on specific elements of the promotional mix. The objectives of this research include to (1) identify differences in values, preferences, and consumption habits of the most important consumer generations in the U.S., (2) establish connections between values, preferences, and consumption habits within each generation, and (3) determine the most effective marketing strategies for businesses to reach each generation. Research methods consist of primary research, including personal interviews, and secondary research,
including government statistics, studies, and journals; this research will provide insight into how certain elements of the promotional mix appeal to each of the generations and which elements are most effective within each age group. The purpose of this research is to identify ways in which marketers can gain a better understanding of their consumer, effectively engage in generation and multi-generational marketing, and develop marketing communication strategies to more accurately reach their target market.

*Keywords*: consumer generations, generational marketing, marketing communication strategies, promotional mix, multi-generational marketing, target market

**Room 174  3:45-4:30  Panel 7**  
Nikolai T. Wright  
Dee Lynn Boyle-Clapp (Faculty Sponsor)  
Department of Arts Extension Service, UMass Amherst  
A Focal Point of Art: Audience

Arts organizations have always used marketing to fill seats and promote programs and classes, but in recent years that focus has shifted from filling seats to using marketing as the backbone of sustaining healthy growth for organizations. The core of marketing is audience participation and continued engagement with not only audience members, but members of the board of directors, donors, and the greater community. Objectives for each marketing campaign can differ, especially when considering the overall goal of an organization, whether it be to simply bring as many audience members as possible to a performance or create a deeper experience for the avid fine arts supporter.

Depending upon a mix of desired outcomes, there are many ways of reaching audience members. Each way requires research and analysis, energy from staff, cost, and tracing the path of a concept from idea to message to recipient reaction. What this means is, arts organizations have different priorities and capabilities regarding marketing and community engagement, which in turn affect the method they use to reach audience members. Through a set of interviews, background texts, and examining three different arts nonprofit organizations, this paper presents the most important aspects of continuing to broaden, deepen, and diversify audience experiences.
Prime numbers are a fundamental part of mathematics. The currently greatest known prime has approximately 25,000 digits and is a Mersenne Number, specifically $2^{82589933} - 1$. They are an integral part of number theory, in which I will research topics such as modular congruence, diophantine equations, Euler's Totient function, and various implementations of the theory in encryption and decryption, along with their importance. Tying that area of mathematics with modern technology, I will learn about modern cryptography to illustrate to the general audience how various methods of cryptography such as monoalphabetic substitution, and public-key encryption work. Within my presentation, I will display my own cipher I created along with its benefits and drawbacks. With the ever-so-expanding scope of technology, data transmission is constantly improving; however, as a result of more advanced technology, personal data breach and privacy become critical problems. To combat these devious hackers, learning about cryptography is essential to understanding the methods to prevent these attacks. Despite the seemingly secure encryption of systems with tactics such as RSA Encryption, future quantum computers could easily decrypt a modernly “safe” message in the matter of minutes. Theoretically, quantum encryption could combat this problem; however, a very strong foundational knowledge of cryptology is required. Because of that, I also intend to learn about some foundational quantum mechanics to help me understand quantum encryption on a conceptual level.

Fractals are patterns that infinitely repeat within themselves. Besides their self-similarity, they are unique in dimension. Fractal geometry defines dimension through a ratio of the change in scale to the change in detail. As their names suggest, fractals have a fractional dimension that lies between integers. Although fractals seem to fit into a type of theoretical abstract mathematics, they are found commonly in nature. Snowflakes, ferns, and lightning bolts are a few examples of fractals in nature. Fractals are used by game designers to create more realistic mountain ranges or coastlines and for fractal compression. The purpose of the presentation and study presented here is to research how algorithms can be used to create and manipulate fractals. The answer will involve topics of fractal geometry, fractal algorithms, and some linear algebra.
**Is Euclidean Geometry Dead?**

Have you ever experienced difficulties with any Euclidean Geometry problem at high school, college level or even olympiad-style? The primary purpose of my research is to resolve this issue, even if spatial imagination is not your strong point.

My project describes the main theorems and formulas that can be used to solve difficult proof-based geometry problems. I am explaining various methods to introduce a rectangular coordinate system which solves almost any Euclidean geometry problems.

Finally, my research is supported by Tarski’s axioms set, which also discusses the universal way to solve Euclidean geometry.

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**Minimum and Maximum Length of Superpermutations**

A superpermutation on $n$ symbols is a string that contains each permutation of $n$ symbols as a substring. The difference in just listing all the permutations together and a superpermutation is that in a superpermutation the permutations can overlap. For instance, with $n=2$, the superpermutation can be written as 121 or 212 instead of 1221 and 2112, respectively. Both of these examples contain both permutations.

The goal of my research is to:

- Write an algorithm to search for the minimum length of superpermutations
- Analyzing patterns of superpermutations currently known and unknown
- Using current understanding of superpermutation lengths to further develop a hypothesis on the minimum and maximum lengths of superpermutations

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**An Analysis of Syrian Civil War Human Rights Data**

Fusheng Yang
Krista Gile (Faculty Sponsor)
Department of Mathematics and Statistics, UMass Amherst
An Analysis of Syrian Civil War Human Rights Data
Many people died in the ongoing Syrian Civil War. Several human rights organizations have collected data on deaths in the Syrian Civil War. In this project, we used data from the Human Rights Data Analysis Group (HRDAG) to support estimation of the total number of deaths in the Syrian Civil War from 2011 to 2016. HRDAG provided us with data from four sources: Syrian Center for Statistics and Research (CSR-SY), Damascus Center for Human Rights Studies (DCHRS), Syrian Network for Human Rights (SNHR), and Violations Documentation Center (VDC). Statistical modeling will use overlap between these lists to infer total number of deaths. Sometimes these organizations used data collected by other organizations to enrich their own database, either accidentally or intentionally. When this happens systematically, it can distort the patterns of overlap between lists, biasing inference on the total number of deaths. It is therefore important to detect copying events that exist in the data from the four sources. In this project, I used R to conduct visualizations and find evidence of the copying events.

1:30-2:15   Board 63
James P. White
Mahmud A. Ahmadov (Faculty Sponsor)
Department of Mathematics and Statistics, Holyoke Community College
Integration: Riemann v. Lebesgue

I would like to discuss how the Riemann integral is defined as the limit approximating the area under a graph using the Riemann sums. This will be demonstrated by using an infinite number of infinitely small subdivisions while using Riemann sums; I will show that the limit, the area approaches to as the number of subdivisions get closer to infinity, is an exact number regardless of using the left or right sided method when using Riemann sums.

I will explain and compare Riemann's method to that of the Lebesgue integral and show each of them in easy to understand terms. Examples of functions that are not integrable in terms of the Riemann integrals, but can be integrated in terms of the Lebesgue integrals will also be presented. The formal definitions of both Riemann and Lebesgue integrals will be presented and discussed, as well.

2:45-3:30   Board 81
Ariane De Souza
Michael Krul (Faculty Sponsor)
Department of Mathematics and Statistics, Framingham State University
An Investigation of the Robinson-Schensted-Knuth Algorithm as It Pertains to the Marked Hook Formula

Partitions and generating functions are widely researched subjects in mathematics. This research plans to investigate a conjecture of Guo-Niu Han regarding the Robinson-Schensted-Knuth (RSK) correspondence between permutations and Young Tableau with the goal in proving the Marked Hook Formula for integer partitions using an RSK type algorithm. This research makes extensive use of generating functions, combinatorial proofs, and exploratory computation, and poses questions that could be used for further research on the topic.
The Firefighter Problem was introduced over 30 years ago and continues to be studied by researchers today. The problem consists of a graph of interest where a fire breaks out at time $t = 0$ on any given vertex of the graph $G$. The player, then, gets to place a firefighter on a vertex to "defend" the fire. Each consecutive turn, the fire spreads to adjacent vertices. These vertices are then referred to as "burnt." The firefighter also gets to move to protect an additional, unburnt vertex. Each vertex that the firefighter “defends” stays protected for the remainder of the game. The game ends when the fire cannot move to any adjacent vertices. This game can be used to solve real world problems. For example, using the approach and ideas from the Firefighter Problem, we can model the spread of diseases in a community. There are many known results for the Firefighter Problem on finite graphs. In this project, we study the Firefighter Problem on infinite graphs, with the goal of expanding on known results. We are exploring various infinite grids by imposing the additional requirement that firefighters can only move to adjacent, unburnt vertices.

In the study of linear algebra, bases allow every vector to have a unique representation. As such, bases are the building blocks of any vector space, and restriction to bases can significantly simplify complex questions in linear algebra. However, bases have quite restrictive properties. For example, the elements of any basis must be linearly independent. This lack of flexibility makes bases unsuitable for real-world applications, and there is a need to develop a theory for less restrictive basis-like objects. The desire for flexible basis-like mathematical tools led to the discovery of frames. Using frames, every vector admits an expansion in terms of a fixed frame, and the coefficients corresponding to a given vector need not be unique. In this poster, we will present the basic concepts of frame theory. Next, we will provide an explicit parameterization of a class of frames known as Parseval frames. Finally, we will describe a procedure for constructing a class of frames known as full-spark frames.
Defined by the American Psychiatric Association (APA) in the DSM-5, bipolar disorder consists of changes in mood between manic and depressive states. While many research efforts have focused on understanding and unearthing various forms of bipolar disorder (bipolar I, bipolar II, and cyclothymic disorder) from a behavioral standpoint, little effort has been put towards understanding the disorder through a mathematical and neuronal framework. A 2015 paper by Bonsall et al. suggests that these prevalent mood fluctuations in bipolar disorder can be modeled via relaxation oscillators and time-series analysis. Bonsall et al. utilized differential equations to capture mood dynamics through a total mood derivative which consists of the interaction between two coupled oscillators. My research expands Bonsall et al.’s original work through a thorough investigation into understanding the mechanism of relaxation oscillators. Direct analysis on the single oscillator, two independent oscillators, and coupled oscillator cases is explored from various mathematical viewpoints, such as stability analyses and the effects of oscillatory strength on the systems. This work is theoretical, proposing novel mechanisms of understanding bipolar disorder with the hope of it being applied to physical patient data in the future. Advancing the understanding of the mathematical and neural mechanisms present in bipolar disorder has the potential of finding new ways to explore new treatments and interventions. It will also provide insight as to how research surrounding mental disorders can be expanded beyond today’s measures, bringing to light new ideas and techniques for treatment interventions.

In this thesis, we will initially consider the stability of the discrete Kuznetsov-Ma (KM) soliton to determine whether time-periodic solutions to the Ablowitz-Ladik (AL) model (with lattice spacing h=1) can be observed in an experimental setting. Upon utilizing the explicit functional form of the KM soliton, we will not only perform Floquet analysis and investigate its stability trait but also corroborate its existence using fixed-point methods to identify the corresponding solution numerically. Subsequently, we will perform a parametric continuation over the lattice spacing by decreasing its value, thus gradually approaching the continuum limit h->0 and study how the stability trait of the discrete KM depends on h. It should be pointed out that as h becomes smaller and smaller our results must coincide with the ones reported in a recent publication by Jesus-Cuevas Maraver, et. al. Having performed this study for the AL model, we will investigate the existence and stability of time-periodic solutions (KM solitons) in the generalized Salerno model in which time periodic solutions are unknown so far. The Salerno model itself interpolates...
between the integrable and discrete AL and discrete NLS (DNLS) models and the numerical tools developed for the integrable case will be of crucial importance in order to shed light on the existence (and stability) of time-periodic solutions in the Salerno model.
MECHANICAL ENGINEERING

Room 174  8:30-9:15  Panel 1
Frances Mitchelle Rivera-Diaz
Charles Bonar
Ileana Vasu (Faculty Sponsor)
Department of Mathematics and Statistics, Holyoke Community College
STEM Scholars Community Project

Holyoke Community College’s NSF STEM Scholars have partnered with Office of Students with Disabilities and Deaf Services in creating a community project to make the campus more accessible for visually impaired students. The objective of the community project is to create a tactile or 3D printed versions of the campus. This presentation will introduce the audience to our project, the research undertaken, from blueprint, to reading the blueprints with the 3D printer, to rendering the product in a medium readable for the visually impaired. Our challenges and successes will be highlighted, along with the importance of this type of community service project.

Our initial prototype of the map revealed deficiencies on campus blueprints, leading grant proposal and fundraising to purchase a new embosser and correction of campus blueprints. It also led the Scholars to recognize the insufficiency of labels with Braille on campus rooms. The Scholars are obtaining skills using Solidworks modeling software, which they have designed a label prototype and legible Braille that was approved by HCC’s Marketing Department and officially funded by the campus. The group is currently creating their final Braille Prototype. Now that the new embosser has been purchased the Braille tactile map prototype is in the process of design.

Room 808  10:45-11:30  Panel 2
Daniel Thomas Borden
Robert Hellstrom (Faculty Sponsor)
Department of Geography, Bridgewater State University
Aerodynamically Modified Small Unmanned Aircraft System to Increase Area Coverage for Assessment of Land Use Impacts on Air Temperature and Humidity

After using computational fluid dynamics and the Bridgewater State University wind tunnel to perform tests and analysis, a Convergence VTOL BNF Basic drone was modified to enhance aerodynamic performance and energy efficiency. The drone was then used to carry out multiple weather experiments. At multiple altitudes in the lower troposphere, the drone recorded air temperature and humidity during both overcast and clear conditions to assess the impact of landscape variability on heating. The drone utilized multiple rotors and a fixed-wing to maneuver between different landscapes to carry out the experiment.
Renewable technologies, such as solar and wind, are environmentally friendly, but at large penetrations they can complicate operation of the power grid due to their intermittency. Hydropower often plays a large role in providing flexibility and balancing the grid during periods of large volatility. While hydropower plays a key role in supporting the grid, varying the operation of hydroelectric plants will have impacts on ecosystems. Understanding how hydropower operation varies as offshore wind capacity increases is crucial in considering the impact on the overall system and the environment. In this case study of the New England region, changes in hydroelectric power plant operation are evaluated using an electricity model that estimates electricity contribution of various technologies towards meeting electricity demand. A regression analysis is performed on model results to determine the effect of wind on hydro operation and fish populations. Our results suggest that increasing the installed capacity of wind leads to increased hydropower variation, which in turn leads to variation in the flow of the river. The highest variation occurs in July, the beginning of young alewife migration seaward.

The goal of this project is to produce a portable microbial water sample incubator design that maximizes accessibility. It takes into consideration aspects such as cost, material source, ease of assembly, and off-grid capabilities while still adhering to ASTM E1292-94 regulations. The final product can maintain a temperature of 35-37 °C to perform microbial water tests, and accommodates a variety of sample types. The internal components consist of a dryer heating element, a computer fan, and a temperature sensor, while the 1 cubic foot shell is constructed from plywood, duct tape, and polystyrene. A control unit sits on the front of the incubator shell and consists of various electrical components, most important among them an Arduino Uno and a second temperature sensor measuring ambient temperature. The deliverables include an incubator prototype and a set of instructables detailing the build process.
1:30-2:15  Board 42  
Joshua David Souza  
Matthew William Hogan  
Sean Loder  
Gail M. Stephens (Faculty Sponsor)  
Department of Engineering, Massachusetts Maritime Academy  
Carbon Dioxide Methanation System Design for Implementation as a Carbon Capture and Transformation Process in the Fossil Fuel Industry

The design of new energy technologies is an important first step in the reduction of greenhouse gas (GHGs) emissions from fossil fuel combustion. Continued global temperature rise due to these emissions will have a catastrophic effect on not only our daily lives but on our children's quality of life and that of other species with which we share this planet. This paper outlines the design and construction of a sample facility that will capture one of the most abundant GHGs, carbon dioxide, and transform it via the Sabatier Reaction into a useful fuel, methane, to be burned for power production in order to offset both emissions and the need for increased amounts of external fuel. According to our analysis, the addition of this system to a natural gas fired power production facility will reduce emissions by up to 73%, while also reducing external fuel needs by up to 71.8% for the same rate of power generation. Our data, analyses, and designs are based on the Wilkinson Boiler Plant located on the Massachusetts Maritime Academy campus. Emissions on the Wilkinson Boiler were tracked and then used as a starting point for stoichiometric calculations and further analysis. Construction on the sample system will begin in March of 2019 and will serve to demonstrate the feasibility of our design. With further design and experimentation, this system could potentially allow for the continued use of high energy density fossil fuels in the power generation industry while significantly reducing emissions and external fuel costs.

Room 174  1:30-2:15  Panel 5  
Yu-Che Chang  
Sankha Bhowmick (Faculty Sponsor)  
Department of Mechanical Engineering, UMass Dartmouth  
Thermoelectric Module, the Possibilities of Achieving Higher Seebeck Effect and Improving Efficiency

For almost a century, scientist been trying to improve the merit, ZT, of the thermoelectric modules in the hope to replace many traditional power generation or heat exchanger system. However, even with the recent attempt using the synthetic method to achieve a higher Seebeck coefficient while restricting the thermal conductivity in a material, the merit still seems to reach a bottleneck of around 1.3 in room temperature. In order to sufficiently replace a refrigeration system, such as a household refrigerator, a ZT of 4 is required for the system to be both economically justified and efficiently reduce the cost. An even higher merit would lead to revolution to emission-free power generation. The goal of this research is to examine the possibility of improving the efficiency of current thermoelectric device unconventionally. The experiment will be using ionic electrolyte instead of traditional solid-state semi-conductor, since Seebeck effect as high as 11 mv/K had been observed. Once, the potential of ionic
thermoelectric supercapacitor is recognized, further experiments will be performed to maximize the efficiency of this thermoelectric module.

Due to the complexity of the project, Dr. Qinguo Fan from Bio-engineering department is collaborating with us. His knowledge and help are vital to altering the certain components within the device, which lowers the cost and ensures the replacement of critical parts of the supercapacitor is relevant.

Room 174  1:30-2:15  Panel 5
Ali Adnan Termos
Salim Laaguell
Alfa Heryudono (Faculty Sponsor)
Department of Mathematics and Statistics, UMass Dartmouth
A Pseudo-Spectral Approach for the Dynamic Analysis of One-Dimensional Non-ideal Cantilevers and Fixed Beams

In this paper, we address the free vibration of non-ideal cantilevers and fixed beams in one dimension. According to the Euler-Bernoulli theory, a 4th order ODE models the free vibration of beams. The ODE is refined to an eigenvalue problem, where computing the natural frequencies become evident. The analytic approach for getting the natural frequencies is proven to be lengthy and problem-specific. Alternatively, we compute the natural frequencies of the beams using forward solvers that utilize the Pseudo-spectral method based on the Chebyshev polynomials of the first kind. The solvers are designed to output the natural frequencies of the beams subject to non-ideal boundary conditions (i.e supplying decay parameter(s) $k_l/k_R$ as input(s)). Inverse solvers for the equivalent inverse problems are also designed, where the damage parameter(s) to be computed after supplying the natural frequencies of the beams as inputs. All solvers are written in MATLAB [3] language, and the computational approach is conclusively accurate. The codes can be modified to suit other beam configurations as well.

2:45-3:30  Board 44
Danielle C. Samarjian
Chima Ebele
Kelvin R. Foe
David Jay Hilton
Jason G. Pinto
Samuel Robertson
Soumitra Basu (Faculty Sponsor)
Department of Industrial Technology, Fitchburg State University
Design, Development and Application of an Algorithm to Determine Machining Parameters for a CNC Router

Automated Manufacturing provides a pathway to improve safety and product quality. It also reduces costs by leveraging the capabilities of integrated CAD/CAM systems. The determination of suitable machining parameters for a CNC is an important part of the process.
Optimum decisions about the speed, feed and depth of cut during machining bring significant benefits that translate to a cheaper and higher quality product.

The goal of this project is to enable rapid selection of optimum machining parameters and thereby fully utilize the capabilities of CNC machines. The scope of the work encompasses algorithm design for machining parameter selection and implementing the algorithm with VBA Excel, a widely available and widely used software tool. The resulting application (VBA program) is fully customizable, and responds to changes in available tools, the material being machined and the geometry of the work piece. The program is particularly useful while machining softer materials such as wood and plastics on a Computer Numerical Control router.

The software developed provides the data needed by a toolpath generating program, VCarve from Vectric. This program is typical of the toolpath generating programs bundled with relatively inexpensive CNC routers that respond to information about the "bounding volume" and the geometrical features on the finished job. This is a work in progress and it is expected that measurements of the finished job (after machining) and the associated time will reveal the utility of this fast and easy to use tool.

Room 908  3:45-4:30  Panel 7
Eli Mattingly
Yahya Modarres-Sadeghi (Faculty Sponsor)
Department of Mechanical Engineering, UMass Amherst
Toward Cerebral Aneurysm Rupture Prediction through Geometric and Categorical Indices

Aneurysms affect approximately 3-5% of the world population [1], and their rupture is associated with a mortality upwards of 40% [2]. In order to facilitate the physician’s risk-benefit analysis of different often invasive treatment strategies it is important to understand the likelihood of a given aneurysm to rupture. Both quantitative geometrical and categorical indices associated with the flow qualities suggesting rupture and thus themselves associated with rupture. This analysis quantitatively assesses 1-D, 2-D, and 3-D shape and size parameters. These parameters are then correlated to hemodynamics through a novel approach of digitally altering morphologies to enable greater experimental control. Geometries are quantified through an originally written MATLAB code. Beginning with aneurysm morphology from a CT scan, and then a spectrum of digitally altered versions of the aneurysm are created, both expanding the “bleb” as well as reducing the aneurysm size until it is non-existent. By creating a spectrum of morphologies, we suspect that any indications of rupture should approach null in the case of non-existent aneurysm. The flows are then evaluated with computational fluid dynamics, and the pressure loss coefficient (PLc) and energy loss (EL) values, among other hemodynamic indicators are determined. Finally, through a statistical analysis we connect the geometric parameters to the flow parameters. [1] Chalouhi, et al., 2013, Stroke. [2] Bederson, et al., 2009, Stroke.
It is not well understood how sperm cells travel proportionately great distances to find an egg cell. Progesterone is a chemoattractant suspected to be the chemotactic guide in most cases of mammalian fertilization, however specifics about chemotaxis in sperm are largely unexplored. I have designed and computationally tested a microfluidic oviduct model for use in a study of spermatozoa chemotaxis. In this study, I will be using this device as an easily observable \textit{in vitro} environment to study sperm motility in order to enhance the knowledge of sperm chemotaxis. Currently, microfluidic models used to study the role of chemotaxis in mammalian reproduction may not allow for enough control of the chemical gradient that is created and do not allow the created environment to be stably maintained. This microfluidic device not only generates chemical gradients but also aims to maintain them. Additionally, this device will be used to elucidate the relationship between spermatozoa and progesterone as a chemotactic agent. Beyond this application, the blueprint of this device, which has been computationally examined in COMSOL and is in the process of fabrication, has future implications for many other studies where a chemical gradient is desired to study chemoattraction or other mechanisms in cells under chemical gradients.

The goal for this project was to create an automated track for a model wind turbine. A linear actuator and servo-motor work in tandem to create this effect, simulating pitch and surge motion. A tachometer is also installed, so rotational speed can be monitored. Offshore wind turbines are known to have different dynamic properties than onshore due to the unsteady nature of waves. This apparatus can simulate waves' effects to measure the output power, and new controller designs and codes are discussed that can manage these effects. In addition to movement, wave parameters can be inputted to manipulate its path of motion, based on simple physics of waves to oscillate. Other studies show that the tilt of turbines in arrays can be adjusted so that the wake has less influence on the turbines downstream. The testing apparatus can control the model's tilt to evaluate the effect. The results can be visualized using smoke and a high-speed camera, capturing the differences between constant and unsteady movement. The project is modular, so additions can be made if a UMass student in the future would like to use it. Other additions could be added degrees of freedom to simulate heave, sway, yaw, and roll.
The efficiency of wind farms is often decreased by wind turbine wake interactions, where the used air from an upstream turbine flows into the downstream turbine behind it. This can cause uneven load distributions and decreased power output from the downstream turbine. A proposed method to mitigate wake losses is to use a flow control device—shaped much like an airfoil and placed behind the upstream turbine—to redirect the wake beneath the downstream turbine. Building off of previously completed computational fluid dynamics (CFD) analysis, this thesis focused on scale model experimentation to provide proof-of-concept for the method. Wind tunnel testing was conducted to demonstrate the effectiveness of flow control devices using either 12 inch or 17 inch rotor diameter scale models. Data was recorded for two airfoil designs: a stack of three parallel airfoils and a ring-like circular airfoil that encapsulates the rotor diameter. To quantify the effect of the airfoil on the flow, the power output of the downstream turbine was recorded in watts, and a velocity profile was constructed on a grid of 3D points in the 4’x4’x10’ wind tunnel test section. Both devices were compared to control measurements with the same turbine spacing at a constant windspeed of 10 m/s. Preliminary results show that the concept is moderately effective at mitigating wake losses between two turbines, with the more successful design being the ring-shaped airfoil.

The use of crosswind kite power has the potential to make small-scale wind energy significantly more economic than conventional wind turbines. Kite energy systems use a vast array of methods to convert wind energy into electrical power. Existing systems have been developed using autonomous aircraft with turbines attached, or a kite that is retracted while spinning a generator and reeled in for a net power gain. A passive, off-grid system, however, is much simpler and more economically feasible for applications such as disaster relief or water pumping. The shortcomings of an oversimplified system are highlighted, as a straight, rigid kite lacked the aerodynamic properties to respond to control inputs. Utilizing a C-kite, a limited degree of freedom system is modeled, using 2-D motion in a single plane. Using the airfoil sections method, it is shown that the kite’s radius of curvature along with variable angles of attack must be used to control stable flight. With a constant tether length, the kite’s properties are used to simulate the desired horizontal figure-8 path for crosswind flight. The system is secured to the ground using a sliding track that will transmit the power from the tether through translational motion, by spinning a generator shaft or operating pumps.
Gripping Device for Use with Limited Finger Mobility

This research aims to design and manufacture a mechanical device to assist scleroderma patients and others experiencing limited finger mobility with grasping everyday objects and extending reach. Scleroderma is an auto-immune disorder that causes hardening of skin that commonly manifests itself in patients’ fingers, causing swelling, tightening, pain, and lack of fine motor control. For patients with these symptoms, it becomes increasingly difficult or impossible to open and tighten fists and pick up or grasp everyday objects, such as coins, medication, and large jar lids. Similar devices that currently exist largely do not account for limited fine motor function as many are controlled and manipulated by the hands and help with gross motor functions, but there are few products that assist with fine motor skills besides highly advanced prosthetic hands.

The project includes a research phase during the first semester and the design and manufacture stage during the second semester. Research was conducted by communicating with patients, studying symptoms and challenges that the grasping device could assist, and reviewing patents for similar devices. Communication with patients was through the lens of patient participatory design, which is design theory that lets the patient lead with their ideas, ensuring that the engineer creates relevant designs.

The design of the device is ongoing. The main design challenge is the actuation of the gripper without the use of fine motor skills. One solution being pursued is to create an electronically actuated gripper while keeping the device lightweight, portable, and largely waterproof.

Effect of Tail Stiffness on the Startle Response of a Biomimetic Mechanical Fish

We have built a biomimetic robot to model the fast start maneuver that a fish performs in fight or flight scenarios. The robot is actuated by two pneumatic cylinders that cause the fish body to buckle by pulling on steel cables fixed to either side of the fish tail. By contracting the body into a shape and then rapidly contracting the body in the opposite direction, a wave propagates through the body and tail of the fish, transferring momentum to the fluid and producing thrust. High speed video and acceleration data were collected on fast starts performed by the robot with differing tail stiffnesses. Each tail was identical in cross sectional area. Stiffer tails were built by stacking thinner tails on top of one another. The bending stiffness of each tail tested was quantified. Fast starts were also elicited when the tail was completely removed, which
significantly decreased the maximum acceleration observed. Fast starts with a flexible tail were also compared to those with a rigid tail. High speed video revealed differing wave forms between tails of different stiffnesses. We also expect to find that the maximum acceleration achieved by the fish will vary significantly based on tail stiffness. By developing a relationship between tail stiffness and acceleration, we are able to characterize the role of the tail in accelerating the fish during a fast start.

4:45-5:30    Board 80
Mahdias Edraki
Yahya Modarres-Sadeghi (Faculty Sponsor)
Department of Mechanical Engineering, UMass Amherst
Renewable Energy Extraction from Oscillating Structures (REEOS)

This project develops a robust stand-alone device that extracts electromagnetic energy from the transverse galloping of an equilateral triangular prism in flow. The kinetic energy of an oscillating prism is converted into usable electric energy using an electromagnetic generator. The performance of the energy extraction device was evaluated through the efficiency of the system, which has been defined as the percent energy extracted from the mechanical energy of the oscillating prism. The system efficiency has been calculated at various fluid flow velocities, U. The load resistance, R, introduced through the generator, has been varied and it was determined to affect the coupled damping, ζ, of the system. The total damping of the system was obtained using the logarithmic decrement method from the free response of the system. It is shown that the energy extraction device obtains maximum efficiency when the damping ratio of the system is at the maximum value that allows for the prism to undergo transverse galloping and a limit cycle oscillation is achieved. Tests were conducted in a recirculating water tunnel and the oscillatory motion of the prism was tracked using a laser sensor.
The purpose of this research is to investigate the process of Life Cycle Assessments and textile recycling, explore fabric content and country of origin for garments from major retailers, and provide recommendations to these brands for reducing their environmental impact. This study presents fabric content and country of origin data that was collected from a sample set of 20 tops each from nine different retailers. The retailers that were investigated in this study include Tory Burch, Michael Kors, Kate Spade New York, Zara, H&M, Forever21, Lululemon, Nike, and Under Armour. The major findings from this study are that a majority of all athleisure fabrics from the sample were composed of a blend of two or more fibers, while the majority of fabrics from light luxury brands were found to be composed of only one fiber. The most prevalent fiber found for every brand except for Lululemon was found to be polyester. From all of the fabrics in fast fashion that were a composite of only one fiber, 44% were made from polyester, followed by 27% made from cotton. As a result of this study's findings, recommendations are given that identify specific areas for improvement for the major fashion brands Tory Burch, Michael Kors, Kate Spade, Zara, H&M, Forever21, Lululemon, Nike, and Under Armour. Each company has an individualized supply chain and manufacturing process, and similarly, will require different tactics and recommendations to lessen their overall environmental impact. Companies must work closely alongside consumers to develop plans that will lessen their overall impact on the environment.
Today, it is common to find once effective antibiotics no longer work. We are inadvertently selecting for antibiotic resistance in many strains of pathogenic bacteria every time we expose them to antibiotics. Failing to find new antibiotics means in the future, even minor infections may prove fatal. The Small World Initiative and Tiny Earth programs seek to enlist the help of students around the world to search for novel antibiotics. The strategy is to isolate bacteria samples from soil—a known source of relatively safe and diverse bacteria species—and test them against safe relatives of ESKAPE organisms. ESKAPE organisms are a group of six common multi-antibiotic resistant bacteria: *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter species*.

My work resulted in the discovery of a single isolate with antimicrobial properties—the isolate Mr. B. The isolate had strong antibiotic effect when tested against a safe relative of *Staphylococcus aureus*, *Staphylococcus epidermidis*. Mr. B also had a slight effect on the ESKAPE safe relatives *Acinetobacter baylyi*, *Bacillus subtilis*, *Pseudomonas putida*, and *Escherichia coli*. Isolate Mr. B was analyzed by common microbiology biochemical tests, and its 16S rDNA was amplified by PCR and sequenced in an effort to identify it. I will go onto create an extract of antibiotic material to test against prokaryotic and eukaryotic cells.
into *Fusarium graminearum*, another fungal species (2) PXR was transformed into both the wild type and ShXDR1 knockout strains of *S. homoeocarpa*. Results: Bioassays, qPCR, and PCR used to evaluate results. Results are still being analyzed. Conclusion: The results of these transformations hold the potential to greatly improve understanding of xenobiotic detoxification and multidrug resistance in both human and fungal cells.

8:30-9:15 Board 69
Danielle Hoffman
Mandy Muller (Faculty Sponsor)
Department of Microbiology, UMass Amherst
The Possible Role of ORF20 in the Formation of Replication Factories

Viruses are evolutionarily constraint to hijack the host gene expression machinery for their own benefit and for proper progression of the viral life cycle. This is particularly true for viruses like herpesviruses that must establish a balance with their host to maintain decade-long infections. We focus on KSHV (Kaposi Sarcoma Associated Herpesvirus) and oncogenic herpesvirus linked with the development of malignancies in immunocompromised individuals. While some of the KSHV proteins that contribute to viral and host gene regulation are known, there are uncharacterized contributing viral factors. Identifying these proteins and their role in gene regulation is important to determine the mechanistic underpinnings of the replication cycle of KSHV. We set out to characterize KSHV ORF20, a member of the widely conserved herpesviral core UL24 family. By qPCR, we observed a burst of ORF20 expression at 72h post viral reactivation, suggesting that ORF20 is a Delayed Early (DE) gene, narrowing down its possible function to helping in viral replication. ORF20 ortholog in Herpes Simplex was shown to induce dispersal of the host protein Nucleolin in the nucleus, a process crucial to liberate space in replication compartments. Ribosomal footprinting has previously identified 3 distinct isoforms for ORF20: ORF20FL (full-length), and two shorter isoforms (ORF20A and ORF20B) starting at internal start codons. Our data suggests that ORF20B is the only isoform with nuclear expression. By studying the mechanism by which ORF20 contributes to the progression of KSHV infection, we hope to further our understanding of the complex interplay between KSHV and its host.

8:30-9:15 Board 70
Laura Dwyer
Samuel James Black (Faculty Sponsor)
Department of Veterinary and Animal Sciences, UMass Amherst
Genetic Analysis of African Trypanosomes Related to Virulence Abstract

African animal Trypanosomiasis (AAT), caused by infection with an African trypanosome, is a fatal disease of cattle and other domestic ruminants and is endemic in sub-Saharan Africa where it is transmitted via the Tsetse fly vector. AAT exerts a powerful constraint on the economic development and food security of Africa. I am working on establishing culture systems to investigate the interaction of African trypanosomes with host defense cells particularly lymphocytes that make host protective antibodies. I adapted a clone of *T. brucei* called AnTat
1.1 to grow under axenic culture conditions in vitro. After 6 months growth *in vitro* I observed that the culture adapted parasites had decreased virulence when injected back into mice compared to control *T. brucei* Antat 1.1. An important constraint on the progression of pathogenicity in a Trypanosome infection is the parasite gene encoding GPI-PLC, a lipase that releases the variable surface glycoprotein coat from stressed trypanosomes. Mice infected with GPI-PLC-/- *T. brucei* Antat 1, i.e., *T. brucei* from which the GPI-PLC gene has been deleted, are able to produce a stronger host antibody response than mice infected with intact *T. brucei* and survive for longer than 90 days after infection. I hypothesize that *T. brucei* Antat 1.1 that have adapted to grow *in vitro* will have a lower level of expression of the GPI-PLC gene than their parent non-adapted *T. brucei* Antat 1.1. To complete my thesis work I will quantify mRNA encoding GPI-PLC using RT-qPCR and *T. brucei* cells from culture and infected mice.

8:30-9:15  Board 71
Jessica L. Ulloa
Wilmore Webley (Faculty Sponsor)
Department of Microbiology, UMass Amherst
A β-glucan Formulation to Enhance Wound Healing

In the United States, 6.5 million people suffer from chronic wounds annually with limited treatment options. Anal fissures are tears that occur in the mucosa of the anus. The location and increase in microbes make them difficult to treat. Treatments are available, but they have a low healing rate and adverse side effects. Previous research has demonstrated that β-glucan, a polysaccharide, has immune-modulatory properties. It is hypothesized that β-glucan treatment will enhance wound healing. Human Dermal Fibroblast adult cells were used to model the skin and wound healing in tissue culture. A major accomplishment of this study was the development of a novel method to solubilize β-glucan to use in the growth media. To analyze the efficacy of β-glucan and determine the optimal formulation, an in-vitro scratch assay and LDH assay methods were utilized. Through ImageJ analysis, the results indicate that cells wounded in β-glucan media closed the wound gap at least two times faster than the control media starting at 6 hours post wounding. At 38h and 50h post wounding, β-glucan treated cells had clearly covered significantly more of the wounded surface area compared to media only controls. Ongoing studies seek to develop an optimal β-glucan formulation that will be applied through novel wound dressings and suppositories. We conclude that β-glucan is effective at enhancing wound healing through immune stimulation and the current formulation has the potential to be a better treatment for people with anal fissures and other chronic wounds for which there is currently no effective treatment.
Mycobacteria are causative agents of many diseases that affect the human population. Most notably, *Mycobacterium tuberculosis*, the bacterium that causes tuberculosis (TB), is estimated to infect 10 million people worldwide per year and lead to roughly 1.5 million deaths. In addition, there has been an emergence of multi-drug resistant strains of TB, making the identification of new drug targets an even more urgent matter. Studying the way these bacteria divide is one way to find alternate drug targets. Mycobacteria have a dynamic replication process of asymmetrical, sub-polar growth in which enzymes associated with the Intracellular Membrane Domain (IMD), a multifunctional domain, play critical biosynthetic roles. A previous study has shown through fluorescence imaging that a novel septal protein, SepIVA, has localization patterns similar to those of the IMD. In the current study, we hypothesized that SepIVA physically associates with the IMD. In contrast to the initial hypothesis, through sucrose gradient fractionation, we showed that SepIVA does not localize to the same fractions as the IMD. Instead, the fraction that SepIVA localized to was the same fraction that some other non-IMD-associated membrane proteins were localized to. To see whether or not SepIVA is associated with this putative membrane domain termed Really Interesting Membrane Domain (RIMD), we performed immunoprecipitation with RIMD candidate proteins. We were not able to detect SepIVA in the pulled down material, suggesting it may not associate with the RIMD. These conclusions indicate that SepIVA does not seem to associate with either the IMD or the RIMD.

The project goal is to develop novel methods and procedures to extend optical and fluorescent microscopy methods to submicron length scales and to exploit this new methodology to probe buried interfaces in complex systems. Two interfacial systems were studied: interfaces within colloidal fluids and the buried interfaces between adherent bacterial cells and solid biomaterials surfaces. The experiments addressing bacterial/surface adhesion are interdisciplinary and cross cutting, impacting the disciplines of physics, biology, healthcare, and environmental and soil science. The study compares different driving forces for adhesion of bacterial and colloidal objects, including electrostatic attractions and depletion forces arising from dissolved polymer. These different interactions are expected to alter the shape of the contact zone, and extend of particle- or cell-surface interactions. Future work will develop the relationship between the interactions at these interfaces and the biological responses of cells.
This project is part of a NSF funded 3 year program: RAISE Dynamic Touch-based Bacertia-Device Two-Way Communication, a collaborative project led by my advisor, professor Maria Santore (Polymer Science), with professors Sloan Siegrist (Microbiology) and Mark Tuominen (Physics).

12:40-1:25 Board 31
Raquel Alexis Perry
Andrew V Rallo Romasco
Margaret Riley (Faculty Sponsor)
Department of Biology, UMass Amherst
iCons: Identification and Characterization of Bacteriocins Effective against Various Mycobacteria Species

Over one quarter of the world’s population is infected with tuberculosis, and it’s one of the top ten causes of death worldwide. As with many bacterial infections, the rate of antibiotic resistant tuberculosis is on the rise. Due to the low success rate, high cost, and harmful side effects that come with treating drug resistant tuberculosis, there has been a push to develop alternative treatments. Our goal is to identify and characterize a bacteriocin produced by mycobacteria that can target Mycobacterium tuberculosis. Screening assays of sixty strains of rapidly growing species (M. abscessus, M. chelonae, and M. fortuitum) consisted of spotting liquid cell growth of all strains on a lawn of every strain. Each spot was scored individually for killing activity as zones of lawn inhibition are indicative of a potential novel mycobacteriocins. Our top four producing strains were selected to partially purify protein using ammonium sulfate precipitation. From there, that protein was phenotypically characterized as bacteriocin-like through serial dilutions, freeze-thaw assays, and proteinase treatment. Additionally, this protein is being used to determine the relative MICs of the protein on each strain in our collection using a microtiter assay. Through this experimentation, we hope to identify a candidate alternative treatment for tuberculosis.

12:40-1:25 Board 32
Joshua Mallon
Margaret Riley (Faculty Sponsor)
Department of Biology, UMass Amherst
iCons: Nisin Inhibition against Gram-Negative Phytopathogens

Nearly 16% of the world’s crops are lost every year due to bacterial infections and the lack of effective disease management options. One possible solution to this problem is the use of antimicrobial peptides referred to as bacteriocins. Bacteriocins are produced by most species of bacteria and they are highly active against their closest relatives. One bacteriocin, nisin, has a long history of safe use in food preservation, having attained GRAS status (generally recognized as safe) from the FDA. Nisin is commercially available and is well known for its ability to inhibit gram-positive bacteria. Prior studies have suggested that nisin is ineffective against Gram negative bacteria, which comprise some of the more challenging phytopathogens.
Our preliminary data suggests that these prior studies may have significantly underestimated nisin efficacy against Gram-negatives. The present study is designed to provide a large screen of nisin sensitivity for numerous strains from each of 10 genera of Gram-negative phytopathogens, including *Xanthomonas*, *Pseudomonas*, and *Erwinia*.

4:45-5:30  Board 28  
Andrea Janet Dame  
Heidi Kristina Mannarino  
Eva Tipps  
Jeffrey Blanchard (Faculty Sponsor)  
Department of Biology, UMass Amherst  
Discovering Forest Soil Bacteria-Virus Associations in a Warming Climate

The Harvard Forest is home to three experimental soil warming sites heated continuously to 5°C above ambient. The oldest site has been continuously warmed for nearly 30 years. We still only have a rudimentary understanding of the microbes that inhabit the forest soil, since >99% have never been cultured in the laboratory. Our research focuses on the recovery of microbial cells and genomes directly from the environment in the experimental warming plots. In a recent experiment we sequenced genomes from 35,000 microbial cells. For this project we are focusing on identifying viruses that may have been growing inside of bacterial cells at the time of isolation, since there is very little knowledge on forest soil viruses and their role in the soil ecosystem. Thus, we anticipate discovering many new families of viruses. We have identified viruses in this large genomic data set using the VirSorter software. Co-occurrence network analysis is being used to help determine bacteria-virus associations. We hope this vast viral genomic data will help us find a connection as to how viral abundances or their presence is impacting soil microbial communities as a consequence of warming.

4:45-5:30  Board 29  
Alex Truchon  
Jeffrey Blanchard (Faculty Sponsor)  
Department of Biology, UMass Amherst  
Sequencing-Based Discovery of Intracellular Bacteria

The net short-term effect of warming on forest soil communities is increased microbial activity, which translates to increased CO2 flux to the atmosphere. Several challenges remain to directly link soil communities to changes in soil CO2 efflux. It is essential that we develop alternative methods for analyzing community composition and function of active community members. Cells from soil were labeled using SYBR green and separated by fluorescence activated cell sorting. To improve cost efficiency over single cells genomic methods, 360 subpools of 100 cells each from were sequenced. This approach, termed mini-metagenomics, resulted in ~2,000 distinct genome bins. Phylogenomic analysis revealed a surprising diversity of unknown or uncultured bacteria and viruses. Intracellular and hosted-related bacteria (Chlamydia, Legionellales, Bacteriodetes, Rickettsiales and TM6) were enriched in the data set relative to abundances in our traditional metagenomics data set of DNA extracted directly from the soil and
further over-represented among high quality genome bins. The mini-metagenome assembled genomes (mini-MAG) were used to map traditional metagenomic and metatranscriptomic reads lending support for the presence of these bacteria as active soil community members. This collection of mini-MAGs exposes a reservoir of genetic diversity in difficult to cultivate organisms, some of which are related to human pathogens. Comparative genome analysis is ongoing to reveal evolutionary features related to bacterial invasion and persistence in eukaryotic cells.

4:45-5:30 Board 30
Stephanie A. Ryan
Klaus RL Nüsslein (Faculty Sponsor)
Department of Microbiology, UMass Amherst
Structural Analysis of the Phyllosphere of Key Amazonian Forage Grasses Based on Leaf Senescence

With its tropical climate, the Amazon rainforests have become a hub for agricultural industry. With an ever-expanding world population and market, Amazon deforestation has increased dramatically to make room for livestock pastures and plantations.

As a result, farmers have turned to planting new forage species as biomass replacement, particularly the grass species Brachiaria. Able to withstand a variety of environments, Brachiaria has become a pioneer species in providing nutritious forage to depleted areas.

As a microbial lab studying land-use change in the Amazon, we are particularly interested in the phyllosphere of the Brachiaria species, or the above ground portion of the plant and its associated microorganisms. To determine how senescence impacts this dynamic microbial community, we sampled three different aged leaves from three Brachiaria species, extracted the DNA, and sequenced our samples to analyze relative OTU abundance, diversity, and evenness. Furthermore, we quantified an essential nitrogen fixation gene (nifH) for each sample to evaluate if specific functions of the phyllosphere change with leaf age.

Overall, we found no differences in the phyllosphere across leaf age. However, we did find significant differences in OTU abundance, diversity, and evenness between Brachiaria species, indicating that species could be a key driver of phyllospheric diversity.

Looking forward, more research needs to be conducted to determine the role species plays in phyllosphere development and discover why these differences exist. Gaining a better understanding of this complex community could pave the way toward broader applications, such as maximizing plant-microbe interactions to create more sustainable agricultural practices.
As a potent greenhouse gas, methane is important for climate change research. Like many natural gases, methane is involved in a microbial cycle, where it circulates between sources and sinks. The Amazon rainforest acts as a massive methane sink thanks to its methane-consuming bacteria (Methanotrophs). Little is known about Amazonian methanotrophs, or how deforestation affects their diversity and activity. The goal of this thesis was to investigate the effects of deforestation on diversity and abundance by comparing 72 samples from two primary forests, a secondary forest, and a pasture from two separate geographical locations in the Brazilian Amazon. Two hypotheses guided this research: 1) Type I methanotrophs (Low affinity for methane) show higher abundance in the pasture samples relative to Type II (High affinity for methane) 2) Type II methanotrophs show higher abundance in forest samples. The method of stable isotope probing (SIP) using C13-methane, allowed the separation of methanotroph DNA by ultracentrifugation, followed by sequencing of this DNA. The current bioinformatic analysis compares active methanotrophs between samples, to investigate how communities shift. Initial results show an interesting, unexpected trend; the largest community of both methanotroph types was in pasture samples, not, as was predicted, in primary forest. Many marker gene sequences do not match with sequences of known methanotrophs, potentially indicating novel species. Additionally, the high abundance of Type II methanotrophs in pasture soil is very promising, as it increases the chance that a secondary forest has a community of high-affinity methanotrophs after pasture abandonment.

The Amazon Rainforest is undergoing deforestation at an alarming rate mainly due to the widespread installment of cattle pastures across the Brazilian Amazon rainforest. The effect this has on plants and animals is known, however, the response of microbial life is understudied. Studies have shown that the shift from forest to cattle pasture is accompanied by changes to microbial taxonomic composition, including an increase in microbial biodiversity, and a decrease in the genetic relatedness of microbial community members. Alarmingly, microbes responsible for cycling the potent greenhouse gas methane are especially impacted by land-use change. Cattle pasture has been shown to emit methane into the atmosphere from the soil, while the opposite occurs in untouched rainforest. This study focuses on the response of methanogens (methane-producing microbes) to land-use change. By incubating soil samples with substrates containing heavy C13-carbon isotopes we have separated the DNA of active methanogens from other, unrelated genetic material in Amazon soil. We have extracted this DNA from soil samples from primary and secondary Amazonian rainforest and adjacent cattle pasture. By sequencing
genetic markers of taxonomic richness (16S rRNA) and of methane production (mcrA) within these samples we are able to investigate changes in biodiversity, taxonomy, and the ability of methanogens to produce methane across all land-use types. Not only will this research help to inform us on the anthropogenic role in climate change in tropical rainforest areas, but it will contribute to growing knowledge regarding the effect of Amazon deforestation on soil microbes.
MUSIC

1:30-2:15    Board 10
Ian Simpson
Sam O'Connell (Faculty Sponsor)
Department of Visual and Performing Arts, Worcester State University
Writing Jewish Music for Everyone

For Senior Arts Capstone, I intend on transcribing, arranging and performing 3-5 original pieces of music in a program (tentatively) titled “Songs of Hope and Change: Writing Jewish Music for Everyone”. My goal for the program is to share my original compositions, to teach a little bit about Jewish music and how the pieces fit into a larger framework, and to elaborate on my approach to writing music that is moving and meaningful, and approachable/effective outside purely Jewish contexts. Research topics and literature review will include Jewish music history, folk music tradition, and ethnomusicology- specifically the function and best practices of participatory music. The program and research should demonstrate that within a group music has a purpose and a function, and that with proper practice, context and intention, one can create musical experiences that help create and define communities.

Songs performed in the program will include “No More” and “Garden”, which I composed this fall and winter respectively, the former of which received recognition nationally from the Jewish Rock Radio Jewish Star competition. The program notes and transitionary moments will allow me to explain the inspiration and meaning behind the songs, and to share a little bit about my writing process- especially when it comes to writing music in a Jewish context. At the performance, song lyrics will be shared in the program notes and any Hebrew will be accompanied by transliteration and English translation.

1:30-2:15    Board 18
Paige Fullen
Sam O'Connell (Faculty Sponsor)
Department of Visual and Performing Arts, Worcester State University
Elementary Education Unit of Music Fundamentals

I will be compiling a unit plan on basic music fundamentals for elementary school students. This unit will primarily focus on grades one through three but can be used anywhere from pre-kindergarten to the fourth grade. The unit will cover the following topics; demonstrating and responding to beat, meter, and rhythmic notation; using a system to read and sing at simple pitch notation in the treble clef; identifying symbols and terms in accordance to dynamics, tempo, and articulation; how to notate meter, rhythm, dynamics and pitch in patterns; defining basic music fundamentals; and identifying the various sounds of instruments.

I have chosen this project as my Capstone because I am a double major in Elementary Education and Visual & Performing Arts with a concentration in Music. My hope is to be a music teacher after graduating because I believe I can strengthen the music department in public schools and help the children find a new love for music.
Many musicians throughout the world strive to create popular music, but the limited slots on ranking charts make it exceedingly unlikely that any given song reaches them. Scholars have long sought to determine the factors involved in song popularity, but until recently their research yielded mixed results. The rise of big data analytics techniques and new datasets have brought forth a new wave of research that is beginning to uncover the principles of music popularity. This work reviews that recent body of literature to elucidate the acoustic and lyrical factors of songs that influence the probability that they become popular.

The concept for my presentation is to compose two-three pieces of music for a small ensemble to perform that highlight social media and its affects (both positive and negative) on the world today. Ideally, this music performed will be showcased via audio/video recordings.

The timbres that would be included in these pieces would be for but not limited to: Guitar, Bass, Piano/Keys, Drum-set, Trumpets, Saxophones, and Trombones. The recording materials (if needed), and music will be provided by myself. I plan to play Guitar, Piano, and Drums during these three pieces. The live performance (if possible) will be on a voluntary basis and if there are not enough performers available to rehearse for enough time, then the performance will be played via audio/video recording.

Through the synthesized sounds and music, the listener will observe multiple ideas involving social media and its impacts on society. These include: the inception of social media, it’s negative impacts, and life without it. These impacts range from bringing others closer together in terms of long-distance communication to the negative mental/psychological impacts that can lead to depression and even suicide in some severe cases. It is my hope that viewers will realize how social media can be used as a tool rather than becoming completely immersed in it. I also hope that this helps to raise awareness for those who have been negatively impacted by it and will help individuals understand how to use it in moderation.
Annie Machado
Sam O'Connell (Faculty Sponsor)
Department of Visual and Performing Arts, Worcester State University

Understanding an Unstable Mind

My senior capstone performance will encapsulate in an audio/visual experience what the mental illness of depression is, and the affects it can have on a person. This is intended for all audiences in which depression does or does not affect. My goals are; audience members who do not experience depression in any way will develop a better understanding of what it is. Audience members who knowingly experience depression will have something to relate to and can develop a personal connection that may help them get through their mental struggles. Finally, audience members who may experience depression without knowing or wanting to confront it will have something to help them realize these thoughts and feelings are okay to experience, and that depression is not something to be held inside and hidden from those around you. There is a stigma surrounding conversation about mental illness and depression, and since it has become so prevalent in society I think it is important to stop that stigma so people can more openly talk about their struggles without shame or feeling uncomfortable. My work; which includes a vocal performance of existing music that touches upon the many aspects of depression, followed by a solo dance performance to an original pre-recorded piece, will embody what depression is in hopes that it can be understood better through music and performance art.
There are various psychological aspects which contribute to an athlete's ability to exhibit optimal performance. Collegiate student-athletes face a wide array of stressors from adjusting to life away from home to a shift in their careers as they begin transitioning into a more intense level of their sport. The aim of the current study is to explore the effects of mindfulness training on athletic performance in female collegiate rowers at the University of Massachusetts, Amherst. Although mindfulness has been shown to improve athletic performance in various other sports, the exact underlying mechanism is ambiguous. The present research examines whether mindfulness-based stress reduction (MBSR) enhances the athletic performance in collegiate rowers by promoting associative attentional strategies & improving sleep quality and overall emotional well-being. 27 Division I rowers were pseudo-randomly assigned to an intervention (MBSR) or control group. Within 2 weeks of the onset and 2 weeks of completion of the 8-week MBSR course, performance was tested by completing a 2000-meter and 6000-meter indoor rowing test. All participants were asked to wear a sleep- and activity-monitoring watch for 3-7 days and fill out various assessments of sleep and emotional well-being, both pre- and post-course. Thus far, findings indicate that the mindfulness group demonstrated greater athletic performance following the intervention; however, analyses to determine which factors mediate this improvement are yet to be completed. This research has important clinical significance in the area of sport psychology and treatment for mood and anxiety disorders.
normal aging. Both younger (n=20, age 18-30) and older adults (n=20, age 58-75) participated in an explicit serial reaction time task (SRTT) within an MRI for 4 sessions over 2 days. Sessions were separated by either a 2-hour nap period or a 2-hour quiet wake period. I hypothesize that superior motor learners will share similar neural correlates driving task improvement regardless of age. Furthermore, I predict that engagement of medial temporal lobe structures implicated in declarative learning such as the hippocampus and perirhinal cortex, to be greater in superior learners than inferior learners during encoding. Engagement of the striatum, a key structure in procedural learning, will also be greater in superior learners due to simultaneous activation of both explicit and implicit memory networks during explicit SRTT performance. Elucidation of the neural substrates underlying motor task performance increases in superior learners will provide novel targets for neurostimulation and neurocognitive optimization techniques designed to stimulate neuroplasticity and enhance motor learning as well as provide neural targets for further research.

8:30-9:15  Board 73
Jeffrey Dean Tarantino
Taryn Rahman
David Moorman (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Examining the Role of OFC in Sucrose Reinstatement

The orbitofrontal cortex (OFC) lies within the prefrontal cortex, right above the orbits, and is interconnected with the limbic system. The OFC is implicated in encoding preferences for palatable rewards (e.g., sucrose) and reward seeking behaviors, and is suggested to be involved in addiction. Previous research in our lab provides evidence that inhibiting OFC neurons leads to reduced alcohol seeking behaviors. The aim of our experiment was to examine the effects of OFC inactivation strictly on sucrose seeking and reinstatement through the use of chemogenetics.

5 male and 6 female Wistar rats were stereotaxically injected with virus coding for inhibitory DREADDs (designed drug exclusively activated by designer drugs; hSyn-hM4Di-mCherry) bilaterally into the OFC. Rats were then trained to self-administer sucrose in an operant setting. In training, the house light turned off, the rat was required to enter a nosepoke, and then a cue was presented notifying the rat that 15% sucrose was available from a reward spigot. After sufficient training, rats underwent homecage, operant, and reinstatement inactivations with clozapine-N-oxide (CNO, 3 mg/kg) or saline in a counterbalanced fashion. Brains were collected, perfused using paraformaldehyde and sectioned for immunohistochemical analysis to identify if DREADD receptors were present in the OFC.

Our hypothesis, based on preliminary and previous data, is that inactivation of the OFC will reduce sucrose seeking behaviors during reinstatement, but will not have an effect on homecage and operant reward seeking and consumption.
8:30-9:15  Board 74
Sophie Frances Jackson  
David Moorman (Faculty Sponsor)  
Department of Psychological and Brain Sciences, UMass Amherst  
Genetic and Anatomical Exploration of the Indusium Griseum as an Extension of the Hippocampus

The indusium griseum (IG) is a longitudinal structure that consists of two narrow strips of grey matter running along the dorsal surface of the corpus callosum (CC) from the genu into the caudal brain. Several studies suggest that the indusium griseum is an extension of the hippocampus as a result of their morphological and electrophysiological similarities. Considering that the hippocampus has long been established as crucial to learning and long-term memory, the IG-hippocampus connection leads to the subsequent hypothesis that this rostral continuation may be involved in learning and memory as well. To further investigate the continuity and implications of these structures, we have begun studies of the anatomical connectivity and selective gene expression of the indusium griseum and the major dentate gyrus, CA1, CA2 and CA3 subdivisions of the hippocampus in adult mice. The preliminary results from our analysis indicate that the indusium griseum has sufficient similarities to the hippocampus to support the advancement of our investigation into its potential role in learning and memory.

8:30-9:15  Board 75
Nicholas A. Enzer  
David Moorman (Faculty Sponsor)  
Department of Psychological and Brain Sciences, UMass Amherst  
The Role of Orexin in Animal Models of Depression

Depression is a mental disorder that negatively affects the everyday lives of millions of innocent people. Orexin is a neuropeptide in the lateral hypothalamus that regulates arousal and motivation among other factors. There has been a limited amount of research on whether this peptide has a role in depression. Although there appears to be a positive correlation between orexin neurons and elevated motivational and hedonic states, the general consensus is inconclusive. Learning more about orexin's role in depression can give the medical community insight and possibly help improve treatments for depression.

In this experiment, an experimental group of eight rats and a control group of eight rats underwent different conditions. The experimental group underwent mild stressors six days a week in a pseudo-random fashion for five weeks. The control group was simply briefly moved to a novel location. Previous research has demonstrated that these mild stressors, when presented in an uncontrolled, randomized fashion, induce depression-like behavioral phenotypes in rodents. Both groups were subjected to a sucrose test and an open field test to measure motivation/hedonic state and anxiety. The brains of all the rats were sectioned and the quantitative amount of stained orexin neurons between the two groups were analyzed. Our results indicate that chronic stress influenced behavioral measures of motivation and anxiety,
strongly implicating the orexin system. Preliminary immunohistochemical results demonstrate our ability to detect orexin and c-fos protein (a marker of neural activation) in the brain, the results of which will be correlated with stress-induced behavioral changes.

8:30-9:15    Board 76
Neda Toutounchi Shabestari
Lisa Diane Sanders (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Event-Related Potentials Elicited by Phonological, Syntactic, and Semantic Violations in Natural Speech

The purpose of this experiment is to use event-related potentials (ERPs) to index the semantic, syntactic, and phonological processing of adults listening to natural speech for comprehension. Words that violate the meaning of sentence context (e.g., She likes to eat clouds) elicit a larger negativity around 400 ms after onset (N400) in comparison to canonical controls. In contrast, speech segments that violate grammatical rules (e.g., She like to ...) elicit both a left anterior negativity (LAN) and a later positivity around 600 ms after onset (P600) when required to rate the grammaticality of the sentences. However, it was not clear whether these same ERP effects would be evident when participants listen to natural speech for comprehension. Further, it was unknown if violating the phonological rules that govern suffixes (e.g., shoe/s/ versus shoe/z/) would elicit an effect on ERPs. The results show that natural speech conditions had little effect on the semantic N400 response. However, syntactic violations elicited only a LAN that was not followed by a P600. This result indicates that the syntactic processes carried out when listening to speech for comprehension are not identical to those used when making judgments about sentences. Finally, phonological violations elicited an early anterior negativity compared to canonical controls. This effect, previously termed the Phonological Mapping Negativity (PMN), suggests that listeners use their phonological knowledge to formulate predictions about upcoming speech sounds when listening for comprehension. Overall, the results of this study contribute to our understanding of language processing under natural, real-world conditions.

8:30-9:15    Board 77
Sabrina L. Gamm
Lisa Diane Sanders (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Mechanisms of Speech Processing

Although the importance of speech communication is clear, the details of how listeners extract meaning from rapidly changing speech are not. Multiple measures have shown that listeners preferentially process the initial segments of words in continuous speech, allowing listeners to extract meaning without having to processing all of the available speech sounds in detail. One line of evidence employing event-related potential measures shows that word onsets elicit larger auditory evoked potentials (AEPs) than word-medial syllable onsets. The current study investigates the roles of segmentation and selective attention in this preferential processing. Speech segmentation is the process of breaking continuous streams of sound into recognizable
units. Listeners may also allocate more attention to speech sounds that are not predictable from
the preceding context; word initial segments are less predictable than subsequent sounds in
words. We manipulated the presence of an acoustic segmentation cue and the ability of
listeners to predict upcoming speech sounds in artificial, lab-learned languages. To the extent
that the segmentation cue alone results in larger AEPs to word onsets than to syllable onsets,
we will conclude that sounds near segmentation boundaries receive preferential processing. If
we find that training which leads to successful recognition of the words is necessary for larger
AEPs to word onsets than to syllable onsets, we will conclude that being able to predict the later
syllables in words contributes to the preferential processing of word-initial segments. These
results will contribute to a greater understanding of the mechanisms that support healthy speech
comprehension.

8:30-9:15    Board 78
Natalie Grace Sorial
Mariana Pereira (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Changes in Maternal Gene Expression across the Postpartum Period

Postpartum depression is a serious psychiatric condition affecting up to 20% of new mothers
and is a significant predictor of reduced maternal care, which is associated with increased
behavioral problems in children. The medial preoptic area (mPOA), a key structure of the
circuitry involved in maternal behavior, is thought to be a primary locus of information
integration, calibrating the sensitive expression of maternal behavior to the various
developmental stages of the young. The present study used Wistar-Kyoto (WKY), an animal
model of depression, and control Sprague-Dawley (SD) mother rats to examine whether the
parenting disturbances associated with a depressive phenotype are mediated by altered
expression of candidate genes within the mPOA. Quantitative real-time PCR (qPCR) was used
to profile genes involved in dopamine neurotransmission, hormone signaling, and epigenetic
mechanisms in the mPOA. Five reproductive stages were studied: i) virgin females in diestrus,
and mothers in ii) postpartum day 1 (PPD1), iii) early postpartum (EPP), iv) late postpartum
(LPP), and v) weaning postpartum (WPP). Preliminary analysis indicates altered expression of
the dopamine signaling genes (Drd1, Slc18a3, Maob) in WKY compared to SD mothers. In
addition, the expression of several genes, including estrogen receptors 1 and 2, oxytocin
receptors, DNA methyltransferase 3α (Dnmt3a), and histone deacetylase 4 (Hdac4) changed
significantly across stages in control SD mothers, whereas this was not the case in WKY
mothers. These findings suggest that altered gene expression within the mPOA likely underlie
the parenting deficits associated with depressive phenotype of WKY mothers.
Postpartum depression is a debilitating disorder that is associated with reduced motivation and, more specifically, disturbances in parenting. In order to investigate the relationship between depressive-like motivational dysfunctions and parenting abilities, this study used the Wistar-Kyoto (WKY) animal model of depression and employed a behavioral task that specifically assesses effort-related motivational functions, in combination with detailed analysis of maternal behavior. Sprague-Dawley (SD, an outbred reference strain) were used as behavioral controls. In order to test motivation, we used the Progressive Ratio (PR) tasks, a test of effort-related functions, in which lever-pressing requirement to each subsequent food reinforcer increases systematically. Motivation to perform the task is quantified by comparing the highest ratio completed, or “breakpoint”, between groups. An additional goal of this study was to investigate the ability of the atypical antidepressant, bupropion, to ameliorate the motivational and/or parenting disturbances observed in WKY mothers. Preliminary data indicates that WKY mothers showed higher performance on the PR task, but demonstrated severe deficits in active caregiving in comparison to SD mothers. Bupropion (40 mg/kg intraperitoneal) increased performance in the PR task for both strains, with WKY mothers continuing to outperform SD mothers. In contrast, bupropion effects were greatest in WKY mothers with low baseline levels of maternal behavior. Taken together, results suggest that motivational deficits in maternal behavior of WKY rats do not reflect a general deficit in motivation. Future studies are needed to investigate both the behavioral and neurobiological mechanisms underlying these differences.

Transition to motherhood depends on the action of various hormones, which prime the maternal circuitry to respond to young upon first encounter at parturition with sensitive maternal behavior. In rats, although virgins avoid pups, new mothers are highly motivated to interact with pups, and their maternal behavior depends on the functional interaction between the medial preoptic area (mPOA) and the ventral tegmental area (VTA). However, the precise mapping of these essential mPOA neurons and their neurochemical phenotype(s) remains to be elucidated. To identify the young-responsive neurons in the mPOA that project to the VTA, we injected the retrograde tracer Fluorogold (FG) into the VTA of virgin and postpartum female Sprague-Dawley rats. Six days later, females were exposed to pups for 5 minutes, and their brains processed for FG and c-Fos immunostaining. The molecular phenotype of these neurons was further characterized by performing immunohistochemistry against estrogen receptor alpha (Esr1). As expected,
mothers readily approached pups and displayed maternal behavior, whereas virgins avoided all interaction with pups. Despite these disparate responses to pups, initial findings indicate no differences between virgin and postpartum groups in the total number of c-Fos-ir cells in the mPOA projecting to the VTA. In addition, a similar proportion of these c-Fos-ir mPOA cells also express Esr1 in virgins and mothers. More detailed analysis is ongoing to quantify the distribution of these c-Fos+/Esr1+ cells within discrete subregions of the mPOA of virgin and postpartum female rats.

8:30-9:15  Board 81
Amanda Geagea
Youngbin Kwak (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
A Study of Cross-Culture Difference in the Self-Evaluative Process

The purpose of this study was to investigate the cross-cultural differences in self-enhancement and self-criticism found between Eastern Asians and Western Europeans. It focused on the effects of each respective culture on the psychological process of self-construal (self-enhancement and self-criticism), the neural signatures of these motivational processes, and behavioral scale measures done by participants. Additionally, while studying these differences, the concepts of self-esteem, individualism, collectivism, independence, and interdependence were taken into consideration as they play a significant role in the definition of culture, social situations, and experiences that evidently result in the development of the psyche.

The study observed the self-criticism and self-enhancement present in the two cultures by conducting an implicit self-evaluative task and measuring the neural components (even related potentials, ERPs) of the participants during the task using electroencephalogram (EEG). The study also utilized a multitude of surveys measuring personality traits associated with cultural values, motivational tendencies and perspective about self. Through the analysis of these ratings as well as the analysis and correlation of the neural signatures and response times, the study aims to find evidence to support significant differences of self-enhancement and self-criticism in Caucasians as well as Asian Americans and infer plausible reasons for these differences.

8:30-9:15  Board 82
Serene Reemah Elbach
Adrian Staub (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
ERPs Related to Word Skipping: An Analysis Using Coregistration of EEG and Eye Movements

During sentence reading, a reader may skip a word if sufficient information regarding the word’s identity is obtained prior to fixation. Previous studies have indicated that word skipping occurs when a particular stage of lexical processing is completed and is reliant on full parafoveal preview, i.e., the ability to see an upcoming word to the right. Skipping is particularly likely when a word is predictable from its context; predictability appears to allow for early processing during
sentence reading which can lead to a word skip. These early processes related to word skipping can potentially be isolated and identified using a combination of coregistration of EEG and eye tracking data. Event-Related Potentials (ERPs) related to semantic anomalies (N400) and syntactic anomalies (P600) have been identified and replicated. However, ERPs related to word skipping have yet to be researched. This study will investigate if there is an ERP related to word skipping by analyzing data from a study in which readers’ eye movements and EEG were recorded at the same time, while the predictability and preview validity of a target word in each sentence were manipulated.

Room 168  8:30-9:15  Panel 1
Daniel Pollak
Luke Remage-Healey (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Lateral Inhibition in Zebra Finch Auditory Processing Using a Novel Apparatus for Electrophysiology

The zebra finch (Taeniopygia guttata) provides an opportunity to investigate how complex auditory communication such as that in humans is processed in the brain at a cellular level, as opposed to region-wide resolutions afforded by fMRI. The songbird auditory cortex, known as the caudomedial nidopallium (NCM), shows neural selectivity for birdsong, and is involved in high-level processing of acoustic stimuli. Two putative neural subtypes in the NCM have been observed, known as broad- and narrow-spiking (BS and NS) cells due to the shape of their waveforms. NS cells have been hypothesized to be inhibitory interneurons while broad spiking cells may be excitatory projection neurons. Given this characterization, these neurons might be involved in sound discrimination using lateral inhibition. Understanding the role of BS and NS cells may shed light on the zebra finch brain, as well as the mammalian auditory cortex, in which broad and narrow cells have also been observed.

Unfortunately, exploring behavior and neural activity simultaneously presents technical difficulties, previously limiting investigations to either anesthetized electrophysiology or external observations of awake behavior. Portable and drivable electrode arrays (‘microdrives’) enable unrestrained awake recordings, allowing for neural recordings to accompany behavioral observations. However, current devices are prohibitively expensive, and/or are too heavy for songbirds. We designed a light-weight, inexpensive microdrive with which we obtained high quality extracellular neural recordings in the NCM of anesthetized and awake zebra finches. These microdrives represent an inexpensive platform for electrophysiology in awake and anesthetized zebra finches, in addition to other small animals.
Brain-wide long-range neuron reconstruction at the single neuron level remains challenging in the field. With the advent of light-sheet microscopy, which makes it possible to collect datasets of the scale necessary to matching single micro resolution with broad enough scope to acquire the intact brain. We present a novel strategy to reconstruct individual neurons in the intact brain by identifying and marking each axon branch of a fluorescently labeled neuron of its cell body as 3-D coordinates. The labeled neuron then becomes visible and prepared to reconstruct the neuron to the reference brain. The sample brain where we collected data and the reference brain will be registered first by mapping landmarks on both brains using the Coherent Point Drift algorithm, a point set registration algorithm. Point set registration allows us to assign correspondences between two point sets and to find the transformation within the two sets. Identified single neuron collected from the sample brain will be transformed to the corresponding location in the reference brain. This strategy requires fewer data, is faster, more efficient, but save as much information about the neutral structures as possible that is implementable in more labs.

Our brain is extraordinary: a single brain's memory capacity can range from 1 to 1,000 terabytes and the synaptic information transmission has the power of a computer with 1 trillion bit per second processor. These unbelievable skills come from ten thousand neurons connected via synapses communicating with each other through electrochemical information transmission. It would be an amazing breakthrough if we could fully understand the mechanism of this transmission and apply it to Artificial Intelligence as well as to Quantum Computer development. The mechanism of electrochemical transmission of information at the level of synapses will be investigated in this paper along with emerging applications to computer science, business and health. Understanding how the brain connections work would allow us to create computers with higher processing speed, it can be used to predict the counter action to business – related events and to assist the development of an artificial brain which could enable physicians to bring the so called brain dead people back.

10:45-11:30    Board 15
Kohki Ito
Eugenia Ciocan (Faculty Sponsor)
Department of Engineering and Physical Sciences, Bunker Hill Community College
The Mechanism of Electrochemical Transmission of Information at Synapses

Our brain is extraordinary: a single brain's memory capacity can range from 1 to 1,000 terabytes and the synaptic information transmission has the power of a computer with 1 trillion bit per second processor. These unbelievable skills come from ten thousand neurons connected via synapses communicating with each other through electrochemical information transmission. It would be an amazing breakthrough if we could fully understand the mechanism of this transmission and apply it to Artificial Intelligence as well as to Quantum Computer development. The mechanism of electrochemical transmission of information at the level of synapses will be investigated in this paper along with emerging applications to computer science, business and health. Understanding how the brain connections work would allow us to create computers with higher processing speed, it can be used to predict the counter action to business – related events and to assist the development of an artificial brain which could enable physicians to bring the so called brain dead people back.
Examining the Neural Origins of Hippocampal Estradiol

Aromatase is the enzyme responsible for the biosynthesis of estradiol in the central nervous system and has been tightly linked to the maturation of neural circuits for social behavior. Aromatase inhibitors are also important for treating hormone-receptor positive breast cancer in postmenopausal women, but common side effects include cognitive and memory deficits, likely due to the alteration of estradiol levels in the hippocampus where estradiol affects plasticity and neuroprotection.

This experiment aimed to determine potential sources of aromatase-expressing input to the hippocampus of mice. Based on the abundance of aromatase in alternative regions, such as the hypothalamus and medial amygdala, we hypothesized that estradiol was being sent in via synaptic transmission from aromatase-expressing neurons from one of these high-aromatase regions. To test this, the hippocampus of aromatase::cre X rosa26::lsl::tdTom mice were injected with fluorogold, a fluorescent retrograde tracer, to identify aromatase-expressing neurons in the brain that project to the hippocampus. Unexpectedly, upon examination of tissue sections it was evident that there was no such region that both projected to the hippocampus (fluorogold+) and expressed high aromatase levels (arom+) in the same cluster of neurons. Statistical analyses supported these initial observations, indicating that the hippocampus is synthesizing its own estradiol that then exerts local effects. These findings open up the possibility for future studies including targeted manipulation of these specific hippocampal neurons in relation to long term potentiation (LTP), spinogenesis, neuroprotection, learning and memory, and will hopefully contribute toward a better understanding of cognitive side effects associated with aromatase inhibition therapy.

Effects of N-(3-Oxododecanoyl)-L-Homoserine Lactone on the Stability of Neurites in the SH-SY5Y Cell Line

In recent years there has been an increased interest in the effect the human microbiome has in animal physiology. Through our research, we used the cell line SH-SY5Y as a model to observe the effects that \( N-(3\text{-Oxododecanoyl})\)-L-homoserine lactone, a ubiquitous quormone, has in the neurons and their connections.
Presentation Details

11:45-12:30  Board 78
Sebastian Gomez
Paul Katz (Faculty Sponsor)
Department of Biology, UMass Amherst
Post-metamorphic Neurogenesis in the Brain of the Nudibranch, *Berghia stephanieae*

Throughout life, new neurons are born and added to neural circuits, however, the mechanism by which the neurons are added to the circuit is not. Nudibranch molluscs possess simple nervous systems with large neurons, some of which can be identified reliably. Studying the neural development of the nudibranch mollusc *Berghia stephanieae* after metamorphosis may provide insight into the phenomenon of neural circuit development. Using a fluorescently tagged thymidine analog, which labels new post-mitotic cells, we can “birthdate” new neurons and track their migration during development. Preliminary experiments show new neurons being born peripherally and migrating inward. For example, heavy signaling in the rhinophore lobes occurs along the outer edges with some labeled cells appearing more centrally. The rhinophore lobes contain the neurons relating to the rhinophores, which are Berghia’s olfactory organs are crucial for prey localization. The rapid development of the rhinophore lobes immediately after metamorphosis compared to other ganglia suggests neurons required for vital behaviors are born and incorporated into circuits before those of less vital behaviors. This timeline of neuronal birth and migration provides a foundational step to understanding when and where certain neurons emerge and what neurons they synapse with.

12:40-1:25  Board 44
Thi Ngoc Bui
Paul Katz (Faculty Sponsor)
Department of Biology, UMass Amherst
Circadian Rhythm of Locomotion in *Berghia stephanieae*

Most organisms possess an endogenous biological clock that governs daily behavioral rhythms in a nearly 24-hour cycle. The molecular mechanisms of circadian clocks have been studied in many species, including *Drosophila melanogaster* and *Mus musculus*. However, the neural mechanisms underlying how circadian clocks affect behaviors are not fully understood. To address this problem, we examined the nudibranch *Berghia stephanieae* (Mollusca, Gastropoda), which has a simpler nervous system with large and identifiable neurons. In addition, their small size poses an advantage for high-throughput analysis of behaviors over other previously-studied nudibranchs. This project has two goals: 1) identify whether locomotor activity follows a daily rhythm and 2) determine whether this activity is governed by a circadian clock. To identify the activity pattern of locomotion, I recorded the locomotion of *Berghia* in a confined tank with artificial light over several days in a 12:12 light:dark cycle. I then plotted the data on an actogram to look for patterns in activity levels. I then determined the presence of a circadian clock by exposing the *Berghia* to constant darkness. After recording the *Berghia*’s behaviors under red light during the subjective night, I found out that the *Berghia* can detect red light. The solution was to switch to IR after conducting several control experiments. I designed a new recording setup that has proved to be successful in recording the *Berghia*’s behaviors and can be used for future experiment. This study will serve as a foundation for further investigations of how the circadian clock modulates neural circuits to produce circadian behaviors.
12:40-1:25  Board 45
Niah Holtz
Paul Katz (Faculty Sponsor)
Department of Biology, UMass Amherst
Spatial Vision in the Low-Resolution Eyes of *Berghia stephanieae*

While many people have investigated the capabilities and physiological requirements of high resolution eyes the same cannot be said for that of low resolution eyes. Nudibranch molluscs have simple eyes containing a small number of photoreceptors and pigment cells. Their clade is ordinarily presumed to be blind beyond the use of directional photoreception. The nudibranch *Berghia stephanieae* shows consistent response to visual cues despite the placement of their simple eyes underneath their skin and on top of their brain. After being introduced into a consistently illuminated circular white arena with a single black stripe, *Berghia* utilizes spatial vision to reliably navigate towards the stripe. The success of individual animals in performing this task fell as the size of the black stripe involved decreased. Highest completion rates were seen when animals were presented with black stripes sized from forty-five to sixty degrees, but overall continued to respond above random chance—as established by trials with no black stripe present—until size was lower than ten degrees. The behavioral pattern observed in *Berghia* with a black stimulus is not preserved when a white stripe is presented on top of a black background. This result suggests that *Berghia* have a preference for black areas, a potentially advantageous strategy when searching for shelter.

3:45-4:30  Board 73
Faye Louise Reagan
Sirisha T. Nouduri
Heather Richardson (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Determining How Alcohol Impacts Oligodendrocyte Lineage during Adolescence in Male and Female Mice

Excessive alcohol consumption is popular among teenagers today, when brain areas such as the prefrontal cortex are still developing. The prefrontal cortex, located anterior to the frontal lobe, is known to be important for cognitive behavior. Studies have shown that binge drinking alcohol during the adolescent developmental period reduces myelin in the prefrontal cortex in rat models. The myelin sheath is a lipid wrap around axons that increases the speed at which impulses propagate through neurons through saltatory conduction. Myelin deficits are associated with a variety of neurological disorders that impair cognition and emotional regulation in the brain. The myelin on axons in white matter seem highly susceptible to the effects of binge drinking during the adolescent period but the underlying mechanisms remain unknown. From early life through adolescence, there is a significant increase in the birth and maturation of oligodendrocytes (the cells that myelinate axons). We hypothesized that alcohol interferes with this developmental process, decreasing prefrontal cortical myelin density. Using a reporter mouse line, we are testing the effect of alcohol on myelinating oligodendrocytes in the following
brain regions: the corpus callosum and cingulate cortex of the prefrontal cortex. In mice, we are testing a 2-week and 4-week drinking in the dark paradigm to mimic binge drinking in humans. Overall myelin and mature oligodendrocyte densities will be quantified using immunofluorescence with MBP and CC1 antibodies respectively followed by confocal imaging in prefrontal cortical tissue. Analyses of these data should establish if damage caused to myelin from binge drinking is due to a reduction in the number of mature oligodendrocytes present in the brain. These projects should yield insights into understanding the relationship between cognitive and emotional deficits and heavy drinking during adolescent development.

3:45-4:30  Board 74
Derrick Liu
Heather Richardson (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Quantification of Estrogen Receptor Alpha (ERa) within Microglia Using Threshold-Based Segmentation of Confocal Fluorescent Images

Microglia are the resident immune cells in the brain that secrete pro-inflammatory cytokines in response to neuroinflammatory insults. Estradiol has been shown to have protective effects against neuroinflammation via interaction with estrogen receptor alpha (ERa). Preliminary data from our lab shows that microglia express ERa, which suggests that estradiol has the potential to directly interact with microglia to mediate inflammation in the brain. To begin testing this hypothesis, we are first refining our methodology to quantify ERa levels in microglia cells within brain slices. Estradiol levels fluctuate across the estrous cycle. Thus, the current study used brain tissue slices from adult female rats at different estrous stages and male rats to quantify changes in ERa immunofluorescence in the prefrontal cortex. We are comparing automatic versus manual thresholding approaches to accurately capture ERa expression within individual microglial cells (Iba1 immunolabeled). Our findings suggest that automatic thresholding produces a better binary representation of glial cells than a manually chosen threshold, as has been reported with astrocytes (Healy, et al., 2018). Applying an automatic threshold for Iba1 labeling resulted in clear visualization of the entire microglia cell, thus resulting in tighter within-group variability of “microglia cell counts.” Conversely, the manual threshold resulted in visualization of only part of the cell body and processes in many microglia cells. These findings indicate the automatic thresholding procedure is the optimal approach for quantification of ERa in microglial cells.
Adolescence is a time period of neural development that greatly impacts the brain’s ability to function and behavior in adulthood. Binge drinking alcohol during this time period is associated with impaired cognitive abilities and alcohol dependence later in life in humans. Our lab has found that a two-week voluntary binge drinking program damages myelinated axons in the medial prefrontal cortex (mPFC) of rats. The current study aims to identify the neural pathways that are being impacted by adolescent alcohol to help us better understand the mechanisms and consequences of the axonal changes we have seen in males. To do this, we use a fluorescein dextran amine (FDA) tract tracer to label the axons of circuits coming into and out of the mPFC. Previous studies have shown that FDA can be used to label retrograde and anterograde axons by altering the survival time of the animal. This technique will be used in combination with immunohistochemistry and SCoRe imaging in order to examine the changes to myelinated fibers in control and adolescent alcohol animals. These findings will provide insight into the underlying factors driving long-lasting changes in cognitive abilities and behavior associated with adolescent alcohol.

During adolescence, the brain goes through organizational changes that define adult brain structure. Due to plasticity during this period, substances such as alcohol can have detrimental effects on brain structure and function. The present study investigated how alcohol drinking affects the nodes of Ranvier within the prefrontal cortex — a region important for executive function. The nodes of Ranvier are the unmyelinated spaces between segments of myelin sheaths and are rich in voltage-gated sodium channels, thus propagating action potentials quickly along axons. To understand how alcohol affects nodes we processed prefrontal tissue from male and female adolescent rats who self-administered sweetened alcohol (or sweetened water control solution) for two weeks in adolescence (Postnatal Days 28-42, n=9 rats/sex/alcohol treatment condition). Tissue was immunolabeled for two proteins localized at the nodes of Ranvier that are key components in efficient neural transmission: the central node (Ankyrin G) and paranodal region (Caspr). Rats were trained to lever press to receive their reward (sweetened water or alcohol). Confocal microscopy was used to visualize and quantify nodal features in the forceps minor of the corpus callosum and layers II/III of the adjacent anterior cingulate. Nodal count, nodal length to diameter ratios, and intensity profile quantifications were used to measure overall nodal integrity. Preliminary results suggest a decrease in nodal length and ratio, as well as sex differences — females being somewhat less
susceptible to alcohol. Because these proteins are critically important for signal propagation, these changes could have significant implications for prefrontal function during adolescent development.

4:45-5:30    Board 33
Allison Heuston
Jeffrey Starns (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Facial Recognition and Lineups

Inherent facial recognition ability may play a crucial role in the accuracy of the performance in a lineup by an eyewitness. Research on this relationship is lacking, but other factors like confidence ratings, type of lineup, and suspect position, have been shown to affect the accuracy of selections during lineups. Using an online survey, we searched for a correlation between a participant’s score on a face matching task, based on the Benton Facial Recognition Test, and their performance in six simultaneous lineups. Participants also provided confidence ratings for each lineup response to determine whether an individual’s confidence positively correlated with their accuracy. Data is currently being collected and analyzed, so results and reflections are still to come.

4:45-5:30    Board 34
Nicole Ayres
Joonkoo Park (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Neural Correlates of Syntactic Hierarchical Structure Building in Number-Word Phrases

Like sentences, number word phrases are perceived sequentially, word by word. However, the brain processes these complex phrases by creating a tree-like hierarchical structure as each incoming component of the phrase is perceived. Much research has investigated this process of hierarchical structure building in linguistic situations, but little work has been done to understand how this process applies to the comprehension of number word phrases (i.e. one hundred fifty thousand). My research aims to address whether the linguistic theories regarding tree-like hierarchical structure building can be adequately applied to the realm of number words, and if so, what does the associated brain activity during such parsing activity look like? My study utilizes electroencephalography (EEG) technology to investigate the oscillatory brain activity while participants comprehend a complex numeral to investigate if and how the brain builds these hierarchical structures. Past research in the field leads us to believe that high-gamma frequency will be found to increase with each successive word until the series of number words can be merged into a single phrase. Past research also suggests that this high-gamma activity may likely be found in the pSTS, the left IFG, the anterior temporal lobe, and/or the posterior temporal lobe regions during the parsing of number word phrases. If such patterns are found to exist in number word processing, my thesis would support the idea that linguistic-based hierarchical structure building can, in fact, be applied to number word phrases. Such results would advance our knowledge in the discipline of number cognition.
It has been suggested by some neuroscience researchers that a ketogenic diet (low in carbohydrates and high in fats) may be a viable treatment for cancer as the diet may “starve” cancer cells. Due to the uncertainty of how cancer cells metabolize ketone bodies, this research will determine if C6 rat astrocytoma cells can use the ketone body β-hydroxybutyrate as an energy source. Specifically, these experiments focus on how replacement of glucose with β-hydroxybutyrate affects the mitochondrial function of the C6 cells. Media containing glucose (positive control), no glucose or ketone bodies (negative control), 1mM β-hydroxybutyrate, or 5mM β-hydroxybutyrate will be used to mimic different diets. Under these simulated diets oxidative stress will be measured through a Reactive Oxygen Species (ROS) assay and cellular respiration will be measured with an Adenosine Triphosphate (ATP) assay. Based on previous studies, it is expected that a simulated ketogenic diet using β-hydroxybutyrate as a fuel source for C6 cells will increase oxidative stress and decrease ATP production compared to the positive control group of glucose.
NURSING

8:30-9:15  Board 83

Jennifer Anne Specht  
Carrie-Ellen Brier (Faculty Sponsor)  
Department of Nursing, UMass Amherst  
Human Milk Storage and Use at Home

Introduction: The recommended duration of breastfeeding is at least 12 months, yet the United States does not have paid family leave which results in many mothers returning to work during the period of breastfeeding. These mothers must express/pump their breastmilk while they are away from their infant.

Purpose: This study examines current practices of mothers in breastmilk storage and handling to identify how mothers are pumping, storing, and handling their breastmilk which will be fed to their infant. There are multiple guidelines available for mothers to determine how to safely handle and store their breastmilk, and this study will evaluate which ones mothers are using.

Methods: In order to identify which resources mothers are following, questions were developed to determine how mothers are handling their expressed milk.

Results: Data collection is currently ongoing and analysis will be complete by early April.

Conclusions/Implications: The survey was sent out to members of the community who are currently pumping breastmilk for an infant 12 months old or less. The results are currently being gathered and will be analyzed using graphs and data analysis to identify trends and which resources are chosen most frequently and why. The results will indicate which resources are used most frequently and how parents chose to use that particular source. This will aid practitioners in tailoring their teaching regarding breastmilk storage and handling to what parents are actually following. It can also aid in providing feedback to practitioners on the effectiveness of their teaching.

8:30-9:15  Board 84

Winnifer Montero  
Cynthia Jacelon (Faculty Sponsor)  
Department of Nursing, UMass Amherst  
The Impact of Raising a Child with a Physical Disability on the Caregiver

Introduction: The purpose of my honors thesis is exploring the quality of life of the mother of a 4-year-old boy with a progressive neuromuscular condition, his quality of life, and that of his family.

Background: Caregivers who are raising children with a physical disability are charged with an incredibly challenging task. They have to provide 24-hour care to an individual, while also caring for themselves. The review of literature explores the caregiver burden of raising a child with a physical disability.
Methods: In Spring of 2018, I collaborated with four mechanical engineers, as well as his parents, in creating an assistive arm device that addressed the range of motion needs of the child’s current condition. Additionally, I conducted interviews with his main caregiver to be able to understand how raising her 4-year-old boy with a physical disability affects her life.

Discussion: Caregivers are heavily impacted by raising a child with a physical disability. They endure many physical demands and as a result face the risk of developing chronic conditions themselves. The emotional costs are high, always on a rollercoaster of emotions—from constant worry to social isolation to never ending uncertainty. Psychologically, depression and anxiety play a major role in their life. In order to cope, they normalize their situation.

Conclusion: It is crucial that we care for the caregivers. They are the reason that we can function in the health care community. Therefore, we must care for them—physically, emotionally and psychologically.

8:30-9:15 Board 85
Ryan Alexander Lee
Emma Dundon (Faculty Sponsor)
Department of Nursing, UMass Amherst
Student Nurses’ Perception of Stay S.A.F.E. Strategy

Objective: Interruptions in the nursing field are common and expected in healthcare. Nurses on average experience up to ten interruptions per hour, or an interruption every six minutes. While interruptions are frequent due to the collaborative nature of nursing, their frequency have been shown to cause errors. The Stay S.A.F.E. strategy, developed by Henneman and colleagues, has been shown to decrease time distracted from the nurse’s primary task in simulated clinical settings. The method is broken down into five distinctive steps that the nurse can follow to effectively manage interruptions: stay in current location, say what task you are performing, acknowledge the interruption, fixate on task, estimate time to completion. The aim of this study is to see how current nursing students perceive the Stay S.A.F.E. strategy. Methods: This is a qualitative study gathering data through surveys of 10-15 nursing students. There will be a pre survey given and then the study participants will then be shown the Stay S.A.F.E. strategy. After learning the Stay S.A.F.E. strategy the participants will then have a post survey. Findings: Research data is currently in the process of being analyzed. Conclusion: The results from this study will help find areas of strength and weakness of the Stay S.A.F.E. strategy.
Introduction: The purpose of this thesis was to determine the effect of professional introductions on the level of compassion that patients perceive from a nursing perspective. The literature states: professional introductions should include a nurse's first/last name and role in the patient's care.

Background: Evidence in the literature suggests patients perceive compassion as familiarity/time commitment, and specific values and beliefs facilitate nurses to deliver compassionate care. This study's objective is to determine if a first name introduction provides a more compassionate environment when compared to a professional introduction.

Methods: Secondary data analysis using quantitative methods and coding for thematic analysis was completed. Data was previously collected from 167 nurses/nursing students, and individuals were given surveys to complete anonymously. The data was coded for data set frequencies to provide a better thematic analysis.

Findings: Individuals (N = 168) completed surveys about professional introductions and were asked how they introduced themselves, and in which situations they wouldn't utilize their full name. Analysis revealed that only 20.2% of participants utilized professional introductions. Common themes found in which individuals would not introduce themselves with their full name included safety and approachability concerns.

Conclusion: Most individuals that were surveyed did not use their professional introductions, and decrease in approachability was one significant reason. Therefore, nurses may perceive that using their full name may be too formal for the nurse-patient relationship. Overall, there is little research in this area and there needs to be more on professional introductions and its effects on patient's perceptions of compassion.
information, to learning to cook a healthy meal, therefore learning is applied in and out of the classroom. Despite its effectiveness there is still a lack of consistency in curriculum nationwide, as well as within the state. The aims of this research project are to determine if schools in North Central Massachusetts incorporate healthy behavior education into their curriculum, identify if experiential learning techniques are utilized in the school setting, and to compare BMI data across school districts. The findings from this research will help to determine the exposure that students are receiving and whether their BMI data, and thus their health, is impacted by the current education provided. Comparing multiple school district’s data will demonstrate whether some schools are utilizing more effective strategies than others. Based on findings, a suggested plan to enhance and standardize curriculum will be provided.

11:45-12:30    Board 55
Bradley Sylvestre
Susan McPherson (Faculty Sponsor)
Department of English, Quinsigamond Community College

Regenerative Medicine

The focus of this presentation will be on tissue engineering that involves the growing of organs in laboratories and with the use of 3D printers. Tissue engineering uses stem cells from either bone marrow in adults, stem cells from the embryonic stage of gestation, or stem cells from an umbilical cord of a newborn baby. Research will show that regenerative medicine is a probable future treatment for worn down cartilage in the knee, which is responsible for arthritis to the generation of a whole organ, a trachea. Scaffolds are used that mimic the biological environment that direct the cell to perform a certain function. From there the cells will self-assemble into specific tissues (ex: nervous tissue). Tissue engineering can be autologous, meaning the cells are derived from the self, but it could also be allogenic, meaning another individual (of the same species) can donate their healthy cells. Using bio-artificial tissues could dramatically decrease the risk of rejection from normal transplantation surgeries. Recovery time after invasive surgeries would accelerate rapidly. Currently regenerative medicine is not cost effective like other treatments, though tissue engineering could permit a longer life span for humans.

11:45-12:30    Board 61
Anli Xiang
Yeon Sik Noh (Faculty Sponsor)
Department of Nursing, UMass Amherst

Activity Trackers and Estimating Physical Activity

In the management of many diseases, maintaining regular physical activity is crucial, however without a method of quantifying physical activity levels, people are unable to accurately gauge if their levels of activity are adequate. Health care providers may also have a difficult time assessing physical activity levels in patients if relying purely on subjective questionnaires and verbal history. Working both as an incentive and an activity “journal,” activity trackers can be a
valuable tool in not only promoting healthy living, but also enhancing health management in those with chronic diseases who would benefit from regular exercise. The purpose of this research study is to explore the accuracy of self-reported activity by people without activity tracker usage and compare the reported activity levels of users with previous exposure to activity trackers to those who have not used activity trackers before. This study will provide information about people’s perception of their activity levels without continuous feedback from the activity trackers. Using the International Physical Activity Questionnaire (IPAQ), a survey tool for tracking and quantifying self-reported physical activity, and actual wrist and ankle-worn activity trackers, we are able to compare user perception and reporting of daily activity to actual activity levels as recorded by the activity trackers. The purpose of this quantitative and qualitative descriptive research study is to evaluate the capacity of self-reported activity in comparison to actual activity levels as recorded by activity trackers and to obtain a better understanding of how activity tracker usage can influence user perception of activity.

1:30-2:15   Board 65
Sheilla Mwiza Murungi
Charlene A. Campbell (Faculty Sponsor)
Department of Nursing, Salem State University
Young Women With a Diagnosis of Sarcoma, Decisions Related to Disease Treatment and Infertility

Women suffering from sarcoma are often presented with the devastating news that they may experience infertility during or after chemotherapy and radiation treatment for the disease. Because of this, they must make the difficult decision to either go through with the treatments or explore options to preserve their fertility. Many of these women may be planning to have a family with biological children but undergoing chemotherapy and radiation treatment might make those plans impossible. This study examined therapeutic advances for preserving fertility in women while maintaining a therapeutic regimen for treatment of the disease. This research also examined the extent to which these patients have a full understanding of these treatments and if they are adequately informed of all of the available options from which to choose. This comprehensive review of the literature examined the psychological effects of potential infertility resulting from sarcoma treatment on women (18-44 years old) and their families. This study also explored the resources available to patients suffering from psychological effects of sarcoma treatment and infertility and the efficacy of these resources. The overall purpose of this study was to examine further the possible treatment options for these patients with an emphasis on the methods and resources to help them navigate this devastating diagnosis.

Key words: Sarcoma, Infertility, Fertility treatments, Psychological Effects, Women 18-44 years old.
The experience of first-time fathers during childbirth has changed dramatically over the last several decades. Recent studies have demonstrated that though the support person plays a major role in childbirth, they are often overlooked. Some first-time fathers may feel like they did not have many choices or a voice in the childbirth experience. This study analyzed the experiences of seven first-time fathers through personal interviews and is aimed at helping nurses adapt their care to better include fathers. These interviews identified a need for improved assessment of first-time fathers desired involvement in childbirth and ultimately leading to the development of an efficient tool to fill this gap.

The incidence of Neonatal Abstinence Syndrome (NAS) is increasing due to the current opioid epidemic. The foundation of NAS treatment has been pharmacotherapy but nonpharmacologic interventions are increasingly used to alleviate symptoms, reduce the amount of pharmacotherapy needed, and decrease the hospital length of stay (LOS). A systematic review of the literature was performed to identify non-pharmacological interventions (NPI) that are effective at improving infant outcomes and to identify gaps in current knowledge about NPI. Eight NPI were used as key words in literature searches: infant massage, parental presence, breastfeeding, Reiki, vibrotactile simulation, acupuncture, non-nutritive sucking, and auditory stimulation. Results found nine studies that met the criteria; one study investigating the effect of infant massage, three studies on outcomes of parental presence, two studies on the effects of breastfeeding, one study on outcomes of Reiki, one study on vibrotactile stimulation, and one study on acupuncture. No studies assessed non-nutritive sucking or auditory stimulation interventions. NPI found to be effective in reducing NAS symptoms were infant massage (one study), parental presence (one study), and breastfeeding (one study). Decreased LOS was associated with parental presence (three studies) and breastfeeding (one study). Acupuncture reduced the length of time the infant required the medication (one study). Parental presence and breastfeeding each had one study where decreased amounts of medication were needed. Reiki and vibrotactile stimulation were not found to be effective interventions. A gap identified is the scarcity of research on the effectiveness of NPI.
BACKGROUND/PURPOSE: Nursing burnout is a pressing issue in healthcare, and it is often overlooked. Many factors can affect your risk for nursing burnout; some factors include age, length of time working as a nurse, number of children at home, place of employment, etc. The purpose of this study is to evaluate how the self-care and health management of critical care nurses affects their risk for developing nursing burnout. DESIGN/METHOD: A non-interventional survey study was conducted in a Level 2 Trauma Center north of Boston, MA. 31 nurses completed and handed back two surveys that were administered. The Professional Quality of Life (ProQOL) Version 5 survey was one of the surveys that was administered. The other survey that was administered was the Self-Care and Lifestyle Inventory. By cross-analyzing the results of this study, the relationship between nursing burnout risk and self-care was evaluated. RESULTS: The data was analyzed using SPSS Version 23. The results of the study were quite conclusive. The participants’ scores for the Self-Care and Lifestyle Inventory are significantly negatively correlated to their scores for Nursing Burnout ($r = -.540$). This proves my hypothesis that self-care is directly related to nursing burnout risk. NURSING IMPLICATIONS: Because nursing burnout affects patient care, the results of this study can be used in other critical care units where staff suffer from high levels of nursing burnout. Creating a healthy working environment should be made a priority to decrease stress levels of critical care nurses.
administrators than by the nursing leadership. These factors are not constants and the dynamic environment of acute care nursing does not lend itself to staffing that does not consider these factors. Government mandated nurse to patient staffing ratios cannot provide the work environment that supports the nursing needs of today’s patient populations.

Room 808  1:30-2:15  Panel 5
Jena Nicole Nesta
Stephanie Griggs (Faculty Sponsor)
Department of Nursing, UMass Amherst
Perceptions of Preparedness of Student Nurses in End-of-Life Care

Nurses spend more time with patients during end of life than any other discipline in health care yet practicing nurses report feeling unprepared to deal with and provide end of life care. A majority of people die in a hospital or long term care setting increasing the importance of nurse preparation for end of life care. It may be that this topic is not adequately taught in current nursing curricula. The purpose of this honors thesis is to explore undergraduate nursing student’s perceptions of end of life care following an end of life simulation. Thirty-one junior and senior nursing students (Mean age 21.04  0.52, 96.2% female) in a baccalaureate program participated in the end of life simulation. Data were collected from a baseline demographic survey, post-simulation satisfaction survey, and reflective journals. Quantitative data will be analyzed using SPSS and will be triangulated with the qualitative data. Congruence between the quantitative and qualitative will be assessed. This study will provide information about the perceptions nursing students have towards end of life care and how exposures to end of life simulations in an academic setting influence those perceptions.

2:45-3:30  Board 84
Kerry I. Brodbeck
Catherine Buell (Faculty Sponsor)
Department of Mathematics and Statistics, Fitchburg State University
Death and Dying: A Nursing Focus on the Care of the Dying Patient

The role of the nurse is often associated with healing and helping bring people back to health. While this is a large aspect of the nursing profession, the nurse also cares for patients who are dying. The care delivered at this time revolves around the comfort of the patient, as well as ensuring that all of the patient’s needs are met. In order for the care of the patient to transition from curative to comfort measures, it is necessary for a diagnosis of dying to be made. When this diagnosis is not communicated in a timely manner, it has been found that the patient’s do not receive quality end of life care. This diagnosis surpasses all other diagnoses and shifts the focus towards the comfort and well being of the patient. Care at the end of life includes pain management, discontinuation of routine vital signs and laboratory tests and coordinating care with other professionals to ensure the best quality care is being offered. Palliative care is a resource that can be implemented at any stage of a disease, which assists the patient with pain and symptom management. When the patient’s life expectancy is less than six months, hospice
care is a resource that should be offered. At the end of life, the nurse is on the front lines to ensure that the patient is receiving the best quality care possible. This is done by communicating and listening to the patient and developing a therapeutic relationship with them.

2:45-3:30    Board 85
Melanie Rose Muzyka
Joohyun Chung (Faculty Sponsor)
Department of Nursing, UMass Dartmouth
Perceived Stress and Mindful Self-Care in College Students and ROTC Cadets

Perceived stress and mindful self-care play major roles in regard to the health and well-being of college students and Reserve Officer Training Corps (ROTC) cadets. In times of high stress, self-care practices are often practiced less frequently. There is a lack of research on the relationship between these two populations regarding perceived stress and mindful self-care. The purpose of this study was to explore perceived stress and mindful self-care behaviors between traditional college students and Army ROTC cadets. A cross-sectional descriptive study was conducted in order to gather information on perceived stress and mindful self-care behaviors in undergraduate students and ROTC cadets. Data collected from participants in the form of written questionnaires included demographics and the use of the Perceived Stress Scale (PSS) tool, as well as the Mindful Self-Care Scale (MSCS) tool. Based on the results of lower levels of perceived stress being associated with a higher frequency of self-care behaviors in ROTC cadets, and higher levels of perceived stress correlating with a lower frequency of self-care behaviors in college students, it can be concluded that lower levels of stress may be associated with more self-care behaviors. These results show the importance of being aware of the stressors on these populations and how perceived stress and mindful self-care activities can directly act on each other. Healthcare professionals can help students in the college and ROTC setting practice more self-care behaviors while guiding them with stress management, reducing the risk of health problems later in life.

2:45-3:30    Board 86
Christina Rose Ruiz
MaryBeth Sosa (Faculty Sponsor)
Department of Nursing, UMass Dartmouth
Knowledge Levels and Attitudes of Student-Athletes in National Collegiate Athletic Association Regulated Sports versus Club Sports Regarding Concussions

The purpose of this study was to assess the knowledge levels and attitudes regarding concussions in collegiate student athletes in National Collegiate Athletic Association (NCAA) regulated sports who receive mandated concussion education as compared to non-NCAA regulated club sports athletes who do not receive standardized concussion education and determine if there was a significant difference in knowledge levels and attitudes between the groups. Data was collected from 15 NCAA regulated sports athletes and 15 from non-NCAA club sports athletes on the UMass Dartmouth campus using the Rosenbaum Concussion
Knowledge and Attitudes Survey. T-tests were used to compare knowledge and attitudes levels in NCAA versus club athletes. The mean score of concussion knowledge in NCAA regulated sports was 23.3 out of 25 points for concussion knowledge while athletes in non-NCAA regulated sports received 22.7 out of 25 points in concussion knowledge. In concussion attitudes, NCAA regulated sports yielded a mean score of 62.1 out of 75 points while non-NCAA regulated sports revealed a score of 58 out of 75 points. There was no significant difference in knowledge levels between groups (p=0.487). However, non-NCAA athletes had significantly lower attitudes toward concussion (p<0.5). Further education and interventions should be assessed to address concussion attitudes that negatively influence reporting behaviors and promote safer attitudes in all athletes.

2:45-3:30 Board 87
Dong Liang Dzindolet
Megan Ann LaMonda
Shaye Marie Lane
Melissa D. Duprey (Faculty Sponsor)
Department of Nursing, Worcester State University

Background: Children diagnosed with an autism spectrum disorder have difficulties with social interaction and communication, especially with unfamiliar people. Nurses find that children diagnosed with an Autistic Spectrum Disorder (ASD) have difficulties in communicating information regarding pain or the chief complaint for the visit. There are many therapeutic options to increase an ASD child’s communication and social skills, including a newer strategy that utilizes Animal Assisted Therapy (AAT).

Purpose: The purpose of this integrative review was to determine if the use of animal-assisted therapy increased an ASD child’s social interaction and communication skills with health personnel. Methods: Both quantitative and qualitative articles were explored through multiple literature reviews. Results: The findings revealed that ASD children who were exposed to AAT experienced an increase in social and communication skills and the child’s family as a whole benefited as well. Conclusion: As nurses, it is important to have the ability to adequately speak with patients and understand their current complaints in order to create nursing diagnoses and better care for patients in a holistic manner.

Keywords: Autism Spectrum Disorder, Animal-assisted-therapy, children, social interaction, communication, nursing, health personnel

2:45-3:30 Board 88
Alisha Tavares DeMelo
Sharon Keating (Faculty Sponsor)
Department of Nursing, UMass Dartmouth
Nursing Students’ Knowledge of Abusive Head Trauma: A Cross-Sectional, Quasi-Experimental Study
According to the National Center on Shaken Baby Syndrome (n.d.), Shaken Baby Syndrome (SBS), or Abusive Head Trauma (AHT) is the leading cause of physical child abuse deaths in the U.S. (NCSBS, n.d.). This study aimed to answer the following research questions, (1) What are senior nursing students’ knowledge levels regarding AHT? (2) Are there changes in knowledge levels after an educational intervention? The study sample consisted of 37 senior nursing students enrolled in NUR 336, Child and Family Nursing. A cross-sectional, descriptive, quasi-experimental, pre- and posttest design was used, and a brief informational session was presented between the pretest and posttest. Data was analyzed using SPSS version 25 and examined for missing data, skewness, and outliers prior to analysis. Pre- and posttest scores were compared. Pretest scores ranged from 46.70 to 86.70 (range = 40.00, median = 66.70, mean = 65.41, mode = 60.00, SD= 10.04). Posttest scores ranged from 66.70 to 100.00 (range = 33.30, median = 93.30, IQR = 9.95, mean = 89.00, mode = 93.30). Posttest scores were significantly higher than pretest scores. The low pretest average score may indicate a need for more exposure to AHT content. The posttest mean score of 89.00, demonstrates an improvement in scores after the intervention was presented. The study results identify a need for expansion of a learning module on AHT in the nursing curriculum. The educational intervention from the current study may be useful in educating nursing students’ on identifying and caring for patients diagnosed with AHT.

Room 168  2:45-3:30  Panel 6
Myles Leal Goulart
Elizabeth Chin (Faculty Sponsor)
Department of Nursing, UMass Dartmouth
The Lived Experience of Instrument Playing in Individuals with OCD

Purpose: Obsessive compulsive disorder (OCD) is a chronic disorder that involves obsessions and compulsions. Due to the chronic nature of the disorder, the obsessions and compulsions are recurring, and may affect a person throughout their lifetime. In individuals with OCD, medication therapy and psychotherapy have not proven to be completely effective. Music therapy is a form of complementary and alternative medicine (CAM) commonly used in many psychiatric disorders such as depression, anxiety, and schizophrenia. There is currently no information on the effect that playing a musical instrument has on the lived experience of an individual with OCD. The purpose of this study was to gain insight into the meaning of the experience of playing a musical instrument in individuals with with OCD.

Methods: A phenomenological qualitative approach was used to explore the lived experience of instrument playing in individuals with OCD. Three female students, age 19-20, with self-reported OCD who played guitar, ukulele or clarinet participated in this study.

Results: Depending on the view the participant had on their instrument playing, the effect the activity had on their OCD differed. Those who viewed instrument playing as relaxing and fun found it to be anxiety relieving and grounding. Those who played instruments in a ritualistic way found playing to be anxiety relieving, as a result of fulfilling their compulsion.
Conclusions: Further research should be conducted to examine the relationship between music playing and OCD symptoms in persons with higher-level musicianship.
with. **Implications for nursing.** As nurses, it is imperative to know what options patients have to manage their pain because there are other alternative therapies that can be effective.

### 3:45-4:30  Board 79
Grady Harris
Caitlyn E. Dowd
Kimberly Dunker (Faculty Sponsor)
Department of Nursing, Worcester State University
The Effect of Education on Marijuana Usage

The quality of drug education that adolescents receive in school may influence their marijuana usage and their understanding of the consequences of the drug. More students use marijuana than any other type of drug combined. The number of students using marijuana is increasing contributing to an epidemic of drug use, along with the number of adolescents requiring treatment for drug overdose in recent years. This review of the literature examined the correlation of classroom education methods, normalization of marijuana, and peer drug education to prevent future drug use. Findings indicate that drug education provided for adolescents has contributed to a knowledge deficit in the adolescent population concerning the consequences of marijuana use, and does not effectively prevent the adolescent usage of marijuana. Further research is indicated to address the educational needs of this population related to future drug use.

### 3:45-4:30  Board 80
Laura Elizabeth Ernst
Colette Aimee Patenaude
Kimberly Dunker (Faculty Sponsor)
Department of Nursing, Worcester State University
Verbal Abuse against Nurses in the United States

**Background.** Verbal abuse committed against nurses is a common phenomenon within the healthcare industry of the United States (Phillips, 2016). Significant research has been conducted studying the occurrence and impact of verbal abuse against nurses, yet little research exists studying interventions designed for improving working conditions for nurses and decreasing the occurrence of verbal abuse. **Review of Literature.** In healthcare, physicians, patients, patient family members, and other nurses were most frequently involved in verbal abuse against nurses (Park, Cho & Hong, 2015). Furthermore, new graduate nurses were among those commonly victimized (Brewer, Kovner, Obeidat, & Budin, 2013; Budin, Brewer, Chao, & Kovner, 2013; and Keller, Krainovich-Miller, Budin, & Djukic, 2018). Numerous studies indicated a correlation between the frequency of verbal abuse incidents and various occupational characteristics such as employed nurses’ unit and the specific shifts they were assigned to (Speroni, Fitch, Dawson, Dugan, & Atherton, 2014; Phillips, 2016; Trahan & Bishop, 2016; Keller, et. al., 2018; and Brewer, et. al., 2013). **Conclusion.** The research indicates that further studies are warranted regarding interventions to be put in place to facilitate less hostile work environments such as zero tolerance policies and improved communication skills. Furthermore, an increase in the report of verbal abuse toward nurses in the U.S. correspond to the lack of education and limited prevention strategies in place.
Background: Due to the progression and increased muscle wasting associated with Duchenne Muscular Dystrophy (DMD), caregivers are often relied upon heavily to perform most, if not all, activities of daily living for the child with this neuromuscular disease. Few studies in the United States have looked into the psychosocial challenges caregivers face when caring for a child with DMD, as well as the effects of caregiver burden on their overall well-being. Parents of children with DMD tend to have moderate family burden and tend to rely on religion, venting of emotions, and emotional social support for coping (Thomas et al., 2014). Caring for a person with DMD can be associated also with impaired health related quality of life (Landfeldt et al., 2015). Life satisfaction in these caregivers is often dependent on high social support, high resiliency, and high income (Kenneson & Bobo, 2010). Purpose: The purpose of this study is to assess the levels of caregiver burden in families caring for children with DMD. The levels of burden will be compared between parents of children 12 years of age and younger with the burden of parents with children over the age of 12. Methods: In this research study, nine family caregivers of children with DMD associated with the Muscular Dystrophy Association completed an online quantitative survey using the Qualtrics platform. Caregiver burden was measured with Family Burden Interview Survey (6 subscales, scores from 0-48, higher scores more burden). Caregiver well-being was measured with Caregiving Well Being Scale (45 items, scores from 45-225, higher scores more needs being met). Data were analyzed using SPSS. Descriptive statistics, t tests and correlations were computed to answer the research questions. Results: The results of this data concluded that the areas where most burden was felt were related to loss of a caregiver’s job in order to care for the child, disruption of personal leisure, and disruption of family interactions. There was an increased level of burden felt by caregivers of children over the age of 12 in comparison with those under the age of 12. There was positive relationship between overall burden and caregiver well-being. Conclusions: The results of this study can be used in the future to better support family caregivers and provide them with the adequate resources in order to improve their quality of life.
frequency, motivations and attitudes towards substance and polysubstance use among college students enrolled in a nursing program.

This cross-sectional, descriptive study used a convenience sample of undergraduate nursing students (n=147) attending a medium-sized Massachusetts university. Participants were 76.2% Caucasian and 86.5% female. Questionnaires were distributed to 76 freshmen and 71 senior participants during one class period. The questionnaire consisted of demographics, the PSS-14 and the Substance Survey. Data was analyzed using SPSS-24.

85% of participants drank alcohol, 30.6% used nicotine, 44.2% used marijuana, 5.4% used sedatives, 3.4% used amphetamines, 2.1% used hallucinogens, 0.7% used cocaine, and 0.7% used opioids in the past year. Although insignificant, seniors (chi-square=2.198, P=.106) and females (chi-square=.617, P=.312) were more likely to report drinking alcohol, while freshmen (chi-square=2.790, P=.066) and males (chi-square=1.260, P=.189) were more likely to report using drugs in the past year.

This study found higher rates of illicit drug use in all categories, except for opioids and nicotine, than previous studies. Participants, who reported early first use, use to reduce stress, frequent binge drinking, familial history, and risky behaviors are at potentially higher risk of developing substance use disorders. Results suggest a need for further education on substance use and where to seek help in the area.
NUTRITION

2:45-3:30  Board 46
Veronica Vasconcelos
Colleen Avedikian (Faculty Sponsor)
Department of Sociology, Bristol Community College
An Analysis of the Relationship between Nutritional Awareness and Healthy Lifestyle Choices

Research has demonstrated a strong correlation between dietary practices and overall health. For example, the Standard American Diet (SAD) which emphasizes the consumption of red meat, processed foods, and high fructose corn syrup has been linked with heart disease, hypertension, obesity, cancer and Type II diabetes. Conversely, diets rich in high fiber fruits, nuts, vegetables, whole-grain foods are less likely to lead to illness.

Many people are not aware of the negative effects of eating a Standard American Diet. As a consequence, myths about SAD are pervasive. However, research also suggests that people who know about the correlation between diet and health are more likely to make better food choices. Further, they are more likely to engage in other practices correlated to healthy lifestyles, such as regular exercise, limited alcohol and recreational drug consumption, and not smoking.

The purpose of this research is to examine the relationship between nutritional awareness and healthy lifestyles among college students. Students at Bristol Community College will be surveyed regarding their knowledge of common SAD myths, as well as their own personal behaviors. An analysis of the data may reveal further variables as not yet identified as correlated to healthy lifestyle choices.

It is the hope of the research that the findings of this project can be used to develop strategies to educate college students about the healthy alternatives to the SAD diet.

3:45-4:30  Board 83
Lauren Erickson
Catherine Wickham (Faculty Sponsor)
Department of Food and Nutrition, Framingham State University
Gut Feelings: A Systematic Review on the Use of Probiotic Supplementation in the Treatment of Psychiatric Disorders in Adults

Nearly 1 in 5 Americans live with a psychiatric disorder (PD). PDs are clinically diagnosed mental illnesses that can have devastating effects on an individual’s quality of life. Typically, PDs are treated with prescription medications which can have varying levels of effectiveness. However, emerging research is finding connections between gut health and mental health in what is known as the gut-brain axis. This model indicates improvements to gut health lead to improvements in mental health. In an effort to synthesize the research on the gut-brain connection, this review aims to systematically assess the existing literature on the use of probiotic supplementation in the treatment of PDs in adults (18-65 years old). To be included in this review, research articles had to be primary research published in peer-reviewed journals.
within the last 10 years. Additional criteria for inclusion consisted of populations between the ages of 18-65 with a clinical diagnosis of at least one of the following PDs: anxiety, bipolar disorder, depression, or schizophrenia, according to the DSM-IV definitions for each PD. Studies were included if they were randomized, double-blinded, and placebo-controlled designs using various strains of probiotics in the treatment group. Symptom improvement was the primary outcome while composition of gut microbiota was included for review as the secondary outcome. Preliminary results from these studies suggest that probiotic supplementation may lead to significant symptom improvement in each of the PDs studied.

3:45-4:30 Board 84
Kaiden Girouard
Jerusha Nelson-Peterman (Faculty Sponsor)
Department of Food and Nutrition, Framingham State University
Sugar Substitutions in Sugar Cookies

Purpose: To create a reduced sugar cookie.

Methods: A control and two variations were prepared. Granulated sugar was replaced by 75% with Truvia Baking Blend and by 50% with Splenda Baking Blend. Semi-trained panelists (n=8) rated external appearance, internal appearance, aroma, flavor, and texture (1-5; 5=optimal). An overall product score was calculated for each variation. ANOVA with LSD post-hoc adjustments assessed differences between variations. Total kilocalories, carbohydrates, and sugars were determined using ESHA Food Processor software.

Results: The Truvia variation rated lowest in sensory analyses. The external appearance score was higher for the control (4.8+/-.07) than for Truvia (3.8+/-.07); the flavor of the control (4.9+/-0.4) and Splenda (4.4+/-0.7) was higher than Truvia (3.5+/-0.9), and the texture was higher for the control (4.9+/-0.4) than for Truvia (3.4+/-1.5). There were no other differences between the Splenda and Truvia variations for subjective measures. The control had 120kcal, 23g carbohydrates, and 12g sugar; Splenda had 140kcal, 17g carbohydrates, and 12g sugar; Truvia had 130kcal, 13g carbohydrates, and 2g sugar.

Discussion: A previous study on muffins discovered that up to a 50% sugar replacement is generally accepted, and another found that Stevia sugar substitutions like Truvia bake and brown like sugar. In this experiment, the least acceptable cookie was the Truvia variation with a 75% sugar replacement. The Splenda variation scores were comparable to the control and had fewer calories, carbohydrates, and sugars than the control. Up to 50 percent sugar replacement with Splenda can be a suitable alternative to white-sugar when baking sugar cookies.
Abstract

**Purpose:** To create a peanut butter banana chocolate chip cookie using banana as a butter replacer.

**Methods:** A control and two variations of cookies were prepared. Banana puree replaced a quarter (25%) and a half (50%) of the butter by weight. Semi-trained panelists (n=7) rated external and internal appearances, odor, flavor, and texture of each (1-5;5=“perfect”). An overall product score was calculated for each variation. Height, weight, and spread of each variation were measured. ANOVA with LSD post-hoc adjustments assessed differences between variations. Calories and saturated fat were determined using ESHA Food Processor software.

**Results:** There were no differences between the control, the 25%, and the 50% variations for sensory characteristics. There were no differences between the control and either variation for height, weight, or spread. The weight of the 50% variation was higher (26.2g+/−1.8) than the 25% variation (24.2g+/−1.1). The spread of the 25% variation (63.1mm+/−2.3) was less than the 50% variation (66.4mm+/−1.7). The control had 190 calories and 45 calories from saturated fat; the 25% variation had 180 calories and 40 calories from saturated fat; and the 50% variation had 170 calories and 30 calories from saturated fat.

**Discussion:** Previously, cookies using fruit purees have been found to have decreased spread due to decreased fat content. Fruit puree replacements up to 50% are just as acceptable as control due to an increase in chewiness and sweetness. In contrast, in this experiment, banana puree was deemed an acceptable alternative to butter in peanut butter banana chocolate chip cookies.

Purpose: The purpose of this study was to improve the fatty acid profile of regular meatballs based on 99% lean/1% fat ground turkey by adding an olive oil-in-water emulsion, while maintaining the sensory and structural integrity of traditional meatballs.
Methods: Subjective measures were assessed using a group of 7 semi-trained sensory panelists who scored the products' tenderness, flavor, juiciness, and overall acceptability using a scale of 1-5 (one being deemed “unacceptable,” and five being “perfect”). ANOVA tests with least significant difference post-hoc tests assessed differences between variations; nutrition analyses were conducted to determine proportion of macronutrients.

Results: No significant difference in subjective measures was observed between the control and variations (P > 0.05). Weight was different between the control and variation one (mean difference of 1.28 g, P = 0.000), as well as variation one and variation two (mean difference of 1.5 g, P = 0.000); there were no differences between variations for other objective measures. For reference, the control had a weight of 20.6±0.2, variation one was 19.4±0.2, and variation two was 20.9±0.3.

Discussion: In this experiment, use of these emulsions was a success. It is likely that the discrepancy in weight is a result of oil lost during cooking, or potentially because fat is less dense than water and protein. Overall the replacement was determined to be an attractive substitute; the results are similar to previous studies using olive oil-in-water emulsions as fat replacers in ground meat products.

Phenylketonuria (PKU) is a rare inherited metabolic disorder detected shortly after birth that affects the metabolism of dietary phenylalanine (Phe). If untreated, Phe can build up to toxic levels and cause irreversible damage to the nervous system as well as several hormone and neurotransmitter deficiencies. These detrimental effects, as well as minor side effects, may be prevented and/or reversed through a combination of metabolic/dietary control and pharmacologic/formula treatment. However, treatment approaches are mixed; while many practices have converted to the new treatment method or “treatment for life” there are still many that follow the old treatment methods which discontinue diet restriction and follow up care for mild PKU adulthood. Literature on both old and new treatment approaches was reviewed to establish the efficacy of each in the prevention of uncontrolled maternal PKU and improvement in social cognition and functioning in affected adults. Infants and children were shown to be fairly protected by both theories of treatment due to factors such as close clinical oversight and parental control of diet and treatment. Research on adult populations suggests significant social and cognitive disruptions resultant from uncontrolled PKU in teenage and adult years. Additionally, uncontrolled maternal PKU in early trimesters of pregnancy, resulting in newborn sequelae, was often preventable by adult metabolic control. Implementation of the new theory of treatment, maintenance of target blood Phe levels through dietary control and appropriate pharmacologic drug use, has significant positive correlations with improved executive and social cognition in adults and decreased occurrence of uncontrolled maternal PKU.
Government-Issued Nutrition Programs in US Schools and Their Effect on the Diet Quality of Enrolled Children

The diet quality of American children from low-income backgrounds are directly affected by government-issued nutrition programs in schools. Diet quality, a measurement of the balance, diversity, and nutritional contents of the food in one's diet, is necessary to understand not just the amount of food children have access to but the quality of their food. The objective of the group was to examine the gaps between the actual and necessary diet qualities of children enrolled in these programs to introduce possible changes for improvement. The government offers supplemental food assistance during school through the National School Lunch Program (NSLP) and the National School Breakfast Program (NSBP). Additionally, the Summer Food Service Program (SFSP) and the Backpack Program (BPP) provide children with food outside of the normal school schedule. Research on food assistance programs and dietary quality was collected from multiple peer-reviewed, reliable articles from PubMed and Wiley Online Library. It was found that in-school programs were able to relieve children of food insecurity, but they were not able to improve their dietary quality. In programs outside of school, if children followed the meal plan correctly, they would be able to get necessary nutrients, but the quantity did provide enough calories for childhood growth. Our research showed that there needs to be reforms to NSLP, NSBP, BPP, and SFSP so that low-income children are not just being lifted out of food insecurity but will also receive a nutritious diet.

Disparities and Coping Mechanisms in Relation to Long-Term Food Insecurity

In 2017, food insecurity affected 15 million households in the US. The USDA quantifies who is food insecure into two groups: food insecure and food secure. The objective of our research was to look into the more individualistic determinants, experiences, and coping behaviors of food insecurity. We used PubMed and the UMass Library Database to identify journals with qualitative information. The research showed that factors such as economic status, education, race, the makeup of a household, and local social and environmental characteristics may impact

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one’s likelihood of experiencing food insecurity. Beyond this, it was also evident that various
groups of people cope with the stresses and effects of food insecurity in different ways. It was
found that food insecurity influences children’s academic performance, social skills, and their
ability to focus on work. For food insecure adults, feelings of guilt and confusion were apparent.
Through these experiences it is evident that the problem is still existing despite the programs in
place to fix it. Further research showed that the programs aimed to help and ultimately solve the
issues of food insecurity such as SNAP use the data collected by the USDA. The results show
that it is necessary to conduct further research to see how more data can be collected to better
address each individual who is negatively affected by the consequences of food insecurity.
Qualitative methods have the potential of providing a more holistic view of who is affected and
how they cope to solve it from its roots.

4:45-5:30 Board 96
Camilla Prata
Erik Givens Bratland
Natalie Greenbaum
Clare Elizabeth Lonsdale
Caroline Anne O’Neill
Lisa Troy (Faculty Sponsor)
Department of Nutrition, UMass Amherst
Food Insecurity and Meal Skipping: Its Impact on Health and Academic Performance on School-
Aged Children and Adults

In 2017, food insecurity affected 15 million households in the United States. A food insecure
household is defined as one that does not foster a healthy and active lifestyle because there is
not a consistent access to food, therefore causing meal skipping. Meal skipping is defined as
the lack or omission of one or more of the traditional meals throughout the day. The question
that we wanted to answer in our research is what is the impact of meal skipping and food
insecurity on academic performance as well as mental and physical health in school-aged
children and adults. We used JSTOR, PubMed, AAP Publications, and Google Scholar
databases to research our objective. We utilized search terms such as “Productivity”,
“Depression”, “Anxiety”, “Diabetes”, and “School-Connectedness”. We found that food insecurity
and meal skipping negatively impacted productivity, attention, academic performance, and
possibly sleep. Food insecurity was also found to be a contributor to an increase in body mass
index, diabetes, depression, and anxiety. Food insecure teenagers were more than twice as
likely to have seen a psychologist, and almost three times as likely to have been suspended.
Parental distress and irritability related to food insecurity can produce a negative stressor on
children. The future depends on the minds of the youth, therefore our findings on the impact of
food insecurity and meal skipping on children and young adults should motivate lawmakers and
stakeholders to advocate for policy that reduces the incidence of inequity in access to healthy
and nutritious food.
Intuitive Eating is Associated with Higher Diet Quality and Healthy Body Composition among College Students

**Background:** Traditional dieting methods that rely on restriction have been found to be ineffective. Participants often cannot sustain quick weight loss from a diet in following years. Intuitive eating is a relatively new weight management approach that focuses on unrestricted eating following an individual’s internal hunger and satiety cues.

Research Gap: Studies thus far examining intuitive eating or similar approaches focus on obese, female populations and use BMI, a marker of obesity status.

**Methods:** This is a cross-sectional study following students enrolled at the University of Massachusetts over a two year period. Our study uses body composition as measured by waist circumference and BMI and diet quality measured by the Dietary Guidelines for Americans Adherence Index (DGAI) by the Harvard Food Frequency Questionnaire.

**Results:** Higher intuitive eating score was associated with higher diet quality, as assessed by the DGAI 2015 ($p < 0.02$).

**Discussion:** Our sample provided evidence for a more diverse population in terms of body composition but not race/ethnicity.

**Conclusion:** Our results suggest that intuitive eating appears to be associated with higher diet quality and better intuitive eating may improve dietary intake.
The CDC estimates that at least three million United States adults are diagnosed with an inflammatory bowel disease (IBD), a chronic inflammation of the gastrointestinal (GI) tract. Ulcerative colitis, also known as colitis, is an IDB that occurs within the large intestine and rectum. Through observing previous metabolomic studies involving mice subjects with colitis induced by dextran sulfate sodium and/or a dietary treatment, the colitic mice showed abnormal purine pathways with an accumulation of uric acid in the colon, when compared with healthy mice. Uric acid was assumed as a possible pro-inflammatory since an accumulation of its crystallized form is known for other inflammatory conditions like gout, but uric acid’s role in colon inflammation is unknown. Therefore, it is important to know the fates of purine metabolites in the GI tract. Using high-performance liquid chromatography (HPLC) with an ultraviolet (UV) detector, three purine metabolites were targeted for observation: inosine, hypoxanthine, and uric acid. As uric acid was undetectable with the UV detector, inosine and hypoxanthine were detected under 250 and 267 nm wavelengths, respectively. With the established standards from HPLC-UV method, the concentrations of hypoxanthine and inosine in colitic mice and non-colitic mice can be known, which are vital to analyze how purine metabolism may affect colonic inflammation. As for analyzing uric acid, higher sensitive detection methods, e.g. mass spectrum, can be pursued in comparison to the UV detector. The fates of purine metabolites will provide insight into studying the purine pathway’s role in colonic inflammation.

Similarities between the gut epithelia of Caenorhabditis elegans and humans, in addition to shared homologous genes, provide an opportunity to investigate the probiotic effects of bifidobacteria post-ingestion. In order to better understand how bifidobacteria impacts life span, health, and morphology of C. elegans, dietary preference behaviors must be studied. Due to its inherent ability to choose the higher quality food when allowed a choice, C. elegans serves as a particularly incisive model for studying such behaviors. Similarly, C. elegans acts as a favorable model for assessing the impact of probiotic microbes within the gut, as it feeds solely on bacteria and exhibits significant immune activity within its gastrointestinal track. The primary objective of this study is to identify how C. elegans fed bifidobacteria vary in physical form and functionality. Such insights are pertinent to understanding how the variety and fitness of the human gut microbiota may govern health outcomes throughout the body.
When worms are plated equidistant from *Escherichia coli* OP50 and *Bifidobacterium longum*, *C. elegans* exhibits a strong preference for OP50. This result necessitated the development of an improved plate assay to test whether conditioning naïve nematodes prior to preference exposure could influence which bacterium is selected as food. Lastly, this study explores how a mixed culture diet of *E. coli* OP50 and *B. longum* may benefit the health and development of *C. elegans*, in comparison to a *B. longum*-only diet.

3:45-4:30  Board 87
Stephanie Brigley
Susan Massad (Faculty Sponsor)
Department of Nutrition, Framingham State University
In a Nutshell: What Are Tree Nut Allergies, Who’s Impacted, and How Can We Reduce the Risk in Food Service Establishments?

Food allergies in adults and children are on the rise, and tree nut allergies are of great concern as they often lead to life-threatening anaphylaxis. Currently the only sufficient preventative strategies involve complete avoidance of the allergens and preparing for a possible reaction. The purpose of this research paper is to identify what tree nut allergies are, who is most impacted, why the allergies occur, and how to reduce the risk of allergic reactions in food service establishments. Food service personnel will be interviewed in order to assess the current steps being taken to protect students with food allergies. Through specific recommendations to reduce cross-contact, a much safer environment will be fostered in food service establishments for those diagnosed with food allergies.

3:45-4:30  Board 88
Inessa Jacqueline Burnell
Vinay Mannam (Faculty Sponsor)
Department of Chemistry and Food Science, Framingham State University
Regulation of Moisture Loss in Dough Types at Various Temperatures

During the baking process there are set bake times, matching specific parameters put in place by a recipe. The bake time assumes that the oven being used stays at a constant temperature for the duration of the baking period. Not all ovens are calibrated, which causes slight differences in temperature despite the temperature setting being the same for all ovens. This will cause variances in product quality. The objective of our study is to develop a model predicting the completion of the baking process of the product based on the moisture loss. Bread was regulated based on temperature and moisture loss rather than on temperature and time. This achieves a more consistent moisture content, texture, and color of the product, overall, improving product quality. This was done by measuring moisture loss of various types of bread at varying time and temperatures when baking. The experiments were conducted using a modified electric oven with thermocouples, which was used to obtain actual oven temperatures. A weighing scale measured the moisture loss in real time. The quality of the bread was determined via texture analysis and color measurement. At the end of the study the results were used to create a model that can be used to provide baking completion points based on moisture loss; considering product composition.
Acidified Foods to Reduce Waste and Extend Shelf Life of Local Crops

Developing shelf stable acidified canned foods using locally grown produce is an efficient way to make consumer friendly products, support local farms, and increase the shelf life of a food. Due to all of these benefits, this project aims to take 12 common household recipes that require locally grown produce which farmers may have in excess, and convert them to formulas which can be created on a large scale. In order for the formulas and standard operating procedures we create to have validity, the products we make must first be tested for safety factors such as pH and water activity, which have certain regulations according to CFR 21 Section 114. Additionally, other products may also have identity standards such as degree brix that must be met. When a final product reaches our safety and quality specifications, we send it in to a process authority to obtain a scheduled process, which formally acknowledges our product meets all the necessary specifications and requirements. Finally, the formulas must be filed with specific processing centers through the FDA, which will allow them to be remade by other people in the community. After our work is completed this project will allow farmers, and others with access to the project, to easily create safe and reliable acidified canned foods.

Metabolic Effects of Azelaic Acid in *Drosophila melanogaster*

Azelaic acid (AzA) is a dicarboxylic acid found in wheat, barley, rye, and sorghum. AzA is widely used as a topical treatment for acne and rosacea. Moreover, recent studies have shown its potential as a radical scavenger, antimicrobial agent, and antitumorigenic agent. However, it is not known if AzA has beneficial effects against fat accumulation and metabolic disease. Thus, the goal of this study was to determine the role of AzA in lipid metabolism using the common model organism, *Drosophila melanogaster*. Adult *Drosophila* were fed a sugar and cornmeal-based diet with 0, 200, 400, and 800 μM AzA. Body weight, triglyceride as fat accumulation, and glucose were determined. In addition, data was collected on food intake and locomotor activity of control and treated flies. Though body weight and fat accumulation were unaffected by AzA, other parameters suggest that AzA may have an impact on metabolism. This study may provide key insight into the role of AzA as a metabolic regulator. As key physiological processes are conserved between fly and human, this study may aid in the identification of AzA as a potential nutraceutical agent for prevention of obesity.
PHILOSOPHY

11:45-12:30    Board 56
Hanin Noori
Susan McPherson (Faculty Sponsor)
Department of English, Quinsigamond Community College
The Future of Religions

With the progress of science and the development of technology, what role will religion take fifty years from now? Will it be important? Will religion continue to exist? With science controlling almost every aspect of our lives, religion and old traditions are becoming less and less important for us. The two major religions, Christianity and Islam, have their own opinions about science and its progress. In some matters, they agree. In others, they do not. After all, it is not even guaranteed for them to even exist in fifty years to keep fighting for their old traditions to survive. This presentation will explore the future of religion.

1:30-2:15    Board 2
Fernanda Munari Joaquim
Daniel Arthur Soucy (Faculty Sponsor)
Department of Philosophy, Mount Wachusett Community College
Hypothesis for Climate Change

For years the words "climate change" have been used in newspaper, television or media all around us. Institutions have shared a collection of evidence in order to support this change in our world. Global temperature increases, warming oceans, shrinking ice sheets, glacial retreat, decreased snow cover, sea level rise, declining Arctic sea ice, extreme events and ocean acidification are some of the evidences. Even with all this information, climate change is not a belief for all. Seventy percent of Americans believe in climate change but only 58 percent of those believe humans have something to do with that. But how much evidence and what kinds of evidence do we need before we accept a hypothesis?

1:30-2:15    Board 3
Ariadne Day
Daniel Arthur Soucy (Faculty Sponsor)
Department of Philosophy, Mount Wachusett Community College
The Use of Human Enhancements for Optimal Health

This presentation seeks to urge the use of human enhancement for optimal health and to amplify its use in the treatment of current illnesses and diseases. Some of the reasons of why we need to embrace it are our own survival and the survival of our successors, our need to obliterate diseases in our species, and the need to relieve the suffering of our families and friends. Human enhancements can do a world of good if we just regulate it consciously.
Utilitarian, Kantian, and Virtue theories are three of the major theories of philosophy. The Utilitarian theory says that we should act based on what will produce the best results for the greatest number of people. Part of the Kantian theory says that we should not use people as mere means. The Virtue theory says that we should always be striving to develop our moral characters and use the Golden Mean. All three of these theories can be extended to include animals, and applied to the issue of animal testing to argue that the practice is unethical.

Libertarian Paternalism: Why It Is Sometimes Okay to Nudge

Paternalism involves interfering with another person's freedom for her own good. Paternalistic interference is common in both the law (seatbelt laws, helmet laws, etc.) and in our everyday interactions with others (withholding information from one's patient to spare her unnecessary harm, softening the truth to spare a friend's feelings, requiring our children to eat their vegetables, etc.). Because paternalism involves interference with individual freedom, it is criticized for being fundamentally incompatible with respect for individual autonomy. Rights of autonomy, critics argue, belong to rational persons by virtue of their capacity for self-governance, and paternalistic interference is plainly incompatible with respect for such rights.

The aim of this presentation is to show that although autonomy and paternalism may appear antithetical, there are special cases where they are not; paternalistic policies needn't always fail to respect rights of autonomy. The special cases are those that have been identified by proponents of Libertarian Paternalism; their essential feature is that choice is "nudged" in the direction of certain outcomes without introducing constraints on individual choice that are not already present in the situation. I will outline the Libertarian Paternalist's argument and defend the view against several important objections.

Twentieth-Century Barbarians: Leopold, Loeb, and Nietzschean Nobility

In 1924, Richard Albert Loeb and Nathan Freudenthal Leopold Jr. murdered Loeb's 14-year-old cousin Robert Franks. They claimed that they committed the murder to "prove their status
as Übermensch” in accordance with their understanding of the philosophy of Friedrich Nietzsche. This discussion interrogates whether Leopold and Loeb’s extreme interpretation of Nietzsche is a plausible interpretation of Nietzsche by analyzing Nietzsche’s conceptions of nobles, slaves, rank, caste, natural law, and non-universal moralities as they pertain to his illiberal and anti-modern metaethics. Furthermore, the inevitability of a natural ranking of humanity is shown to be a consequence of the will to power. Finally, this discussion contends that Nietzsche’s primary project of overcoming modernity is necessarily a social and political project and explicitly rejects the claim that Nietzsche is apolitical and concerned only with exceptional individuals.

Room 163  2:45-3:30  Panel 6
Jeffrey Beery
William Devlin (Faculty Sponsor)
Department of Philosophy, Bridgewater State University
Affirming Life in a Godless World: An Analysis of the Übermensch and Active Nihilism in Friedrich Nietzsche’s Philosophy

Perhaps one of Friedrich Nietzsche’s most famous parables is that of “The Madman,” illustrated in his work The Gay Science, where he professes the death of God. As Nietzsche recognizes, following the death of God is a devaluation of all value, what he terms nihilism. Nihilism, as a psychological condition, arises for Nietzsche as either passive or active. Nietzsche compares the former to that of Arthur Schopenhauer’s pessimism, whereas the latter is viewed as an affirmation of oneself. I aim in my paper to argue in support of Nietzsche’s conception of active nihilism as life affirming. To begin, I will give an overall assessment of Nietzsche’s “Madman” parable. Next, I will evaluate what Nietzsche means through the pronouncement, God is Dead. I will analyze Nietzsche’s arguments as to how the belief in God leads to a devaluation of our earthy focus, referencing his works On the Genealogy of Morals, and The Antichrist. I will then follow a detailed analysis of passive nihilism, where I present and explain the consequences of the death of God, and how this leads towards the psychological adoption of passive nihilism. From there, I will present and explain Nietzsche’s notion of active nihilism, as the ability to affirm one’s life in a godless world. Finally, through an analysis of Nietzsche’s Übermensch it will be made explicit how active nihilism affirms human existence in this life.

Room 165  2:45-3:30  Panel 6
Jonathan Michael Bevis
Gal Kober (Faculty Sponsor)
Department of Philosophy, Bridgewater State University
Environmental Ethics: Defending the Land Ethic

This paper considers the various ethical frameworks that inform decisions regarding the environment and particularly draws from the “Land Ethic” as presented by Aldo Leopold in A Sand County Almanac. I argue against the prudent approach, according to which our duty to take care of the environment stems from the need to secure a safe and healthy environment for
future generations. I make the case that our duties to the environment are not based on prudential considerations, but rather membership in the natural community, with equal value to all other members. This shift from prudent reasoning to a duty- and community-based moral reasoning implies a shift in our value structure, from an atomistic to a holistic point of view. Further, I argue that we should not only move away from prudent reasoning towards the environment, but in fact have a duty to the environmental community we are a part of. As opposed to the rationale of preservation for future human generations, a holistic, community-based ethic place value on the whole ecosystem as it is now, rather than in a future world.
Geoengineering for Preventing Global Warming

In recent years, the topic of global warming has been heating up. In the face of the fact that carbon dioxide continues to accumulate in the atmosphere, accelerating the greenhouse effect, the scientists are trying to find techniques to effectively cool the Earth. In 1991, Mount Pinatubo erupted, spewing 30 million tons of sulfide into the stratosphere. These tiny particles dispersed some of the sun's radiation, which bounced off into space and cooled the Earth. Using these sulfides as shields could be an efficient geoengineering technique for cooling the Earth. But at the same time, geoengineering technology may bring serious negative effects. The use of geoengineering techniques is likely to disrupt the global rainfall system and accelerate regional droughts. This paper will highlight possible strategies geoengineering is considering for preventing the overheating of the Earth.

The Possible Applications of Quantum Computers

Computers are essential in our life, from daily usage to rocket science. Computing machines have helped humans to reach calculation and performance beyond the original expectation. However, the physical limitations of the processor led the complex problems in the scientific field into a dilemma. An alternative solution for the situation has been proposed: the switch to quantum computers. In this paper, I present physics aspects of quantum computers such as quantum superposition and quantum entanglement. The quantum superposition allows the computers to bear more data with less memory being used and the quantum entanglement allows the machine to change the transmitting information instantly. The most significant part of this investigation will consist of applications of quantum computers. Examples based on D-Wave quantum machines use will be presented in comparison to classical computers use for solving problems in radiation medicine, displaying optimized ads and traffic flow optimization.
To find clean and substantial energy has always been a goal for scientists over many decades. Nuclear fusion is one of the best hopes to produce unlimited energy for the future. Realizing controllable thermonuclear fusion reaction is a tremendous challenge. The Tokamak is a device being used around the world to study the ways of producing controlled thermonuclear fusion power. It uses a powerful magnetic field to confine a high temperature plasma in the shape of a toroid. In this plasma, deuterium and tritium will be fused together and as a result a large amount of energy will be released. One of the challenges is to sustain such a high temperature plasma reaction, because large scale destructive events can cause the loss of confinement, which leads to the escape of plasma and causes the massive amount of heat to severely damage the Tokamak. For this reason it is very important to avoid plasma disruption. Artificial Intelligence is reshaping the world as it has the ability to think and learn and this is why it can be used for prediction. In this project, we will discuss how nuclear fusion works with Tokamak and how we leverage Recurrent Neural Networks (RNNs) to predict plasma disruption. We will also discuss other challenges in obtaining the controlled nuclear fusion.

This paper explains the importance of the computer simulation in the physics. Since computer simulations provide a useful tool to check the reliability of the chosen mathematical models, they become increasingly important in our life, and are widely used in science, manufacturing, health care and engineering. Computer simulations are ideal for presenting the relationship between the cause and the effect in Physics. For example, the change of the projectile trajectory when the launching angle is changed can be visualized and predicted using computer simulations. A very important aspect related to computer simulations is that they can provide information that is very difficult to obtain directly from experiments because of extreme environmental conditions. This paper will also exemplify how computer simulations facilitate the separation or simplification of the causes, the testing of hypothetical theories and the visualization and interpretation of the experimental results. Due to the rapid pace of hardware developments, the technology of computer simulations will continue to expand as a powerful tool which can help us make important advancements.
10:45-11:30 Board 18
Kevin A. Chacon Rodriguez
Eugenia Ciocan (Faculty Sponsor)
Department of Engineering and Physical Sciences, Bunker Hill Community College
Intro to Feynman Diagrams

With an understanding of Feynman Diagrams one will inherently understand other subjects that are necessary in understanding what makes up the observable universe. This paper will provide an introduction to Feynman Diagrams. One needs to understand the connection between the four fundamental forces and the standard model. These fundamental forces are what govern all the interactions and events that may occur in the universe. Being able to explain these interactions begins with being able to understand all of the elementary particles in the standard model for the reason that certain elementary particles are carriers to a specific force, hence the need to understand all of the fundamental forces. There are rules that allow one to draw a Feynman Diagram. The scope of this paper will mainly focus on introducing these rules rather than explaining why these rules exist. Thus this paper will walk through connecting the fundamental forces with the standard model, and lastly explaining the rules that would allow for an appropriate Feynman Diagram to be constructed, ultimately allowing one to understand a small event in our universe.

10:45-11:30 Board 19
Wonsang Yoo
Eugenia Ciocan (Faculty Sponsor)
Department of Engineering and Physical Sciences, Bunker Hill Community College
The Physics of the Car Brake System

Car brake systems have become important in all modes of transportation. This research paper is focused on the physics of a car brake system. The basic physics principles generating the force that stops the car when a small force is applied on the pedals of the car will be presented in the paper in close relationship with the structure of the brakes. Based on physics of brakes presented in this paper, safety rules of the car brake system will be highlighted.

10:45-11:30 Board 20
Wai Kin Yu
Eugenia Ciocan (Faculty Sponsor)
Department of Engineering and Physical Sciences, Bunker Hill Community College
The Railgun Technology

The railgun consists of a pair of parallel guides, on which the sliding armature is accelerated along the track by an electromagnetic induction, reaching a velocity of the order of $10^4$ m/s without using explosive propellant. Railguns have been an experimental technology for a period. However, due to the mass, size and cost of the required power supplies, this technology seems not to be efficient and this prevented it from becoming practical in the development of military weapons. This paper will show other ways and places to apply such an experimental
technology, including space rocket and satellite launchers as well as accelerators for spaceships. If we can apply this technology, space travel will become easier and less expensive.

11:45-12:30    Board 37
Shashank Jayakumar
Andrea Pocar (Faculty Sponsor)
Department of Physics, UMass Amherst
The Effects of Fused Silica on Light Yield

Dark matter remains as one of the biggest, most exciting mysteries in modern physics. Other than knowing that it makes up 85% of the matter of the universe, the only other pieces of information we have are that it does not interact with electromagnetic forces, but is affected by gravity. One particular candidate that fulfills these requirements is a WIMP (Weakly Interacting Massive Particle), a theoretical particle that experiences weak force interactions.

One experiment that attempts to directly detect WIMPs is DarkSide, a Two-Phase Liquid Argon Time Projection Chamber (LAr TPC). While DarkSide 20k, the final detector, is still in construction, simulations are being employed to model its performance. These simulations are written using Geant4 and G4DS, a simulation software produced by CERN and the toolkit specifically designed for DarkSide, respectively. As processing power is limited, it is paramount to optimize simulation efficiency. One way this can be achieved is to replace complex geometries within G4DS with simple mathematical models that approximate the effects.

This presentation will focus on UMass's work with G4DS to examine the light yield differences due to a 0.5 mm layer of fused silica deposited on the Silicon PhotoMultipliers (SiPMs) of DarkSide-20k. These SiPMs face the active LAr volume, detecting the scintillation light produced by WIMP interactions. By comparing the difference in light yield due to the fused silica windows, G4DS no longer has to explicitly simulate the fused silica, increasing efficiency and computation times.

11:45-12:30    Board 79
Ian Murphy
Anthony Dinsmore (Faculty Sponsor)
Department of Physics, UMass Amherst
Assembly, Growth, and Function of Nanoscale Sheets and Rods Based on Amphiphilic Molecules

The goal of this project is to develop the science behind fabrication of nanoscale sheets and rods composed of amphiphilic molecules for a variety of applications ranging from pipeline repair to biomedicine. The amphiphilic molecules, when dissolved in dimethyl sulfoxide and introduced to water, self-assemble into thin 2D sheets or rods only a few nanometers thick and several microns in length. Understanding the connection between molecular design and the properties of assemblies of these sheets and rods is imperative to specializing such small
molecular structures to perform any number of tasks, such as removing cells from suspension or acting like platelets in blood to patch leaks. This study will address this connection, focusing on various aspects of the nanoscale assemblies: the growth rate, steady-state size and shape, and internal molecular orientation. Starting with custom-designed amphiphilic molecules, we have explored conditions of molecular assembly in aqueous solutions by varying the procedure of sample preparation. We use dark-field optical microscopy to observe the assembly of the molecular structures over time while they are in suspension. This work is supported by the U.S. Army Research Office (W911NF-15-1-0568).

**Room 909  11:45-12:30  Panel 3**
Karen Poon  
Eugenia Ciocan (Faculty Sponsor)  
Department of Engineering and Physical Sciences, Bunker Hill Community College  
Redesigning Self-Adjustable Medical Beds

Exercise is extremely important for patients’ recovery, as it improves the blood flow and flexibility of the patients and prevents future injuries. However, a lot of the nursing homes do not have enough resources for patients while many patients are not provided enough attention and care during their process of recovery. Right now most of the facilities in the nursing homes are not designed to help with patients’ recovery. As a result, patients are not allowed to maintain enough body movement and to stretch whenever they want. Based on some of the physical therapy and exercise in the nursing home, the new idea is to add automatic control to the patient’s bed, so that the nursing home can handle the shortage of staff. In order to improve the design of a medical bed, the new bed will include massage movement in different directions. It will also allow support patients when they want to turn their body with a speed and force that are controllable. The bed can also focus on massaging specific muscles. The project will be focused mainly on patients who are conscious but have difficulties with muscle movement. This research paper will have three parts: the purpose of design, the mechanics behind the design and the safety. While the need for medical beds is going to increase as human longevity increases, the self-adjustable medical bed presented in this paper will help patients to recover and will make it possible to reduce the cost of running the nursing home.

**12:40-1:25  Board 12**
Jeremy Michael Laprade  
Anthony Dinsmore (Faculty Sponsor)  
Department of Physics, UMass Amherst  
iCons: Mechanical Properties of Charged Granular Media

Authors: Jeremy M. Laprade, A.D. Dinsmore

Many important processes are based on our understanding of charged granular media, such as laser printing, plastic recycling, and powder coating. Granular materials which are electrically insulating and water-repellent have a unexpected response to the application of like-charges. We have observed that, when subjected to many like-charges, these grains become cohesive...
rather than repulsive as Coulomb’s Law would suggest. We hypothesize that the charges are inducing polarization in the grains, thus causing the grains to be attracted to the ion between them. To test this hypothesis, we examine granular materials with high dielectric constant, which are more susceptible to polarization. Like-charges are deposited on a granular sample, then quantified by a measurement of the voltage on the surface of the pile ($V_s$). To quantify cohesiveness, the sample is then tilted to its maximum angle ($\theta$), defined by the highest angle the pile will remain intact without breaking. We have found that $\theta$ is proportional to $V_s^2$, and can exceed 90 degrees relative to the horizontal. We have also found that grain shape is a relevant factor in sample cohesiveness. Samples with irregular-shaped grains are more cohesive than samples with spherical-shaped grains under the same $V_s$ and humidity conditions.

This project was partially supported by the Xerox University Affairs Committee.

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**12:40-1:25  Board 15**
Zachary Sun  
Mark Tuominen (Faculty Sponsor)  
Department of Physics, UMass Amherst  
iCons: Behavior of a Non-equilibrium Self-Organizing System: A Potential Means to Enhance Energy Efficiency in Systems with Functional Intelligence

Research and development efforts in so-called artificial intelligence has increased dramatically. However, designing AI with energy efficiency is becoming an important priority. It is not yet clear how this should be done. One possible inspiration is to study the physics of self-organizing systems, both non living and living, as guidance for future designs with functional intelligence. Irreversible processes at non equilibrium can drive a system to self-organize and exhibit characteristics shown in systems known as dissipative structures. Our research explores the characteristics of experiments that use electrically conductive beads in an applied electric field. The setup resembles a primitive dissipative structure that can be interpreted as a possible bridge between behaviors in nonliving and living systems. Using video and electrical measurements, we investigate the transient and steady-state behavior of self-organizing worm-like behavior under a range of initial and driving conditions. The non-equilibrium processes of a nonliving system exhibiting characteristics that also exist within a living system are a possible way to explore biomimetic structures that exhibit intelligence.

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**12:40-1:25  Board 16**
Anwesha Saha  
Anthony Dinsmore (Faculty Sponsor)  
Department of Physics, UMass Amherst  
iCons: Nanoscopic Sheets as a Means to a Future with Self-Healing Infrastructure

Imagine microscopic ‘smart’ sheets that can identify a leak and patch it quietly, without human interaction. Ultra-thin sheets could be designed that selectively bind to certain surfaces or shrink-wrap particles in a suspension. These thin elastic structures can be synthesized using

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amphiphilic molecules, designed to self-assemble into sheet-like morphologies. However, little is known about the mechanical properties of these assemblies. The goal of this work is to optimize the assembly of these molecules and to characterize the properties of such assemblies. Dark-field optical microscopy was employed to monitor sheets dispersed in water. To characterize their response, we studied the interaction of the thin sheets with lipid vesicles. Vesicles are a useful test target as they are small, soft and squishy, so they loosely mimic cells. Since vesicles have a defined stiffness, we aim to extract sheet properties based on their interactions. We have observed sheets binding to the vesicles causing their shapes to change. This provides interesting insight into the nature of adhesion, bending energy and wrapping mechanisms of these sheets, models for which are currently under analysis. These studies aim to shed more light on the manner in which these sheets can be used in the different venues that they have potential in, namely pipelines that may corrode and rupture, fluids that may contain toxic cells to be removed, etc.

This work was supported by the U.S. Army Research Office (W911NF-15-1-0568). We also thank the Commonwealth Honors College and the Integrated Concentration in Science program for their support.

12:40-1:25  Board 37
Anushka Shrivastava
David M. Kawall (Faculty Sponsor)
Department of Physics, UMass Amherst
High-Precision Calibration Using Computer Vision Techniques

The g-2 experiment at Fermilab requires high-precision calibration techniques to be able to measure the magnetic moment of a muon to 140 ppb. This particular calibration technique determines the location of an NMR probe with sub-millimeter accuracy in order to measure a magnetic field up to 1 ppb. A UV light illuminates glowing dots on the NMR probe, then a Raspberry Pi captures an image of the glowing dots in the dark. The program analyzes the image to determine the real-world location of the NMR probe. This technique is helpful to the g-2 experiment because it is suitable for operation in a vacuum environment, does not interfere with the magnetic field, and allows experimenters to re-calibrate the NMR probe more often.

12:40-1:25  Board 46
Justin Edward Leo Roberts
Shubha Tewari (Faculty Sponsor)
Department of Physics, UMass Amherst
Analyzing the Flow of a System of Spheres Using Shape-Anisotropic Particles

We report here on a simulation conducted using LAMMPS [https://lammps.sandia.gov] of a small concentration of dimers in a gravity-driven flow of spheres. The simulation box is a quasi-2D vertical hopper with a rectangular outlet containing a 1% concentration of dimers in an equal mixture of frictional spheres of diameter ratio 1.2. Each dimer consists of two contacting spheres
glued together, and all spheres undergo the same Hertzian contact interactions. We track the positions, velocities and orientations of the dimers relative to the flowing spheres and find that while the flow is collisional, the dimers do not reorient significantly except near the walls and near the outlet, where the fluctuations in the sphere velocities are higher. However, as outlet size changes, the region with the largest reorientation per dimer moves from near the edges for large openings, to near the center for small openings, thus appearing to track where velocity fluctuations are large.

12:40-1:25 Board 47
John Blatchford
Andrea Pocar (Faculty Sponsor)
Department of Physics, UMass Amherst
Characterization of Silicon Photomultipliers for the nEXO Neutrinoless Double-Beta Decay Experiment

Essential in shaping the Standard Model of particle physics are neutrinos, so common that millions pass through us each day, yet mysterious due to their tiny mass and absence of electric charge. Following the recent confirmation of non-zero neutrino masses in 1998, a large number of experiments have been undertaken to study its nature and magnitude in great detail.

nEXO is one such effort, a second-generation experiment aimed at searching for neutrinoless double-beta decay ($0\nu\beta\beta$) of Xe-136, a not-yet-observed nuclear decay which would show that neutrinos are their own antiparticle. nEXO is a five tonne detector that could detect $0\nu\beta\beta$ in Xe-136 if its half life is $\approx 5 \times 10^{27}$ years or smaller. $0\nu\beta\beta$ only occurs if neutrinos are massive, and the measurement of its half life could provide, with some model-dependent assumptions, a direct method of measuring the absolute scale of neutrino masses, as well as representing a beyond the Standard Model process in which ‘lepton number’ is not conserved.

This presentation will focus on UMass’s work with silicon photomultipliers (SiPMs), state-of-the-art devices to efficiently detect the VUV scintillation light produced in liquid xenon by ionizing radiation. nEXO plans to use a $\sim 4m^2$ array of SiPMs, which have already been shown to be extremely radiopure, a necessary condition for ultra-rare-event detectors. In the UMass setup, important SiPM characteristics such as noise level gain, and photon detection efficiency are tested in liquid Xe-136. Results from our UMass lab measurements will be presented.

1:30-2:15 Board 70
William Jacob Fines-Kested
Emily Maher (Faculty Sponsor)
Department of Physics, Massachusetts College of Liberal Arts
Building Dynamic Models Using Reservoir Computing

Chaotic dynamical systems are those with sensitivity to initial conditions and change over time. Prediction of these systems has been difficult because of the sensitivity of the system to initial conditions in the system’s state. Work has been done to build predictive models using numerical methods and simulated data, but little work has been done in this field using experimental data.
that includes noise. Recent work done in a machine learning field called “reservoir computing” demonstrates success in predicting dynamical systems. We test this reservoir computing technique on a time series data set containing the concentration of bromide ions in a Belousov-Zhabotinsky reaction. We find that we are able to obtain both short-term predictions with minimal error, as well as long-term forecast models with oscillating error that mimics the behavior of the original data that includes noise.

1:30-2:15 Board 71
Eric Paul Struth
Jonathan P. Celli (Faculty Sponsor)
Department of Physics, UMass Boston
Modeling Tumor-Stroma Interactions and Drug Delivery in an In vitro 3-D Co-culture Model of Pancreatic Cancer Cells and Fibroblasts

Studies have shown that mechanical interactions between tumor cells and stromal components in the tumor microenvironment have significant impact upon disease progression and therapeutic response. This is particularly provocative for tumors of the pancreas, which are associated with development of stiff fibrous stroma that impedes drug delivery and contributes to the dismal mortality rates for this disease. Here we describe an in vitro 3D co-culture model of pancreatic ductal adenocarcinoma (PDAC) that recapitulates biophysical interactions between tumor and stromal cells and we leverage this system to study drug delivery. PDAC cells overlaid on laminin rich extracellular matrix (ECM) form compact multicellular nodules. When normal human fibroblasts are added following initial nodule development, a marked interaction between the two cell types occurs whereby fibroblasts and tumor nodules co-migrate, attach to form network-like structures, and contract into a dense compressed mix of tumor and stromal cells resembling fibrotic PDAC in vivo. We use particle image velocimetry (PIV) to analyze how co-culture composition impacts dynamics of cell co-migration and fibroblast contractility. We further implement this model system as a platform to evaluate a strategy to enhance PDAC drug delivery. In preliminary experiments we have found that photodynamic therapy (PDT), which uses a light activated drug called a photosensitizer, is effective at destroying stromal fibroblasts. Using confocal imaging of our in vitro model tumors we are testing the hypothesis that pre-treatment with PDT may decrease stromal compressive stress (“loosen” the stroma) to increase subsequent chemotherapy drug delivery. Going forward this PDAC model system could be useful for evaluating PDAC stromal depletion strategies more broadly as well as for basic studies of this lethal disease.
NASA scientists and military researchers are developing devices which have the capability of launching projectiles at extremely high speeds using only electricity and magnetism. Railguns are most often used by the military as an alternative to more expensive explosive projectiles, however most railguns are still in the research and development phase. NASA has proposed a linear accelerator that uses the same physics as a railgun which would launch spacecrafts out of the Earth’s orbit into space. Due to the fact that railgun technology is based on fundamental concepts in electricity and magnetism, the physics of a railgun does not change based on size, allowing similar technology to be produced in a small laboratory. I will construct a safe, low voltage, small-scale railgun consisting of aluminum rails and sliders which are connected to a supercapacitor bank which supplies a rapid current that produces a large magnetic field. This field exerts a large force on a current carrying slider. Once the building phase is complete, I will use a Pasco system to measure each slider’s resulting velocity, acceleration, and force applied to it. For the current and capacitance used, I expect a maximum acceleration of around 15 m/s² and a velocity of 1.5 m/s.

Analysis of stochastic models of gene expression provides insights into how phenotypic variation arises in genetically identical cells. Current approaches primarily focus on the two-stage and three-stage gene expression models. Several analytical techniques have been developed for characterizing mRNA and protein distributions arising from these basic models. However, for more general models with bursty arrivals of mRNAs/proteins, exact analytical results are often difficult to obtain. In this work, we identify criteria for the burst distributions for which exact solutions can be obtained for steady-state distributions. We develop a novel approach, involving a generalization of the Poisson ansatz introduced previously, using which we obtain previously derived results and also obtain new results involving models with feedback regulation. The approach developed in this work can serve as a building block for characterizing mRNA and protein distributions in complex stochastic models of gene expression.
Computational Modeling of Time Dependent Quantum Systems

This study aims to develop a multitude of efficient algorithms associated with solving the time-dependent Schrödinger equation (TDSE). Common methods such as the finite difference method and spectral method are direct in solving lower dimensional, structured domains. Using a mesh to discretize space as well as time is an effective tool but runs into problems with few body interactions, higher dimensions, and arbitrary domains. As a result, there is current interest in studying related methods such as the finite element method as well as meshfree approaches to tackling the TDSE.

Our approach is composed a finite difference model capable of dealing with the TDSE for arbitrary potentials in 1-dimensional space. The key element of this algorithm is a symplectic technique for time integration and allows reliable extraction of physical observables, with a focus on the flux. Having a norm-preserving method for extracting flux allows many features to be explored like the reflection and refraction coefficients of arbitrary potentials. The algorithm has also already been applied to arbitrary potential barriers extracting the transmission coefficients of a moving waveform. Such an algorithm can be applied to the calculation of atomic excitation and transition rates in ion-atom collisions to obtain absorption and emission spectra of few active-electron atoms of interest to astrophysical systems.

Characterization of Novel Surfactant Molecules for Liquid Crystal Phase Triggering

Liquid crystal systems have the potential to produce macroscopic reactions from microscopic stimuli, making them exciting systems for triggered assemblies. Such triggerable systems are a cornerstone of biological systems’ ability to respond to their environment. Here, we use a novel surfactant composed of a trimer of amphiphilic molecules. These trimeric surfactants have three hydrophobic tails, with one tail varying in length. We have characterized the phase of the liquid crystal, 5CB, in spherical droplets as a function of surfactant type, surfactant concentration, and the diameter of the 5CB droplet. We find that small droplets, less than 11 µm in diameter, with high surfactant concentration, are more likely to be in the radial phase. We also find that the concentration and droplet sizes for the phase transition depended on the variable tail length.
PLANT, SOIL, AND INSECT SCIENCES

8:30-9:15    Board 39
Ellyse Shannon Maynard
Elsa Petit (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Screening Commercial Endomycorrhizae for Grape Production

Endomycorrhizae is known to colonize plant roots and to have a symbiotic relationship with the plant by providing a greater surface area. The larger surface area allows nutrients and water to pass from the soil through the hyphal arbuscules to the cortical cells, in return the plant provides sugars and other carbohydrates to the fungus. With the symbiotic relationship, both parties flourish but it is not known to what extent. The study is going to be conducted on grape cuttings; its focus is to analyze the effect of endomycorrhizae in the rooting and grafting process. The commercial endomycorrhizae with be screened prior to the experiment to ensure the labelled spore amount and type is accurate. Once the fungus is screened, the cuttings will receive an endomycorrhizal dip and be grafted and rooted. Every week for about 6 weeks, we will quantify the following in the un-inoculated control and the inoculated cuttings: (1) How fast the graft union grows and heals? (2) How fast is the change in the cutting mass? (3) What is the size of the callusing tissue at the graft union as a proxy for Crown Gall infection?

8:30-9:15    Board 87
Jessica Rodriguez
Om Parkash Dhankher (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Analyzing Arabidopsis g-Glutamyl Cyclotransferase 1 (GGCT1) Gene for Glutathione Homeostasis and Tolerance to Abiotic Stresses

The Glutathione homeostasis pathway is a crucial mechanism in plants. Glutathione (GSH), an important antioxidant, is a tripeptide made from cysteine, glycine, and glutamate via peptide linkages. It plays a vital role in the survival of cells by protecting them from the deteriorating action of reactive oxidative species (ROS) like free radicals, peroxides, lipid peroxides and it protects cells from xenobiotics like heavy metals and pesticides. There are three members of Gamma-glutamylcyclotransferases (GGCTs) gene family in Arabidopsis thaliana, which are involved in GSH homeostasis. Previous work using knockout t-DNA mutant and over-expression (OE) lines of AtGGCT2;1, one of the three paralogs of GGCTs in A. thaliana, has suggested that OE lines were more tolerant to specific hormonal and heavy metal stresses such as cadmium and arsenic. Currently, we are characterizing AtGGCT1, another paralog of GGCTs in Arabidopsis. Homozygous OE lines and t-DNA mutants were screened this for tolerance or sensitivity, in comparison to wild-type plants, under various abiotic stresses such as drought, salt and heavy metal stresses. Our preliminary results showed that the t-DNA mutant lines were severely sensitive to mercury (Hg), cadmium (Cd) and arsenic (As). Whereas GGCT1 OE lines exhibited somewhat tolerant phenotypes when grown on media supplemented with Hg, Cd, and As well as high salinity. These results indicate that manipulation of GGCTs could be used to increased tolerance to environmental stress in crops.
**8:30-9:15  Board 88**  
Nicholas James Marinelli  
Om Parkash Dhankher (Faculty Sponsor)  
Stockbridge School of Agriculture, UMass Amherst  
**Bioengineering Camelina sativa to Increase Oil and Seed Yield for Biofuel Production**

*Camelina sativa* is an oilseed crop that shows promise for uses in the biofuel industry. Our primary objective is to bioengineer *Camelina*, enhancing oil yields for more efficient biofuel production. We have previously transformed the *Arabidopsis* DGAT1 gene and the yeast GPD1 gene into *Camelina*, as they are known to be involved in increasing triacylglycerol (TAG) levels. *Camelina* lines co-expressing these genes have shown oil increase up to 13% and 40-50% increases in seed mass. We next performed metabolic and transcriptomic analysis to identify other aspects of the lipid synthesis pathway for further bioengineering. One triacylglycerol lipase (TGL1) was identified to be involved in the breakdown of storage lipids through TAG lipase activity. Using the RNAi approach, TGL1 gene expression was suppressed in transgenic *Camelina* lines. Homozygous lines were identified and replicated for analysis. Total seed yield, relative seed mass, total oil content, fatty acid profiling, and harvest index are determined in order to test the effectiveness of gene suppression for further increase in oil yield. Our results showed a significant increase in seed yield and oil contents in TGL1 RNAi lines. Success in increasing oil yields with the suppression of TGL1 allows for potential gene stacking with DGAT1, GPD1, and other key genes for ultimate oil increases.

**4:45-5:30  Board 25**  
Bryanna Lee Joyce  
Lynn S. Adler (Faculty Sponsor)  
Department of Biology, UMass Amherst  
**Testing Pollen Diet as a Novel Management Tool in Honey Bees**

Insects pollinate about 94% of wild flowering plants globally, and honeybees alone pollinate $5-14 billion per year in crop production [1,2]. In recent years, several bee species have been declining and US honey bee colonies have declined 59% from 1947 to 2005 [3]. Diet plays an essential role in pollinator health. Poor nutrition paired with other stressors such as disease and parasites, can affect honey bee health and colony strength [4]. In lab studies, sunflower pollen has been shown to dramatically reduce certain microparasite infections in bumble bees and honey bees [5]. To test whether sunflower pollen can improve the health of managed honey bee colonies (*Apis mellifera*), I conducted a 5-week experiment with 55 hives in Barre, Massachusetts in which I measured pathogen loads in colonies provided one of five different diet treatments: sunflower pollen, wildflower pollen, mixed sunflower/wildflower pollen, the commercial soy-based substitute BeePro®, or no pollen. Two common pests, Varroamites and Nosema, were not affected by diet. Sunflower and wildflower had less chronic bee paralysis virus and deformed wing virus than colonies fed BeePro® or nothing. There was no effect of treatment on Kashmir bee virus or Lake Sinai Virus II. All hives tested positively for the Varroa Destructor virus. Overall, the strong effect of sunflower pollen on pathogen loads documented in individual bees in controlled lab studies does not appear to scale up to free-foraging hives. Access to real pollen reduced certain viruses, indicating the importance of access to adequate floral resources for hive health.
Neoliberalism and Colonization: Physical and Economic Domination through Resource Control

Water has always been the most valuable resource on this planet. Without exception, every species on Earth relies on some form of water for survival. Since the conception of our humankind, water access has been a fundamental component of every civilization’s existence, and a determining factor in their persistence and longevity. Thus, control of this vital resource has long been a means of exploitation, domination, and oppression. Contemporary water management has recently trended towards privatization of water systems, outsourcing business to international conglomerates and disempowering local water practices, leaving communities stripped of their dignity, and facing similar conditions as resource-dominated communities under colonization. The privatization and domination of water systems has proved to be the cause of international calamity, and its continuation will undoubtedly give rise to continuously increasing inequality and suffering.

In this paper, the role of colonization and neoliberal imperialism are compared, and shown to reach similar ends in the context of water security and access. Case studies from across the globe, including Palestine and Lebanon, Syria, Bolivia, and India will be used to draw similarities between colonial imperialism and neoliberalism, and highlight the continuous devastation deriving from natural resource domination, mismanagement, and privatization.

Institutional Corruption in the Pharmaceutical Industry and the Case for Publicly-Funded Clinical Trials

The issue of exorbitant pricing of medications by the pharmaceutical industry has been a prominent matter in recent political discussions. Currently, the system of funding for clinical research by private companies with a financial interest in the success of the drug in consideration creates perverse incentives to engage in corrupt practices. The purpose of this paper is to outline the particular issues and implications of institutional corruption in the pharmaceutical industry. Then, by addressing several cases in which the government has completed basic research on a notable drug, but not completed the clinical trials, and subsequently paid exorbitant market prices for those medications, I will argue the case for a system of public funding of clinical trials, taking influence from Baker (2008). While this system will be particularly difficult to implement politically, unlike more moderate proposals such as reference-based pricing solutions (RBP), value-based pricing solutions (VBP), or increases in the capacity of regulatory bodies such as the FDA, a system of publicly funded clinical trials will...
simultaneously address pricing problems and disincentivize corrupt practices by large pharmaceutical companies. Further, it will have a greater impact on reducing drug spending and promoting the development of safer and more effective drugs.

**Room 162  10:45-11:30  Panel 2**
Conan Chen
Deepika Marya (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Bridging the Global Digital Divide in South Africa

The gap between how people in different countries access or experience the Internet or other Information and Communication Technologies (ICT) is referred to as the global digital divide. Over the past decades, several solutions for bridging the global digital divide have been offered. Since the 1990s, proponents of ICT have attempted to increase low-income countries’ Internet connectivity and access to other kinds of technology, with the goal of encouraging economic and human development. In recent years, multinational technology corporations have partnered with cellular service providers in countries across the globe to provide low-income individuals Internet access through the practice of zero-rating. Zero-rating allows people to access the Internet for “free” but in a limited manner, such as by only permitting them to use certain web applications. One country in which several zero-rating programs are now offered is South Africa. In South Africa, the cost of mobile data is much higher compared to other countries and WiFi coverage is sparse. Zero-rating may therefore be an attractive way to access the Internet for many South Africans. However, it also poses several issues. Engaging with the Internet in an enriching way requires not just connectivity but access to meaningful content. Additionally, by allowing outside corporations to set the conditions for South Africa’s Internet connectivity, the country loses the ability to decide what policies are most appropriate. Furthermore, zero-rating is not purely a humanitarian effort; corporations also stand to profit by targeting South Africa’s market and pushing for market liberalization and deregulation.

**11:45-12:30  Board 80**
Taylor M. Vahey
Kerry Drohan (Faculty Sponsor)
Department of Languages, Literatures, and Cultures, Cape Cod Community College
The Political Climate of the Market

This paper will look at the way the stock market has interacted with the Trump presidency. This paper will also compare the historical behavior of the stock market including during other times in American history. Media coverage of the stock market will be discussed including how much the public understands. Trump’s effects on the market through his presidency will be analyzed based on economists and brokers professional opinions. This paper will cover how much security that investors feel they have in the market during this Presidency.
POLITICAL SCIENCE

Room 162  8:30-9:15  Panel 1
Alexander Jackson Young
Deepika Marya (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Neoliberalism and the Rise of the Far-Right

This study examines the current rise of right-wing politics in Europe and attributes some of the underlying causes to neoliberal economic policies. To understand this phenomenon, I will examine the history of neoliberalism, and how its economic policies have successfully destabilized all other forms of economic structures in Europe. Understanding the failures of capitalism before neoliberalism is vital to understanding the rightward shift in politics. This study will use elements of Marxist, Neoliberal, and World Systems frameworks to analyze data I have collected. Looking forward, I will also study the response by the left to this new era of politics, and what can be done to change the neoliberal system to combat inequality.

10:45-11:30  Board 54
Cella M. Mariani
Claudine E. Barnes (Faculty Sponsor)
Department of History and Political Science, Cape Cod Community College
#It'sComplicated: Social Movements and the Media

Grassroots social movements have always been a driving force for change in America. Starting with the revolutionary ideas of the Founding Fathers, to the Pullman Strike of the Gilded Age, to the Civil Rights movement of the 1960s, populist social movements were the catalyst for major policy shifts within the country. However, success in these endeavors would not have been possible without the use of Media to spread the word of Change. In this current age of social media and the “24-hour News Cycle,” it is easier than ever for organizers to spread their ideas, but with so many ways for Americans to access and share news, can social movements keep up with the ever-shifting public narratives and maintain their core messages? This paper seeks to answer that very question. Focusing on contemporary social movements such as #MeToo, Black Lives Matter, Occupy Wall Street, and the March for Our Lives, this paper follows each from its inception to its current iteration and analyzes how Mass Media have influenced or shifted their narratives.

10:45-11:30  Board 55
Madison Mykel Medeiros
Claudine E. Barnes (Faculty Sponsor)
Department of History and Political Science, Cape Cod Community College
Addressing the Misconceptions of Immigration

This paper will examine and redefine the misconceptions regarding the immigration process in the United States of America. With President Donald Trump and the current administration focused on changing the immigration process, it becomes difficult for natural-born citizens,
those who did not have to undergo the journey of citizenship, to recognize and understand how
the process truly works.

Research includes studying those professions that specialize in the field of immigration:
Attorneys at law, local volunteers, ACLU lawyers. This paper also examines the history of
immigration in America, as well as politician’s and society’s reactions.

The examination proved that immigration is a complex issue that Americans are not properly
educated about. This paper will discuss the legal process of immigration in the United States of
America.

10:45-11:30    Board 56
Hana Zayatz
Claudine E. Barnes (Faculty Sponsor)
Department of History and Political Science, Cape Cod Community College
Polarization of Police Brutality in Contemporary America

This paper will explore specific cases that cause polarization of police brutality in contemporary
America. Certain events will be highlighted, analyzed, and discussed. Media coverage and
representation will also be considered. Police brutality in America is not new, however the
advance in technology has allowed for information to be more easily accessed by the public.
Along with police brutality comes the resistance, for example the Black Panther Party in the
1960’s and the current Black Lives Matter Movement.

10:45-11:30    Board 76
Joseph C. Thorpe
Kerry Drohan (Faculty Sponsor)
Department of Languages, Literatures, and Cultures, Cape Cod Community College
Behind the Scenes: The First Amendment and the Media Economics Influencers of Division

A historical perspective of the First Amendment forms the background for an exploration of
today’s conglomerate news influencers, and the effects of bias and division in news reporting.
The First Amendment did not always carry the weight Americans on all sides of politics hold
dear. The litigations, public and professional opinions, lobbyists, politicians, and organizers that
shaped this view require one to be aware of First Amendment history. The outcomes of these
set the stage for the current state of news reporting and economics controlled by wealthy elites,
the lively discourse of which is sometimes buried under other daily news items. An analysis of
the news media’s true modern nature is also discussed.
10:45-11:30  Board 80
Nian Liu
Andre Alexis Robinson (Faculty Sponsor)
Honors Program, Bunker Hill Community College
Resistance Movements = Economic Recession (#China)

In 1989, the Tiananmen square riot started by millions of Chinese young students, which caused a massive economic decline for many cities across China. Although the intention was to fight against corruption and to democratize China’s political system, the movement dramatically damaged China’s living standard. In my research, I studied, how resistance movements in China are interfering with the Chinese economy. Furthermore, I analyzed the consequence of individual resistant movement in China. Such as Tibet resistance for independence, Xinjian's war on terror, and the importance of government stabilization in China. After further research, I concluded, China’s financial markets, economic development, and material standard of living are threatened by resistance movements which frequently lead to economic downfall and hardships.

10:45-11:30  Board 81
Amy Katherine Shaffer
Kerry Drohan (Faculty Sponsor)
Department of Languages, Literatures, and Cultures, Cape Cod Community College
Always the Spoiler? Impact of Third-Party Candidates on United States Electoral Politics

The United States political system operates on a two-party model. This structure has created a climate that has fostered polarization in our nation. In this two-party system, what is the role of the third party—or multiple parties? This paper explores the roles and impact of third-party candidates, as well as the mark they have made on history in our exceedingly diametric political landscape.

10:45-11:30  Board 82
Jaime Lynne Nielsen
Kerry Drohan (Faculty Sponsor)
Department of Languages, Literatures, and Cultures, Cape Cod Community College

Historically, political figures have been role models in society. Respected war-heroes and local leaders were elected to the federal government because of their experience and knowledge. Today, pop culture icons and media journalists have become as highly regarded and believed to be more trustworthy than some of today’s leading government officials. Society has been subject to a bombardment of entertainment media, affecting several generations over the past 100 years. Becoming heavily influenced by pop culture and the media, Americans form their ideologies based on messages delivered through television and music. Research will explore the relationship between media, politicians, and celebrities, and how advertisement and media coverage is used for persuasion of the masses. Definitions of key terms such as politician,
media, celebrity, and source credibility will be included to reinforce the understanding of the role they play in persuasion. The influence media has played will be demonstrated by identifying a variety of historical events, musicians, television shows, comedians, journalists and political figures that blurred the lines between government and entertainment by making headlines in America.

Room 162  10:45-11:30  Panel 2
Kekely Dansouh
Deepika Marya (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
Colonial Education and Policies on Women in Africa

In the mid-twentieth century, many African countries attained independence from colonial rule, and African women actively participated in various political activities and liberation movements across the continent. In spite of their roles in helping achieve independence, African women quickly discovered that the fight for freedom and equality was largely limited to men. For the most part, women continued in their main roles as caretakers, and only a handful of African women had the opportunity to hold a political position. One of the factors that affected women’s ascendancy to power was the lack of higher education and gender disparities created through the systems of patriarchy and colonization.

This paper seeks to explore the lives and roles of women from 19th century pre-colonial to colonial Africa, the institution and policies of missionary education, and how local ethnic cultures interacted with colonial administrations over time. A focus will be placed on women in Ghana, Senegal, and South Africa.

Prior to colonization, African women held important positions, governed kingdoms, launched military conquests, and established cities. The goal of this paper is to shine a light on how colonial education and policies affected African women and the legacies they left on the continent. A spotlight will be placed on the types of education provided to girls compared to boys, cultural clashes, and the differing outcomes in Ghana, Senegal, and South Africa. Data will also be gathered on enrollment rates from select missionary schools and there will be an analysis of the impacts for various categories of women.

11:45-12:30  Board 81
Falon E. Williams
Kerry Drohan (Faculty Sponsor)
Department of Languages, Literatures, and Cultures, Cape Cod Community College
The Effects of Media’s Evolution on Presidential Campaigns

Media and politics have always been closely intertwined, and as one changed, so did the other. For centuries, print was used as the primary media outlet to cover politics in America. As time passed, radio, television, and eventually social media were invented, and each affected American politics in its own way. Political campaigns changed as a result of these inventions as
This paper will trace how American presidential campaigns have changed with the evolution of the media, starting by observing campaigns in the time where print was the primary form of media, and working through the evolution of media all the way up to modern day, where social media has become increasingly prevalent in campaigns. Through observing and analyzing various campaigns and how they were affected by the media at the time, one can gain insight into how the media affects politics.

**Room 162  11:45-12:30  Panel 3**
Sifa Ephod Kasongo  
Deepika Marya (Faculty Sponsor)  
Commonwealth Honors College, UMass Amherst  
**Gaining Profit versus Eliminating Child Labor: A Difficult Choice for Multinational Companies in the Cocoa Industry**

While consumers indulge in the sweet taste of chocolate for enjoyment, it isn’t joyful experience for around two million children who are trafficked, enslaved, work long hours and participate in hazardous work in the cocoa fields in Cote d’Ivoire and Ghana, where more than 70 percent of the world’s cocoa grows. Child labor in the cocoa industry was not well known around the world until various articles and a documentary surfaced in 2000. Not long after, in 2001, the Harkin Engel Protocol united eight companies in the cocoa industry that pledged to reduce child labor in Cote d’Ivoire and Ghana by 2005. The deadline was extended to 2008, 2010 and now 2020 due to their failure to achieve this goal. This voluntary public-private agreement appears to be unreachable by 2020 because, for one, it is simply voluntary, two, the steps being taken aren’t going to bring about a transformation in the supply chain and three, gaining profit seems to overpower the morality of eliminating child labor for multinational companies. My research will look at past and present efforts made to eradicate child labor and discuss how multinational companies in the cocoa industry have become so powerful to the point where they continue to commit human rights abuses. Discussing certain NGOs, I will discuss how their approaches are not tackling the root cause of the problem. Lastly, I will engage with the question, how do we can tackle child labor when numerous actors keep it alive.

**Room 163  11:45-12:30  Panel 3**
Sean Norman Peters  
Kathleen A. Brown-Perez (Faculty Sponsor)  
Commonwealth Honors College, UMass Amherst  
**The Arc Bends Backwards: Voter Suppression in the 21st Century**

This honors thesis shows readers that the issue of voter suppression was not solved in the mid-1960s with the passage of the Civil Rights Act and Voting Rights Act. Instead, voter suppression has gotten worse, not better, in the past two decades. This paper examines the various ways in which voter suppression is perpetrated in the 21st century, including voter ID laws, felon disenfranchisement laws, unfair distribution of resources, and personal biases within the justice system. A major focus of the paper is the *Shelby County v. Holder* Supreme Court case and its repercussions. This case decided that Section 4 and Section 5 of the Voting Rights Act of 1965 were outdated and unconstitutional, thus getting rid of preclearance requirements for specific
jurisdictions that had a history of voter suppression. This decision ignored ample evidence that these districts were still attempting to suppress the votes of people of color, and instead looked only at an outdated metric to see whether or not voter suppression was still a threat. After this decision was handed down, nearly every single jurisdiction that had been subject to preclearance requirements passed new voting laws that disenfranchised thousands of people. This had an immediate effect on outcomes of elections and caused several states in the 2016 presidential election to swing in favor of republicans. Voter suppression is still very much an issue in the U.S., and it is getting worse, not better.

Room 174  11:45-12:30  Panel 3
Kimberly Anne Barboza
Jennifer L. Jackman (Faculty Sponsor)
Department of Political Science, Salem State University
“Close the Partner Loophole!”, A Toolkit for Feminist Action against Gun Violence

The Domestic Violence Offender Gun Ban (DVOGB) is a federal policy that prohibits people convicted of domestic violence or under a restraining order from having access to firearms. However, the DVOGB only bans gun purchases made by spouses, former spouses, and cohabitating partners convicted of domestic abuse. It does not cover abuse between dating partners, creating an “intimate partner loophole” in gun violence policy.

This thesis combines this policy issue with existing canon on grassroots activism to create a political action toolkit, a series of digital and printable materials that aim to empower young people, feminist groups, and anti-domestic violence organizations to generate public and Congressional support for new legislation to close this loophole. I use an analysis of legislative action in each U.S. state to determine what current policy does or does not do to protect domestic violence victims from gun violence, as well as a comparison of current and former campaigns related to this issue to inform my organizational strategies in achieving federal policy change.

The toolkit includes materials for raising awareness of this policy loophole among the general public, guides to contacting elected officials, and instructions on lobbying in political offices. The toolkit also aims to include and highlight the needs of those at higher risk of homicide by firearms, such as women of color and members of the LGBTQ+ community. Accompanying literature includes additional background research on the policy issue and a detailed account of the strategic and design choices made in constructing the toolkit.
1:30-2:15    Board 43
Henry Dowd
James Heintz (Faculty Sponsor)
Department of Economics, UMass Amherst
Catching Up: Germany's Digitalization Effort

This research focuses on the German government’s efforts to digitally transform its economy and facilitate innovation among German firms. Disadvantaged by its role as a proxy in the Cold war, the German economy is still oriented around its traditional manufacturing capabilities while other global leaders are digitally focused. After conducting interviews with a number of technology consultants working in Germany and reviewing governments from the German government, it is clear that Germany faces a number of obstacles to their economic reformation – including an aging populous, weak broadband infrastructure, and minimal venture capital relative to larger markets. Using South Korea’s improbable industrial revolution as a comparative example, this research asserts that Germany would have to fundamentally alter its bureaucratic structure in order to achieve its digital aspirations.

1:30-2:15    Board 44
Mikayla Jing Rooney
Jesse H. Rhodes (Faculty Sponsor)
Department of Political Science, UMass Amherst
Celebrity Influence on the Political Ideologies of Undergraduate Students

As social media grows and the presence of celebrities in society increases, it prompts the question of whether celebrities possess the ability to shape politics by influencing their followers through social media. This study looks at whether celebrities have influence on politics through social media and explores the intersection of politics, celebrities, and social media. Celebrities have large social media platforms that give them public influence. My research addresses whether the public influence that celebrities are perceived to have is significant when applied to politics. I will argue that this celebrity influence, specifically via social media, can be used in politics by influencing an individual’s political interest and activity. In my research I have found evidence that indicates social media use and celebrity activism can be valuable tools in the dissemination of political information. As social media becomes ingrained in society, it gains significance as a form of media. The research I have done demonstrates the prevalence of social media in daily life. Additionally, my research reveals the ability of celebrities to captivate and direct public attention. Together these findings demand future research on how celebrities and social media can work together to shape politics.
1:30-2:15  Board 74
Matthew Bennet
David Alan Smailes (Faculty Sponsor)
Department of Political Science, Framingham State University
The Utopian Society: Comparing Municipal Government Styles

With comparatively little research being done on municipal government, the field of study is ripe for analysis. This paper serves as a case study of three towns or cities in the Metro West region of Massachusetts: the town of Natick, the town of Hudson, and the city of Framingham. More specifically, the paper looks at the urbanization and economic development of these municipalities, the level of government transparency, the budget process, the town or city’s large spending projects and deficits, the structure of the government, and the level of civic engagement. By looking at these categories of municipal government, the paper aims to determine what the best practices are for local government, to the end that this paper may serve as a blueprint recommendation to towns on how best to organize and run their respective governments.

1:30-2:15  Board 75
Jasmine Efua Dankwa-Smith
Nada Ali (Faculty Sponsor)
Department of Women, Gender, and Sexuality Studies, UMass Boston
Documenting the Life Stories of Sex Workers in Accra, Ghana

In recent years, Accra, the capital of Ghana, has witnessed an increase in the number of both Ghanaian and immigrant female sex workers. The local media often demonizes women involved in sex work, and society stigmatizes them. If they face violence or other violations of their rights, they are often reluctant to report these violations, given that sex work is illegal in Ghana. It is thus important to document and analyze the experiences of sex workers, to understand why they decided to become sex workers, and to understand the challenges they face. It is equally important to document the strategies sex workers use to address these challenges. The proposed poster presentation draws on preliminary research I conducted for my Honors thesis at UMass Boston. It is based on interviews with sex workers in Accra. It is also based on participant observation and media analysis. I argue that in Ghana and elsewhere in Africa, market-driven development has given rise to inequalities based on gender, social class, and regional location. These inequalities drive sex work and expose sex workers to violence and discrimination. I share recommendations, based on the findings of my research.
1:30-2:15  Board 76
Meghan Margaret Doyle
Samantha L. Petey (Faculty Sponsor)
Department of History and Political Science, Massachusetts College of Liberal Arts
Comparing Age and the Relevancy of Women's Rights

Since the election of Donald Trump, there has been an increase in the attention given to women's rights movements, such as the Women's March and #MeToo movement. Given the attention in the media, this research sets out to see the impact the current women's movement has on opinion formation of women's roles in society. This paper analyzes the relationship between age and the perceived relevancy of women's rights issues, with a proposed hypothesis stating that when comparing individuals, those in the younger age brackets will be more likely to show support for women's rights movements than those in older age brackets. Extant research evaluates cross-generational relationships in regards to feminist self-labeling and the influence gender has on public opinion of women's issues. To further the research on public opinion of women's rights movements and age, I examine data from the National Election Study survey and conduct a cross tabulation analysis to test whether age impacts opinions on the role women should play in a society. Results indicate support for my hypothesis finding a negative relationship between age and support for women's rights movements. In general, younger individuals are more likely to answer work as woman's main role in society and older individuals are more likely to answer the home is a woman's main role in society.

2:45-3:30  Board 47
Dafanichel Torres
Avery Plaw (Faculty Sponsor)
Department of Political Science, UMass Dartmouth
A Political Analysis of Domestic Terrorism and Social Media

As social media’s presence rises, so does the threat of domestic terrorism. We have the advantage of living in times where we have access to an unparalleled number of people just at a touch. This technology offers a powerful platform for anyone with an ideology. Perhaps not unrelatedly, Time magazine reports that although global terrorism declined, domestic terrorism in the United States is on the rise. Accordingly, this study addresses the path of radicalization of domestic terrorism in the United States through a social media lens. The purpose of this study is to build on, improve and develop data useful to understanding and countering domestic terrorism. The two research questions the paper addresses are as follows: has social media influenced the rise in domestic terrorism? And what are the advantages and disadvantages in not having a federal penal law on domestic terrorism? I will approach this study with a qualitative research method designed to analyze and collect intelligible data on people’s attitudes towards social media and the influence on domestic terrorism. The particular focus of this study will be on observing domestic ECO-terrorism and social communications from a political science perspective. Finally, this paper is an attempt to contribute to the amount of information available to discern and combat violent extremism on our homeland.
2:45-3:30   Board 91
Abbryanna Vivyan Tirado
Donald E. Kilguss Jr (Faculty Sponsor)
Department of History and Political Science, Bristol Community College
The Effects of a Southern Border Wall

Currently the United States is experiencing an immigration crisis at its Southern border. Illegal immigration has burned in the political spotlight since the wake of the 2016 presidential election. On a topic so controversial our nation is left divided. As opinions and action plans are discussed among our citizens and politicians, one very popular but disputed one arises. Should we build a wall at our Southern border? As this idea fights its way through Congress, we might very well see it happen. However what does a wall mean for its surrounding communities as well the rest of the nation? What does it complicate? What does it aid? Does it pose any new challenges? Does it offer a worthy solution? In this research project I will explore the pro’s and con’s of a border wall existing. I seek to look into many factors such as but not limited to: property loss to eminent domain, blocked access to the Rio Grande, the sealing of wildlife corridors, crime in U.S. border cities, and possible effects to sex and drug trafficking.

2:45-3:30   Board 92
Carley M. Devlin
Paige Marie Hermansen (Faculty Sponsor)
Department of English, Westfield State University
Roe v. Wade and Its Current Relevance

In a society developed through powerful impacts and endurance to succeed in areas where controversy arises, it is important for us as citizens to make an impact and defend personal beliefs. In regards to this, my paper discusses the controversial topic of the Roe v. Wade court case that was issued in 1973 by the US Supreme Court and its abstract influence on the development of fundamental reproductive rights in America. New and developing perceptions following this case as of late have included the proposal of potentially overruling the precedent set by Roe v. Wade as the law of the land that has set important laws regarding abortion and human rights for American citizens. The integration of different organizations and those standing up for maintaining the legality of abortion rights has successfully displayed why and how these rights shall be maintained within our society. Through the power of standing up for what they believe to be are natural, born human rights, many pro-choice activists have developed reason as to why maintaining these rights are important to our country, impacting people in different ways. The impact that the government could have on potentially adjusting these reproductive rights have led to women empowerment and the collaboration of pro-life activists in their desire to maintain the right to abortion. Possible Government intervention and possible changes on this controversial topic could result in a major impact on women’s health and reproductive rights for Americans. With the help of organizations such as Planned Parenthood, pro-life advocates are able to have faith in the system and power to influence the perceptions of those opposed to Roe v. Wade.
Since 2001, the U.S. has used drone strikes extensively both in recognized theatres of armed conflict (like Afghanistan) and outside of conventional armed conflict (in places like Pakistan). U.S. officials have claimed that drones are very precise, and this is a reason for using them in both conventional and unconventional conflict. But are they equally precise in both environments? Some scholars, like Daniel Brunstetter and Megan Braun, have pointed to a gap in accuracy between drone strikes conducted in recognized zones of armed conflict (in which the U.S. has troops on the ground) and areas of unconventional armed conflict (where it does not), and have suggested on this basis that drones should be used only in the former cases and not the latter. The central question of this study is whether their claim about the gap in drone precision is borne out by the data. This study analyzes and compares multiple databases that provide casualty counts in unconventional settings – Pakistan, Yemen, and Somalia – and fatalities in conventional battlefields, such as, Iraq, Syria, and Afghanistan. Resolving this question will speak to the question of whether drones should be used in unconventional armed conflict.

Global challenges—from global warming to the recent refugee crisis—highlight the inadequacies of the nation-state as the primary normative form of governance and sole source of sovereignty in our interconnected world. A strict reliance on territorial sovereignty interferes with the ability to respond to global challenges that fall outside the boundaries of a state’s territorial sovereignty. As a response to the growing crisis of the state, I develop a version of cosmopolitan theory as an alternative conceptual framework that transcends national boundaries. I examine cosmopolitanism’s sympathizers and critics, and I use this literature to reframe and redefine cosmopolitanism within the present crisis context. Lastly, I use the European Union as a microcosmic model to determine if cosmopolitanism exists at all in a supranational body that was founded upon cosmopolitan ideals. I investigate the successes and limitations of cosmopolitanism as embodied in EU approaches to immigrants and refugees, as a pragmatic compromise between cosmopolitan ideals and the reality of a state-centric world. The urgency of the migration crisis justifies an exploration of previously-disregarded frameworks like cosmopolitanism in order to contribute to the development of new frameworks for governance and citizenship catered to our ever-evolving, increasingly interconnected world.
Cruel but Not Unusual: An Interdisciplinary Approach to Enhancing Eighth Amendment Protections for Traumatized Incarcerated Women

Women are America’s fastest growing prison population, increasing by 700% since 1980 and outpacing male incarceration by 50%; the vast majority are nonviolent offenders who suffer from a history of physical abuse, substance abuse, and related mental health issues and are denied adequate treatment for their trauma. This thesis explores how both society’s and the courts’ understanding of the Eighth Amendment’s protection from cruel and unusual punishment on the one hand and of sexual trauma on the other can be made to intersect to produce improved mental health protections for incarcerated women with a history of abuse. This study takes an interdisciplinary approach to the subject by examining the histories of both punishment and trauma as well as the shortcomings of the legal provisions that were intended to safeguard the well-being of prisoners. By bringing the lessons of trauma studies directly to bear on definitions of what is “cruel and unusual,” the project shows that there are Constitutional grounds for mandating the interventions that trauma studies have applied in civil society and translating them into the prison setting. By putting forth recommendations for legal protections informed by medical and psychological findings, this paper brings to the surface the hidden and unlawful degradations of female inmates with a history of trauma and works to diminish the retraumatization of women in the carceral system.

Proving Genocidal Intent: The Impact of Dolus Specialis on the Verdicts of Tribunals for Persons Tried for the Crime of Genocide

Many countries were the sites of mass killings in the 1990s, but only the mass killings in Bosnia (1992) and Rwanda (1994) were immediately classified as genocides by the international community. Mass killings that involve systematic targeting of racial, ethnic, linguistic or religious minorities continue, while the international community remains slow to classify them as genocides. In this paper I examine the role of dolus specialis, or special intent, in the determination of 1.) who is indicted and convicted for committing acts of genocide in the international tribunals that were established, and 2.) which instances of systematic mass slaughter are considered genocides by the United Nations. This paper employs a qualitative textual analysis to analyze the most frequent reasons why some individuals are not convicted of committing genocide when on the surface it looks like their conduct did amount to genocide, but were instead convicted of a crime included in the related categories of crimes against humanity, and/or war crimes. In the trials where the accused were acquitted, either at there initial trial or after an appeal, the focus is on whether an inability to prove dolus specialis is the reason for a verdict of 'not guilty.' This paper supports my claim that the requirement of proving dolus specialis is one of the major reasons an individual is acquitted. In other words, I seek to unpack the legal elements and circumstances that determine whether certain acts--killing, torture, rape, forced displacement, etc., constitute acts of genocide in instances of conflict.
PSYCHOLOGY

8:30-9:15   Board 89
Laurel Alyssa Whitfield
Adrian Staub (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Syntactic Processing in Beginning Readers: Evidence from Eye Movements

This study examines children’s syntactic processing by recording the eye movements of 7- and 8-year old readers. Previous research has found that children at this age do not yet show the same eye movement patterns and behaviors as experienced readers. The purpose of the current study is to build upon research previously conducted with both adults and children to see if children at this age show the same eye movement patterns, and therefore similar processing patterns, as adults when confronted with various syntactic manipulations. The experiment examines children’s reading of garden path sentences involving a direct object/sentential complement ambiguity (e.g. The students knew the answers to the problems were in the back of the book vs. The students knew that the answers to the problems were in the back of the book), as well as garden path sentences involving a subordinate clause object/main clause subject ambiguity (e.g. While the men hunted the deer ran through the woods vs. While the men hunted, the deer ran through the woods). It also examines children’s processing of sentences that either include an object relative or a subject relative clause (e.g. The dog that the cat chased ran into the yard vs. The dog that chased the cat ran into the yard). The results obtained from this experiment will provide insight regarding the development of syntactic processing in reading.

8:30-9:15   Board 9
Josiah Jeremiah Boirard
Bonnie Strickland (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Entrance Age for Kindergarten and Children’s Academic Success

This thesis is an examination as to whether or not there is an association between academic performance and entrance age of kindergarten. This paper examines the origins of preschool and kindergarten in our country. Trends (brain development, cognition, and social skills) on kindergarten readiness are related to entrance age. Children who are among the oldest in their kindergarten class tend to do better and show later academic success in successive grades. Personal experiences in regard to age of entrance into kindergarten are noted.
8:30-9:15  Board 90
Mary Katherine Koontz
Bonnie Strickland (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Bilingual Language Acquisition

This thesis is an examination of the process of bilingual language acquisition. Language acquisition is explained in terms of how humans acquire their first language as infants, and how that sets a foundation for learning subsequent languages. Different brain regions responsible for language acquisition are discussed, as well as the history behind identifying these areas through research done beginning in the late nineteenth century. Studies that demonstrate the primary and bilingual language learning processes are discussed. These include the terms L1 (native language), L2 (second language), and UG (universal grammar), which describe the processes of native and second language acquisition. The language learning process in children and adults is described, as well as how these processes differ across age. The most successful techniques that adult second language learners can employ in language learning are described. Personal interviews on acquaintances’ language learning experience are included, as well as how their experiences correspond to research done on language acquisition.

8:30-9:15  Board 91
Lily Alegra Vesel
Brian Lickel (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Community Preferences for Climate Change Resilience Strategies

Local communities play an important role in the response to climate change’s impacts. Community resilience depends not only on features such as community governance and infrastructure, but also on social capital and community support. Although previous work had linked people’s sense of community, place attachment, and civic participation to community disaster preparedness, response, and recovery, there is a lack of focus on people’s preferred responses to climate change in their local communities and how this affects support for local investments. This study aimed to examine how individual factors contribute to support for local investments to improve community resilience. A community intercept sample from western Massachusetts (n= 269) assessed people’s relationships with their community (e.g. attitudes towards local activism) as well as perceptions of local climate change risk and support for different local investments in response to climate change’s impacts, such as infrastructure and community support. In general, those who felt more at risk for natural disasters reported more support for local investments; however, this risk perception was not related to all resilience investment strategies. Additionally, individual factors such as positive attitudes towards local activism were related to some investment strategies (e.g. investments in community groups) but not all (e.g. investments in infrastructure). Understanding what factors influence community support for resilience and how people evaluate different investment strategies may have real-world impacts as communities begin to focus on building different resiliency efforts.
8:30-9:15  Board 92
Regan Jennifer Woodnutt
Brian Lickel (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
How Do Beliefs about Justice, Deservingness, and Income Inequality Relate to Attitudes toward Universal Basic Income and Income Inequality?

A new income redistribution program known as Universal Basic Income (UBI) appears to be gaining traction as a legitimate way to combat income inequality across the globe, including here in the U.S. Yet, there is currently little research on whether the American public would support such an initiative. The aim of this research is to understand why people would or would not support UBI and how this support is related to underlying social-psychological factors. We collected data from 191 participants through Amazon’s Mechanical Turk. We first asked participants if they would support a program like Universal Basic Income and their reasons. Later, we measured their beliefs about justice (e.g., protestant work ethic; PWE), inequality (e.g., awareness of inequality), deservingness (e.g., meritocracy), and system justification (e.g., social dominance orientation; SDO). Our results showed that higher PWE, SDO and meritocracy scores correlated with more negative attitudes towards UBI, whilst high scores on the awareness of inequality scale were correlated with more positive attitudes towards UBI. This study highlights the need for more social-psychological research into policy initiatives, as deep-rooted, social-psychological attitudes significantly shape how programs acquire support and how they are perceived by people.

8:30-9:15  Board 93
Lan Ba
Youngbin Kwak (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Cultural Differences in Processing of Positive Versus Negative Outcomes

It is well known that cultural difference could affect people’s attitude, behavior and the way people process information. Previous studies have shown a cross-culture difference on self-construal between Western Caucasians (WC) and East Asians (EA). WC with a more independent self-construal are promotion – oriented and concentrated on pursuing success, focused more on positive feedback to obtain their personal well-being. EA with a more interdependent self-construal are prevention – oriented and aimed to avoid failure, focused more on negative feedback to achieve a better self. Current study digs in depth in these differences and discover how those difference effect people’s counterfactual thought- “the what if” emotion. There are two type of counterfactual thought we are looking at: regret and relief. Regret is triggered if an alternative action would lead to a better outcome, while relief is triggered if an alternative action would lead to equal or worse outcome. Previous studies have shown that EA present a more regret feeling than WC, which confirm that counterfactual thought could be effected by the cultural difference. Yet, no studies to date have investigated whether counterfactual feelings are modulated by promotion-oriented vs. prevention-oriented decisions across WC and EA. The current studies investigated these effects within a context of an economic gambling task where outcomes of choice are revealed upon choice at which point
counterfactual thought can be generated. We will measure their brain wave with electroencephalogram to discover cultural effect on people’s brain responses.

Room 909  8:30-9:15  Panel 1
Sarina Carter
Michael James Constantino (Faculty Sponsor)
Department of Psychology, UMass Amherst
Within- and Between-Therapist Alliance Quality as Predictors of Outcome in Psychotherapy for Generalized Anxiety

Objective. With decades of research having established that a higher quality patient-therapist alliance is associated with more positive treatment outcomes, attention is turning to more nuanced understandings of the alliance-outcome relation. For example, researchers are increasingly investigating the amount of outcome variance accounted for by within-therapist alliance differences (i.e., variability between patients’ alliances who are seen by the same therapist) and between-therapist alliance differences (i.e., variability between therapists’ average alliance quality across all patients in each of their caseloads). Thus, the present study will explore the respective influence of within- and between-therapist early alliance levels on patient symptomatic outcomes in cognitive-behavioral therapy (CBT) and CBT integrated with motivation interviewing (MI) for generalized anxiety disorder (GAD). Additionally, I will explore whether treatment group moderates these associations. Method. Data derive from a randomized controlled trial in which 85 patients with GAD were randomly assigned to time-limited CBT or MI-CBT. Patients rated the alliance after every session, and worry and general distress at pre- and posttreatment. Results. Given its ability to simultaneously parse variables into their latent within- and between-therapist components, I will use multilevel structural equation modeling to test whether within- and between-therapist early alliance levels are associated with worry and distress reduction, accounting for treatment condition. I will also test treatment as a between-patient moderator of these associations. Conclusions: Results will help illuminate precise clinical meanings of the alliance construct, and I will discuss implications for evidence-based practice and training.

Room 909  8:30-9:15  Panel 1
Cassandra Sarah Pillsbury
Jannette McMenamy (Faculty Sponsor)
Department of Psychological and Brain Sciences, Fitchburg State University
Gender Dysphoria and Its Placement in the DSM 5

Gender Dysphoria is a diagnosis given when an individual does not identify with the gender they were assigned at birth and they experience significant distress, dissatisfaction or unease related their disconnect with their assigned gender (Liu, 2017). Despite varying data regarding the prevalence of Gender Dysphoria, research indicates that gender ambivalence, incongruence, and nonconformity are increasing (Bouman, de Vries, & T’Sjoen, 2016). With these increases, Gender Dysphoria and its placement in the DSM-V have come under fire. Those in favor of its inclusion argue that the symptoms of Gender Dysphoria should lead to concern. Other arguments include societal views and the belief that the inclusion of Gender Dysphoria
will help assure greater transgender healthcare (Drescher, 2010). Conversely, there is also a number of arguments for why Gender Dysphoria should be taken out of the DSM-V. These arguments include strong claims about its normality, varying definitions of gender across cultures and history, and case studies of past historical figures (Drescher, 2010; Leibowitz & De Vries, 2016). Others have argued that consideration needs to be given to the effects of stigmatization as related to being diagnosed with a mental disorder (Drescher, 2010; Leibowitz & De Vries, 2016). Though there is discourse within both perspectives, this presentation will argue that Gender Dysphoria should be taken out of the DSM-V. It will also argue that there should be assurance of care for individuals with Gender Dysphoria, that hormones and steroids shouldn’t be provided until adolescence, and that there needs to be more research to get a better estimate of the prevalence of Gender Dysphoria and the normality of exploring gender.

**Room 909  8:30-9:15  Panel 1**
Julia Barbara Tager  
Linda M. Isbell (Faculty Sponsor)  
Department of Psychological and Brain Sciences, UMass Amherst  
Caring for Children with Mental Health Emergencies: A Qualitative Study with Emergency Medicine Providers

Background: Pediatric mental and behavioral health visits to Emergency Departments (ED) have increased dramatically. Yet almost no research has explored providers’ experiences with these patients and the specific challenges they present. We sought to gain a deeper understanding of these issues to inform interventions aimed at improving patient and provider experiences.

Methods: We conducted one-on-one semi-structured interviews with ED providers who treat pediatric patients in 2 academic and 4 community hospitals. Providers were asked to describe their experiences and challenges with pediatric mental and behavioral health patients. Interviews were audio-recorded, transcribed, and coded by several research team members in accordance with Grounded Theory methodology.

Results: 26 ED providers (13 attending physicians, 13 registered nurses) participated. Providers frequently expressed frustration, resentment, and sadness in response to pediatric mental and behavioral health patients, with anger often targeted at patients’ parents/caregivers. This anger reflected the most frequently cited cause of visits, which was poor parenting/caretaking. Failures of other systems were also cited for visits, including policies at schools and residential facilities. Most providers perceived at least some visits to be unnecessary, which contributed to negative reactions. Three broad themes emerged regarding challenges with this population: (1) diagnostic and treatment challenges, (2) behavior challenges, and (3) resource challenges.

Conclusion: ED providers report significant challenges treating children with mental and behavioral health conditions. More research and support is needed to help ease these challenges, which will likely improve patient and providers’ experiences and patient outcomes.
10:45-11:30  Board 49
Ashley Anne Emery
Brandi Silver (Faculty Sponsor)
Department of Psychology, Worcester State University
The Effect of Anthropomorphism on Conservational Views and Physiological Fear Response

This study explores how anthropomorphism might affect participants' physiological reactions to a possibly dangerous animal as well as their views on conservation. People are less likely to support conservation programs for animals that are regarded as dangerous or uncontrollable. The use of anthropomorphism, attributing human-like characteristics to non-human animals, reduces the sense of unpredictability associated with certain species. We specifically focused our study on whether anthropomorphism could be used to increase peoples' positive attitudes towards animal conservation. Further, we are also exploring if anthropomorphism can lower a person’s physiological response to a typically dangerous animal. We will collect data from 48 participants at Worcester State University. Participants will view a minute and a half educational video on Sumatran tigers that contains either anthropomorphic dialogue or general facts. Participants will then take the Individual Differences in Anthropomorphism Questionnaire and the Animal Attitudes scale to measure individual levels of anthropomorphism and conservational attitudes respectively. Finally, participants’ Galvanic Skin Response (GSR) to a series of animal photos will be measured. These photos will include neutral images, high-fear animals, low-fear animals, or Sumatran tigers.

We expect that the effect the anthropomorphized script should have on participants is a higher score on both the IDAQ and Animal Attitudes Scale. Further, the interaction between anthropomorphism and the photos should result in higher GSR for tiger photos from the control group, similar to their scores for high-fear animals. The experimental group should elicit a GSR score for tigers most comparable to low fear animals.

10:45-11:30  Board 63
Hanah Marie Bazin
Susan McPherson (Faculty Sponsor)
Department of English, Quinsigamond Community College
Energy Psychology Benefits Veterans Suffering from PTSD by Tapping into the Emotional Freedom Technique

Emotional Freedom Technique is a form of energy psychology that involves acupressure of the body’s meridian and chakra system. Tapping of certain pressure points has proven to be effective in coping holistically with psychological disorders such as depression, anxiety, and/or post-traumatic stress disorder, without the use of pharmaceutical drugs. Randomized studies have proven Emotional Freedom Technique is a beneficial coping mechanism, especially for Veterans who suffer from PTSD. EFT is a solid self-help method that can be used at any time or place for Veteran’s to alleviate difficult post-traumatic stress disorder symptoms. This presentation will explore the importance of Emotional Freedom Technique in treating PTSD in Veteran soldiers.
Perceived Effects of Group Membership and Sex on Social Distance

Cults have typically been depicted negatively by the media, public, and government. This widely held public sentiment may lead members of these religious groups to be treated less fairly than others. Additionally, the men and women who join these religious groups may be treated differently based on their sex due to cults' tendency to issue communal roles to its members. This experiment investigated the effects of substituting the negatively connotated term, “cult” for a more ambiguous term, “new religious movement”. This experiment also examined the effects of sex on social distance. Undergraduate students ($N = 105$) were given one of four scenarios in which a male or female group member was described as belonging to either a cult or a new religious movement. Participants then completed a survey to measure the social distance expressed towards the character. It was found that people expressed greater social distance towards a cult member than a new religious movement member. However, sex did not affect participants' reported social distance scores. Furthermore, the sex and group membership in conjunction did not impact participants' expressed desire for social distance.

Perceived Effects of Sex and Form of Disability on Hiring Bias

The purpose of this study was to determine the perceived effects of an applicant's sex and form of disability on his/her employability. One hundred ten undergraduates (80 women, 30 men) were randomly assigned to read one of four scenarios describing a man or woman who had depression or was wheelchair bound. Participants then completed the Candidate Evaluation Form (Heathfield, 2004). Additionally, they completed a demographics form. Results indicated that there were significant differences for the sex and form of disability on the employability. Possible explanations as well as implications for further studies are discussed.

Nail Biting: Possible Correlations with Heredity and Perfectionism

This study explored the factors which may contribute to the act of nail biting, or as it is medically referred to, Onychophagia. Psychological, emotional and physical consequences affect those involved in the oral habit of nail biting. It produces social anxiety and limitations in social
interactions due to feelings of shame. The goal of this research was to investigate the relationship between Bodily Focused Repetitive Behaviors like nail biting and factors including heredity, its relationship to stress-related factors, and if a link exists to personality traits, such as perfectionism. The data collection method consisted of an online descriptive survey study which included twenty-five questions. Participants had to be at least 18 years old to participate and were recruited via social media portals and word-of-mouth invitations either verbally or via email. Results and any implications will be discussed.

**Keywords:** nail biting, personality traits, heredity, stress related factors, treatment, perfectionism

10:45-11:30 Board 86  
Tiffany Marie Brennan  
Joanna Gonsalves (Faculty Sponsor)  
Department of Psychology, Salem State University  
**Identification of Psychosocial Factors in the Development of Serial Killers in the United States**

The purpose of this study is to identify risk factors associated with serial killing. This line of investigation can aid criminal justice and mental health professionals in preventing murders in the future. Twenty-five case studies of serial killers convicted in the United States between 1967 and 2016 were examined using newspapers, court records, biographies, and social science articles. The analyses focused on demographic, psychological, and sociological factors, such as mental illness and criminality, that may have predisposed the sample to become serial killers. The results of the study are discussed in terms of prevention, including early detection of risk factors, treatment, and improving social systems currently in place.

10:45-11:30 Board 87  
Emma Rose Cyr  
Linda M. Isbell (Faculty Sponsor)  
Department of Psychological and Brain Sciences, UMass Amherst  
**Where Society Meets Medicine: A Qualitative Investigation of Vulnerabilities in the Emergency Department**

**Background:** The Institute of Medicine recently brought attention to the topic of diagnostic error. We know that in the ED, vulnerable patient populations may be especially at risk for diagnostic error. The purpose of this study is to identify the types of challenges ED providers face when treating specific vulnerable populations to better understand the potential negative outcomes for both patients and health care providers.

**Methods:** Purposive sampling was used to recruit ED providers from 4 academic and 4 community hospitals. In semi-structured interviews, providers were asked to describe challenges they face in the ED when treating individuals with mental illness, substance use disorders, and those with difficult behavior. We employed Grounded Theory to identify
emergent themes in the data. Audio-recorded interviews were transcribed and coded by 3 research team members.

**Results:** We interviewed 86 providers. Nearly all reported routinely experiencing a wide range of challenges. Common themes included: (1) Resource challenges (particularly difficulties associated with constraints imposed by societal problems and local hospital policies/conditions), (2) Behavioral challenges (specifically with difficult or demanding patients and families), and (3) Diagnostic challenges (for example, medical complications associated with comorbid conditions, time constraints).

**Conclusion:** Results indicate multiple patient and system factors create challenges for ED physicians and nurses. These challenges may lead to negative outcomes for both patients and providers. Our understanding of these potential negative outcomes will provide foundational evidence to inform the development and assessment of interventions aimed at health care providers to reduce the risk of diagnostic error.

**10:45-11:30 Board 88**
Kelsey Elizabeth Waitt
Kaitlyn Theresa Costello
Maggie Campbell Obaid (Faculty Sponsor)
Department of Psychology, Framingham State University
Perceptions of Academic Achievement and Social Ability Based on School Type and Social Class

Research has shown mixed evidence for the idea that home-schooled students have higher academic ability than students who have attended public or private schools. However, social ability does not seem to differ based on school type. Research also found that students with lower socioeconomic class perceive themselves as having lower academic ability than those of higher socioeconomic class. This current study further investigates the perceptions of others’ academic and social abilities based on their type of schooling (home, private, or public school) and socioeconomic status (low vs. high). Participants will read and respond to a vignette that gives a brief description of a high school junior and then they will respond to items assessing perceptions of the person’s academic and social abilities. We expect that there will be between 150 to 180 participants. Due to convenience sampling, the majority of participants will be female college students who major in psychology and education. We expect that students who attend private school will be perceived as having higher academic ability than students who attend public school or are home-schooled. We also expect that students who are in a lower social class will be perceived as having lower academic ability than upper-class students. We predict that students who attend home-school will be perceived as having lower social ability than those who attend public and private school. These perceptions are important to investigate as they could affect whether one chooses to accept an individual into higher education or in the workforce.
10:45-11:30   Board 89
Cailee Lynne Norton
Maggie Campbell Obaid (Faculty Sponsor)
Department of Psychology, Framingham State University
Differing Attitudes about Physical and Emotional Infidelity in Men and Women

Physical and emotional infidelity have traditionally been viewed differently along gender lines in terms of what exactly counts as cheating behavior and what is most harmful. Research has shown that men and women are held to different moral standards, with women often viewed as less moral. This 2x2 experimental study examines how perceptions of a character's blameworthiness, forgiveability, harm done to relationship, and potential for a new relationship are influenced by the character's gender and type of infidelity. The current study involves a sample of 120 college students with a 50/50 ratio of male and female participants. This study uses four different vignettes of a male or female committing emotional or physical infidelity. I will be using a self-created scale to examine participants’ beliefs about the characters’ blameworthiness and how "relationship ending" the infidelity is, followed by a sexism scale, morality scale, and a gendered difference on jealousy scale to measure participants’ beliefs. I expect to find that participants believe that a female character is more blameworthy than a male in either emotional or physical infidelity. This study expects to see physical infidelity being detrimental to a relationship for male characters, however emotional infidelity will be more detrimental for female characters. This study can help us to better understand systematic sexism and its impact on individuals when faced with a gendered situation involving 21st century relationships. This study will also answer questions about what college-aged individuals believe to be the most hurtful type of infidelity to a relationship.

10:45-11:30   Board 90
Zachary S. Hohl
Alexandra Marie Bortolussi
Maggie Campbell Obaid (Faculty Sponsor)
Department of Psychology, Framingham State University
Media Impact on Self-Reported Self-Esteem and Body Image Satisfaction

There’s ample evidence that physical appearance is highly emphasized in Western culture, influencing how individuals are socially perceived. These cultural expectations can influence individuals psychologically in a variety of ways, including their self-esteem and body image. However, there has not been sufficient research on how media messages may influence individuals in these aspects. The current study intends to investigate how media messages affect an individual’s self-esteem and body image. 120 participants will experience different media message (pro-thin vs. body-positive) in different media formats (image and text vs. image-only). Pro-thin is defined as perpetuating the thin-ideal, or that the ideal body type is a slender physique with little body fat. Body-positive messages are defined as accepting and appreciating all body types as the ideal body. It’s expected that those exposed to pro-thin messages will then have significantly lower self-esteem and body image confidence than those
exposed to the body-positive message. These effects will be especially strong for the participants who receive the images paired with text as opposed to those who only see the images. In today’s world, we are easily exposed to a variety of media messages and it is important to investigate how those messages could shape people’s self-esteem and body image.

10:45-11:30 Board 91
Shauna Nichole Singleton
Maggie Campbell Obaid (Faculty Sponsor)
Department of Psychology, Framingham State University
Perceptions of Sexuality, Promiscuity, and Parenting Skills Based on Gender and Polyamorous versus Monogamous Relationships

There is limited research that can be found covering polyamorous relationships versus monogamous relationships in Western society. Much of the research shows that there are varied negative perceptions that follow the polyamorous community, as they do not follow society’s traditional monogamous culture. Some studies found that polyamorous individuals emphasized that their relationships were normal by pointing out the similarities with monogamous individuals. There is also very little research on how polyamory and gender of the person in the relationship may influence specific perceptions of them. The aim of this 2x2 experimental study is to gain understanding on how relationship type (polyamorous vs. monogamous) and gender (male vs. female) could affect perceptions of someone’s sexuality, promiscuity, and parental skill. A questionnaire will be used that features four scenarios in which an individual is raising a child from a previous relationship with a new partner, and this individual will differ in relationship type and gender. It is expected that the polyamorous people will be seen as more promiscuous and as a worse parent compared to the monogamous people, and that these effects will be especially strong when the character is female. It is also expected that the polyamorous character will be perceived as less heterosexual than the monogamous character, especially when the character is male. The results of this study will help gain better understanding of attitudes towards polyamorous relationships in relation to everyday situations.

10:45-11:30 Board 92
Maya Nicole Bratsos
Jennifer Ferrucci
Maggie Campbell Obaid (Faculty Sponsor)
Department of Psychology, Framingham State University
The Role of Gender and Gender Typicality of Diagnosis on Perceptions of Positive Personality Traits

Past studies have found that men tend to receive more stigma than women when diagnosed with a mental illness, especially when diagnosed with a disorder that is seen as stereotypically feminine. This study aims to determine the prevalence and extent of this phenomenon on a college campus as well as to show current attitudes towards those with diagnoses atypical to their gender. Participants of this study will include 120 college students, 50% male and 50%
female, who will be asked to respond to a scenario-based questionnaire. Overall, the four scenarios will be of a man with a masculine disorder, a man with a feminine disorder, a woman with a masculine disorder, and a woman with a feminine disorder. Participants will rate the overall competence, trustworthiness, friendliness, and stability of the characters with mental disorders. It is predicted that men will be perceived more negatively based on these traits than women when diagnosed with a mental illness, and masculine mental disorders will be perceived more negatively than feminine disorders. In addition, it is expected that there will be similar perceptions between genders with masculine diagnoses, but men with feminine diagnoses will be perceived more negatively than women with feminine diagnoses. The findings of this study can show that although society is progressing, there still may be sexism and discrimination against mental illness.

10:45-11:30    Board 93
Paula Reyblat
Nina Rossi
Maggie Campbell Obaid (Faculty Sponsor)
Department of Psychology, Framingham State University
The Role of Gender and Race in the Application Process: Who Are College Students More Likely to Hire as School Principal?

The job application process is something that most working citizens experience at one point or another. Previous research has indicated that there are many underlying factors that contribute to the decision making process, from the “similar-to-me phenomenon” to “double disadvantage”, but do race and gender also play a major role in influencing the views of today’s college students? This study focuses on the application process in regards to potential employees applying for a school principal position. The possible effects of race and gender on perceived leadership qualities, hireability, and authenticity of the candidate will be explored. There will be 120 college student participants from the Framingham State University campus. The study will include four vignettes presenting potential job applicants for a school principal position. It is hypothesized that participants will rate male candidates as more qualified for an elementary school position compared to a female candidate. It is also expected that participants will rate Caucasian applicants as more qualified for an elementary school principal position compared to African Americans. It is predicted that a male candidate will be rated as more qualified for an elementary school principal position than a female candidate regardless of race, but this gender effect will be stronger when evaluating Caucasian candidates than African American candidates. Results will help the researchers better understand racial and gender stereotypes when it comes to a leadership job position in our society, which in turn can potentially help our society as a whole respect and appreciate diversity.
10:45-11:30    Board 94
Krista M. Guertin
Tyler Andrew Mayo
Mackenzie Whalen
Maggie Campbell Obaid (Faculty Sponsor)
Department of Psychology, Framingham State University
Undergraduate Attitudes Toward Substance Abuse in Men and Women with Comorbid Depression: An Exploration of Stigmatizing Beliefs

Past research has shown that the stigma of both addiction and other mental illnesses can be detrimental to the self-esteem and self-efficacy of individuals struggling, and can also make them less likely to seek treatment. However, more research is needed on these topics, specifically regarding how college students in particular perceive those with substance-related issues and comorbid disorders. This 2x2 experimental study examines college students’ perceptions of drug addiction, mental illness and treatment methods based on the gender of the drug abuser (male or female) and whether or not the abuser has been diagnosed with a comorbid disorder (depression). Specifically, this study investigates stigmatizing beliefs related to blame, social distance, explanation for substance abuse, and views about appropriate treatment and consequences. It is hypothesized that college students will exhibit stronger stigmatizing beliefs toward female substance-abusers than male substance-abusers. It is also hypothesized that participants will exhibit stronger overall stigmatizing beliefs toward substance-abusers with depression than substance-abusers without. It is also predicted that participants who report having been in close proximity with a substance-abuser will score higher on support for therapeutic responses to drug addiction than on penal responses. Exploring stigmatizing beliefs held by college students will serve as a strong indicator of whether or not the landscape of public opinion surrounding addiction is changing with science.

10:45-11:30    Board 95
Morgan Elizabeth Harris
Patrice M. Miller (Faculty Sponsor)
Department of Psychology, Salem State University
Individual Differences in Literacy Development

This study will examine factors related to differences in kindergartener’s literacy development. One factor that is known to be important in early literacy is the extent to which literacy related activities take place in the home. A second factor may be the student’s own perceptions of themselves as a reader.

To gain a better understanding of literacy related activities in the home parents will be asked to complete a shortened version of the HOME assessment. For example, questions include how many books the child has at home, how often they are read to and how often they are watching TV or playing on an electronic device. One purpose of revision of the HOME instrument will be to contrast the amount of time in traditional literacy activities versus technology-based literacy activities. The kindergarten students will be asked three questions from the Harter Self-
Perception, which focus on how the child sees themselves as a reader. These factors will be related to the child’s reading test scores.

Although the research is still ongoing, I predict that individuals’ home life will affect school life. In addition, I predict that traditional literacy activities will be more important and show more transfer to reading scores. Implications for the use of technology-based literacy activities will be discussed.

Room 909  10:45-11:30  Panel 2
Devon Leigh Goldberg
Deborah Keisch (Faculty Sponsor)
Department of Civic Engagement & Service-Learning, UMass Amherst
Approaches to Child Development with Trauma and Mental Health Concerns

Recent research concerning Trauma-Informed care has gained popularity in educational, treatment and criminal justice settings. This evidence-based practice focuses on the medical implications of trauma on a child's development. Using the World Health Organization definition of health, which includes positive mental and social wellbeing, there are clearly other salutogenic approaches that can use holistic approaches to development. Capacity and asset mapping concerning children's development of their self-identity is widely used. Alternative approaches to a medical-deficit perspective, such as Trauma-Informed care and Healing-Centered Engagement, builds on the strengths of the child and include a broader social-emotional context. Patient-centered care is the future and it’s imperative to analyze the approaches we use going forward. In this paper, I will examine the contrast between traditional approaches and these alternative approaches, and use my work in a children’s mental health clinic setting as a case study to consider how such approaches might influence lived experience.

11:45-12:30  Board 12
Meghan Hayes Bremer
Monica Poole (Faculty Sponsor)
Department of Interdisciplinary Studies/BDIC, Bunker Hill Community College
I'm Listening: Detecting the Onset of Depressive Episodes Using Artificial Intelligence

Depression is one of the most common and debilitating mental health disorders in the United States. Tens of millions of Americans are currently living with some form of depression. As this disorder affects relationships, work performance, the immune system, and can result in suicide, the World Health Organization has deemed depression as the leading cause of disability worldwide. Major Depressive Disorder, Recurrent, is a severe, low-functioning form of depression comprised of repeated episodes of depression. The earlier an oncoming episode of depression is detected, the more successfully patients and providers can respond to it. Often, early response can mitigate the severity of a depressive episode. However, it is difficult to detect an oncoming episode. The early stages of a depressive episode often go unrecognized by patients and providers alike. In a 2018 study, MIT researchers Alhanai and Glass presented a neural network that identified depression in individuals through speech recognition technology.
Using audio recordings of human speech, it successfully identified speech patterns, intonations, and word choices that were indicative of depression. This has tremendous potential when applied to treatment of Major Depressive Disorder, Recurrent. One promising direction to consider is the application on a consumer level, empowering patients to monitor their health using apps and wearable devices that could identify a looming depressive episode early enough to respond and mitigate its severity. This research sets out to discover how the abovementioned technology to identify depression through speech recognition might be applied in practice.

11:45-12:30    Board 28
Mandy Lisa Linehan
Susan Zup (Faculty Sponsor)
Department of Psychology, UMass Boston
Theories of Non-coital Sexual Motivation

Despite the wide variety of sexual behaviors performed by humans, most research on sexuality focuses on heterosexual intercourse, or coitus, only. Sexual practices such as BDSM (Bondage/Discipline Domination/Submission Sadism/Masochism), anal sex, and auto-erotic asphyxiation are not only under-researched because they are not coitus, but also because of their distasteful connotations and taboo nature. However, large groups of people participate in these activities which suggests people are motivated to partake in these seemingly unpleasant and painful behaviors. A thorough understanding of the physiological and neurological systems that might underlie this motivation would be beneficial for greater knowledge about human sexuality. A systematic review of the existing literature revealed a significant deficit in literature pertaining to the neurological mechanisms that apparently make these painful non-coital sexual behaviors pleasurable. By examining what is known about these specific sexual practices as well as general knowledge of the various neural reward pathways, typical sexual motivation, and motivation for non-sexual behaviors, this review aims to suggest theoretical neurological pathways that could provide physiological explanations for the motivation of these atypical non-coital sexual behaviors.

[MOU1]Do any of your studies mention an approximate number or percentage?
[MOU2]What word do you want in here? Important….?
[MOU3]Atypical or painful or unusual or taboo…some descriptor
**Presentation Details**

**11:45-12:30    Board 57**
Chloe Maria Current  
Susan McPherson (Faculty Sponsor)  
Department of English, Quinsigamond Community College  
The Meaning in Life

What is the meaning of life? This is a question that crosses the minds of all humankind, and is one of the most profound topics we will just about ever question. This presentation will examine the history, evolution, and upcoming ideology on the meaning in life. Though it is a hard question--what is the meaning in life--that cannot be simply answered, this research will pull threads from different perspectives to try and analyze what the future meaning may be. From individual to collectivist values, all have a part to play in what our role is in the grand cosmic drama.

**11:45-12:30    Board 82**
Jordan Garcia Phillips  
Andrew L. Cohen (Faculty Sponsor)  
Department of Psychological and Brain Sciences, UMass Amherst  
Effects of Similarity on Decision Making in Police Lineups

Adding new alternatives to a choice set can change the relative preferences of the original choices. Such context effects serve as examples of how choice behavior can deviate from rational choice. Research on context effects has largely been confined to marketing and decision making, however, many other situations demand that we choose between options. Thus, such decision making phenomena may also apply to these situations. In the current research, we bridge the gap between the literature on context effects in decision making and selections made within the forensic context of a police lineup, in which an eyewitness selects from a set of potential culprits. Eyewitness lineups were constructed to conform to the experimental paradigms designed to induce context effects. Context effects were found when an image of the culprit remained in view during the lineup, but not when the image was removed prior to the lineup. Furthermore, the context effects were the reverse of those normally found in consumer choice research, but consistent with those found with other perceptual stimuli. Eye tracking was also employed to determine how the manner in which participants compared the faces influenced choice behavior.

**11:45-12:30    Board 83**
John Manuel Mieg Vargas  
Andrew L. Cohen (Faculty Sponsor)  
Department of Psychological and Brain Sciences, UMass Amherst  
Everyday Uncertainties: An Assessment of Bayesian Reasoning Using Semantic Terms

Uncertainty during decision making can be handled using Bayesian reasoning, a rational method for updating beliefs when new information becomes available. Previous research has shown that the format in which information is presented can greatly affect how well people can reason in a Bayesian fashion. A typical comparison is between information presented as natural
frequencies (e.g., 1 out of 100) and probabilities (e.g., 1%). Results consistently demonstrate an advantage for natural frequencies, although overall performance often remains low. Outside of the laboratory, however, numeric values are often not present when making such decisions. Surprisingly, an assessment of Bayesian reasoning without numbers has not been done. The traditionally poor performance of participants may be explained by difficulty manipulating numbers. In order to address this possibility, this project compares performance for Bayesian reasoning problems in which information is presented as either percentiles (e.g., 1%) or semantic terms (e.g., highly unlikely). Because it avoids issues associated with mathematical competency, we hypothesize that accuracy will be higher when information is presented as words. Support for this hypothesis would highlight that part of the difficulty with Bayesian reasoning can be found in mathematical ability, rather than conceptual understanding, and would pave the way for further research initiatives seeking to improve reasoning performance.

11:45-12:30    Board 84
Adam Maarij
Eric W. Mania (Faculty Sponsor)
Department of Psychology, Quinsigamond Community College
Great Expectations: Academic Entitlement in Two-Year Colleges

Evidence from school teachers, faculty members, and college administrators suggests an increase in students’ sense of entitlement and disrespectful behavior in classroom settings. Academic entitlement (AE), a construct that includes an expectation of special privileges from educators, is affecting college classroom settings and student-teacher relationships. We were interested in examining mindset, narcissism and their interaction as predictors of AE. Data was collected and analyzed from a large scale survey of 1844 students at two-year colleges. We hypothesized that narcissism would have a positive correlation with AE. We also considered that those with a fixed mindset might express AE as a way to compensate for their believed inability to develop academically regardless of narcissism. But that for those with a growth mindset, AE would not be used to compensate for perceived academic deficits. Thus, for those with a growth mindset AE was only expected to be high among those high in narcissism. Regression analyses revealed significant correlations of narcissism with AE and of mindset with AE. Results also demonstrated a significant interaction between mindset and narcissism on AE indicating a stronger relationship between narcissism and AE at higher levels of growth mindset. Ultimately, our results suggest that there may be at least two motives driving AE. One motive entails a strategic attempt to boost grades when other paths to desired grades seem closed, while the other entails an extension of a more general desire for special treatment as embodied in narcissism.
Do Infants Represent Others Based on the 'Kind' of Moral Behavior They Engage In?

Infants interpret the actions of others as being nice or mean from an early age (Hamlin, Wynn, & Bloom, 2007). Previous studies from our lab suggest that 11 month old infants are more likely to represent a person as two distinct individuals if they engage in opposite moral behaviors (e.g., a helpful and unhelpful action). The current study builds on this previous work by examining whether infants think about moral behaviors in terms of categories. In this study infants were shown a puppet show in which identical characters performed visually different but morally identical actions after emerging from behind a screen in a sequential fashion. Infants saw characters either helping to build a tower and help open a box (actions that were morally identical but different looking) or knock down a tower and hinder the opening of a box (actions that were morally identical but different looking), followed by a screen dropping and showing either one or two identical characters. The logic of the experiment was that infants would show different patterns of looking depending on how many characters they expected behind the screen. Whereas our previous study found that infants expect two characters behind the screen when they see moral actions that belong to different categories, our current results suggest that infants have no expectation when the moral actions belong to the same category. These results are consistent with the possibility that infants think about the moral behavior of others in terms of different categories or 'kinds'.

Religious Devotion and Tendency towards In-Group Favoritism

Religious organizations are those united by their faith in something beyond their material world. In-group favoritism is the pattern of an individual favoring members of their inner circle, over those outside their inner circle. The purpose of the study was to attempt to find a correlation between religious devotion and tendency towards in-group favoritism. A questionnaire was given to several participants, asking them about their religious affiliation and how willing they are to interact with strangers and known individuals in several situations. The study found that there was no significant correlation between religious devotion and tendency in-group favoritism. In some cases, religious individuals showed less tendency towards in-group favoritism than non-religious individuals.
Status hierarchies pervade virtually all societies and many people seek to ascend social ranks. Yet not all people pursue status through the same ways and by the same means. Across three studies, we developed and validated a scale that measures motivation to attain a higher status and different means to pursuing status. In Study 1, we developed the items for the scale and tested factor structure and reliability within a sample of 258 participants. This process revealed seven subscales: status motivation, antisociality, dishonesty, collaboration, independence, self-promotion, and dominance. This scale structure was tested for replication using confirmatory factor analysis and validation in two separate samples of undergraduates and community members (Studies 2 and 3). In Studies 2 (N = 213) and 3 (N=121), we also examined how the status pursuit scale predicted relevant personality traits, empathic accuracy, academic motivation, and testosterone, which is theorized to promote status pursuit and dominance. Collectively, this research suggests that people motivated to pursue status report greater status, trait dominance, psychopathy, positive affect, aggression, self-monitoring, and an independent self-construal. It also suggests those who pursue status through collaboration with others have greater academic motivation, an interdependent self, and greater empathic accuracy when reading emotions from faces. However, pursuing status independently of others, through antisocial means, and deceptively were associated with increased risk of mood disorders. Finally, dominant status pursuit was associated with men’s testosterone. Overall, there appear to be multiple facets of status-seeking behavior patterns with distinct psychological and social outcomes.

This paper is an exploration of the phenomenon known as the “Filter Bubble.” This phenomenon was first recognized and named by activist Eli Pariser in 2010. This concept may explain and be responsible for some of the polarization seen in the United States today. The paper will thoroughly define the concept of the filter bubble and examine the role that media sources play as well as the effects on individuals. The topic will be approached from a social psychological perspective, which studies the nature and causes of individual behavior within groups or in social settings. The main issues that will be considered within this context will be climate change, the growing distrust of intellectualism and the dire consequences this may have for our civilization.
11:45-12:30    Board 89
Kaitlyn Theresa Costello
Marie R. Phanord
Kelsey Elizabeth Waitt
Phoebe Lin (Faculty Sponsor)
Department of Psychology, Framingham State University
Negative Biases toward Bisexuality Is Called Bi-negativity. Why Not Bi-gotry?

A study investigated potential biases toward bisexual individuals versus heterosexual individuals based on negative stereotypes that bisexual individuals are more prone to promiscuity and/or infidelity. Two scenarios were presented, one with a bisexual woman and one with a heterosexual woman. Both had had the same number of dating partners. Participants then evaluated perceptions of how trustworthy and prone to faithfulness the woman was. It was predicted that, based on bi-negativity, participants would rate the bisexual woman as more prone to infidelity. This study will help to close gaps in the research on negative perceptions of bisexual individuals.

Group Members: Kaitlyn Costello, Kelsey Waitt, Marie Phanord, Erin Dougherty

11:45-12:30    Board 90
Rylee Holmes
Phoebe Lin (Faculty Sponsor)
Department of Psychology, Framingham State University
Ageism in Technology and Employment

Effective use of technology is a skill that tends to be associated with the younger generation, and older individuals seem to be viewed as incompetent in using technology, based on stereotypes, especially in a work setting. This study set out to investigate ageism in the process of hiring an applicant for a tech-job. A scenario was given to participants which depicted a recent college graduate with a bachelor’s degree in computer science as a candidate for a tech position, followed by likert-scale questions regarding the applicant’s perceived competency in various tasks. Participants read the scenario about one of two job candidates. Both candidates were four-year graduates of Framingham State University with a degree in computer science, with the same GPA, course work, and internship experience. The only difference between the two candidates was the age: one was 23 years old and the other was 55 years old. It was predicted that participants would evaluate the younger candidate more favorably due to the negative stereotypes associated with older individuals’ ability to use technology and the stereotype that older individuals are less capable in performing jobs.
The current study was designed to assess the potential differences in preference for either a male or female clinician. Based on gender stereotypes, women are thought to be better listeners, more empathetic, and more understanding. For these reasons, it was predicted that women psychologists would be deemed as more trustworthy, more sensitive, and overall the more preferred gender of a fictional psychologist. Participants were randomly assigned to read one of two scenarios (one independent variable with two levels). All scenarios depicted a clinical psychologist (either Mark or Nicole) who had over 100 hours of field experience, his/her own private practice, and a specialization in treating patients with severe mood disorders. Fifteen items assessed evaluations of the scenario character. Independent samples t-tests did not indicate significant differences in terms of how participants evaluated the psychologist’s professional competence or interpersonal skills based on the psychologist’s gender ($t(91)<1.26, p=ns$). A scale assessing modern racism, right-wing authoritarianism, social dominance orientation, and political ideology was also included. Participants responded using a Likert scale with 1 being strongly disagree and 7 being strongly agree. It was found that liberal politics indicated lower levels of modern racism, right wing authoritarianism, and social dominance orientation while conservative politics predicted higher levels of the three constructs. This can be explained by the idea that in general, people who have liberal ideologies are more open and less judgmental. They welcome change and support new ideas.

Many people have prejudiced opinions of others due to standards set in society and personal beliefs. Research on prejudice is needed to understand how and why people have negative views on out-groups. This study focused on perceptions of people with body modifications such as tattoos and piercings and their likeliness of being hired in the workforce. In this study, undergraduates were provided with a scenario based questionnaire about a female (one clean cut and one with visible body modifications) interviewing for a teaching position. Then participants answered questions about their perceptions of the female, her likelihood of getting the position and seemingly unrelated questions about modern racism, political orientation, social dominance and right-wing authoritarianism. We hypothesized that the female with visible body art would have a more difficult time being hired for the job than the woman with a clean cut appearance due to negative attributes associated with body modifications. The findings expand our understanding of links between prejudice and body modifications.
Perceptions of Political Association

The current study investigated the topic of how participants perceive characters of Republican and Democratic parties in a simulated scenario. Participants read one of two scenarios, where key elements varied in terms of political affiliation. Participants evaluated the background content of the characters of the scenarios; their perceptions regarding the diverse political associations were evaluated by a series of Likert Scale items. It was predicted that participants would perceive the democratic scenario character more favorably compared to the Republican scenario character. This prediction was due to common negatively perpetuated stereotypes of Republicans.

Single Parents: Who Do You Prefer? Mother or Father?

The current study examines potential gender biases that may exist in people’s perceptions of single mothers and single fathers. After examining existing research on the subject, the researchers hypothesized that participants would rate the single father more favorably than the single mother. Ninety-four participants were randomly assigned to read one of two scenarios and then complete fifteen items that evaluated the scenario character. After analyzing the results, the researchers found significant results on three of the items that supported their hypothesis. The researchers concluded that stereotypical gender characteristics that paint males as dominate and capable and females as submissive and needing support may have been responsible for these results. Further research could be conducted comparing single parents to two-parent households and heterosexual parents to gay/lesbian parents.
The present study investigated racial biases associated with attributions of disciplinary issues for an academically gifted student though the scenarios were presented somewhat ambiguously to assess potential bias. Race of the target student was manipulated through names, indicating either a Black student (Tyrone) or a White student (Jack). It was expected that participants would be more likely to believe that the white child was acting out in school because he was gifted and bored while the gifted black child was acting out because he was trying to cause trouble and that these assumptions were based on racial biases.

The current study investigated the topic of weight bias in dating and attraction. Participants read one of two scenarios which varied in terms of the scenario character’s weight. Participants evaluated the scenario character by responding to a series of Likert scale items that assessed the scenario character’s attractiveness, personality, and social skills. Participants also responded to demographic questions. It was predicted that participants would indicate more favorable evaluation of the petite character rather than the plus sized character.

The United States incarcerates its citizens at a significantly higher rate than any other country in the world (Walmsley, 2013), and significant research has been dedicated to noting the disparities in the populations affected by this mass incarceration—specifically, the higher rates of incarceration among people of color, people from low-income backgrounds, and people living with mental illness (Mears, 2004; Pettit & Western, 2004; Prins, 2014). This study will examine the influence of social identity on the outcome of incarceration and will compare the roles that social identity vs. legally defined criminal behavior play in the likelihood of incarceration for an individual. Furthermore, this study will seek to examine the impact of incarceration on trauma
symptoms in order to determine the function of incarceration as a source of trauma in itself. Using data from a sample of individuals incarcerated at a Massachusetts house of corrections and a sample from students at an urban Massachusetts university, these hypotheses will be tested to establish the relationship between social identity and incarceration, as well as to determine the traumatic nature of incarceration and its potential to serve as an institutionalized trauma impacting marginalized social groups.

Room 808   11:45-12:30   Panel 3
Hannah Frey
Nesa E. Wasarhaley (Faculty Sponsor)
Department of Psychology, Bridgewater State University
The Specific Role That Notions about Masculinity and Femininity Play in IPV Misconceptions

Intimate partner violence (IPV) affects 1 in 4 women and 1 in 10 men in their lifetime (NISVS, 2012). This issue affects millions of people and yet many people in the United States base all that they know regarding the issue on myths and misconceptions. These myths surrounding IPV (e.g., the victim is always a female) often lead individuals to blame the victim for what has happened. Previous research has shown that the overwhelming amount of victim blaming that occurs within these accepted misconceptions is connected to a traditionalist view of gender norms (Esqueda & Harrison, 2005). The existing literature has yet to examine the specific role that notions about masculinity and femininity play in IPV misconceptions. Therefore, the present study examines the connection between traditional gender role norm beliefs and IPV misconceptions surrounding masculinity and femininity. I sampled people from the general public via Mechanical Turk (N= 408). This study used a questionnaire to gather data about the prevalence of these misconceptions and notions. Participants were asked to complete survey questions about their demographics, their adherence to traditional gender role notions and their perceptions of specific characteristics of a “typical” IPV case. Preliminary results suggest that there was a strong, positive correlation between sex-role stereotyping attitudes and adherence to IPV myth acceptance. One potential implication of this study will be suggesting awareness campaigns in communities in the United States about IPV cases that do not fit heteronormative norms.

12:40-1:25   Board 34
Blandine Nikuze
Erik Cheries (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
iCons: Moral Judgment in Human Infants: A Replication Study

As adults, we easily and automatically distinguish between pro-social and antisocial partners in the context of our day to day life. Even though this is an extremely basic yet important ability, the developmental origins of this phenomenon have not been well understood. One relatively recent landmark study (Hamlin, Wynn, & Bloom, 2007) provided evidence that pre-verbal infants (6 - 12 months of age), like adults, possess a basic ability to judge the behaviors of others as nice and mean. In this Experiment, infants witnessed a puppet attempting to climb a hill but
failed after several tries. Eventually the puppet was bumped up the hill by a helpful character or, alternatively, bumped down the hill by a unhelpful character. When given a choice of who they would prefer to play with, infants looked towards and reached out to grab characters who had been helpful over hinderers. Because this was the first evidence that pre-verbal infants are capable of evaluating individuals based on their moral behavior towards others the study is important to replicate. Our study is still in progress but we will report data from our lab that will help determine the extent to which infants form moral judgments of other early in life.

12:40-1:25  Board 48
Sahil Chaturvedi
Andrew L. Cohen (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Context Effects and Categorization

Categorization is the process of putting multiple, different things into a class, rendering them equivalent, for example, classifying both a poodle and a pug as dogs. Decision making is the process of choosing alternatives based on stimulus features. For example, selecting one of 3 apartments based on size, location, and condition. Categorization and decision making are central areas of research in cognitive psychology and have wide reaching applications in, for example, consumer choice, advertising, human factors, and marketing. Unfortunately, these two fields are rarely studied together. Here, we conceive of decision making as an aspect of categorization. That is, the act of categorizing an object involves deciding which category to use. The proposed research takes a first step in this direction by exploring whether well-known decision making phenomena, context effects, affect categorization behavior. Context effects are a set of choice phenomena in which the addition of new alternatives to a choice set changes the relative preferences of the original alternatives.

12:40-1:25  Board 49
Adam D. Brent
David Reinhard (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
MLB Study of Rival Competitors and Likelihood of Causing Aversive Experiences

Why does aggression often arise between sports fans? We test whether rivalry between groups can increase aggression between group members and examine whether this occurs because of the pleasure derived when inflicting aversive experiences on rival counterparts. Competition is defined as a single situation involving parties with negatively linked goals. Rivalry is a competitive relationship where contests feel psychologically “embedded” in an ongoing competitive narrative (Converse & Reinhard, 2016). We recruited UMass undergraduates who strongly identified as fans of the Boston Red and felt a high degree of rivalry toward the New York Yankees. UMass students have a history of sports-related riots, including when the New England Patriots lost Super Bowl XLVI to the rival New York Giants (Haggerty, 2012). In the lab, we instructed participants to wear an article of clothing from the Red Sox in order to increase team identification. We then randomly assigned participants to interact with a gender-matched confederate that wore wear either a New York Yankee (rival team) or Houston Astros
(non-rival team). Participants completed an activity where they were allowed to (believe they) were making the other participants listen to unpleasant and aversive (or pleasant and enjoyable) noises. Main dependent variables are the decisions for noise selection toward the rival and the pleasure for the rival's aversive experience. Most explanations of aggression assume it is ultimately an unpleasant experience for transgressors, we propose that the aversion experienced by a rival can serve as a pleasurable end-state pursued in its own right. I will be presenting the results of the dependent variables.

1:30-2:15  Board 17
Valerie Anne McBride
Ruth E. McKenzie (Faculty Sponsor)
Department of Psychology, Salem State University
The Relationship between Social Media Usage and Self-Esteem

Social media usage has been on the rise since it first began to grow in popularity over the last decade. Usage is particularly high among the college student populations in America. The goal of this study is to distinguish a correlation between how often Salem State University students use different social media platforms and how well they rank themselves on a self-esteem scale. The instruments used to measure these variables will include a questionnaire that contains a variety of questions regarding demographics and social media usage, as well as Rosenberg's Self-Esteem Scale. The data that is collected will then be analyzed to determine the relationship between how often students aged 18-23 use social media and how this effects the way they view themselves, as is determined by the Rosenberg Self-Esteem Scale. Results and their implications will be discussed.

1:30-2:15  Board 33
Hannah Karoline LeClerc
Carlos F. Aparicio (Faculty Sponsor)
Department of Public Health, Salem State University
Improving Tier-1 Mental Health Education in Schools

Tier-1 mental health education programs are designed to educate young people about general mental health issues in school settings and everyday life situations. In practice, however, they have not been efficient at delivering a generalized mental health education to individuals ages 5-18 years old, because these programs do not consider socioeconomic, sociocultural, and gender differences; and these factors are important to effectively educate individuals. The thesis of the present study is that if these factors are included in the design and implementation of tier-1 programs, they will succeed in educating individuals about mental health issues. Accordingly, the present study reviewed research assessing socioeconomic, sociocultural and gender factors in determining the successful implementation of tier-1 mental educational programs. The main findings will be described and their implications to the development and implementation of tier-1 programs will be discussed in this paper.
1:30-2:15  Board 5
Isabelle Woodward
Ruth E. McKenzie (Faculty Sponsor)
Department of Psychology, Salem State University
The Relationship between Attachment Styles and Anger Response

Previous studies have found correlations between attachment styles and the ways individuals will respond to anger. These responses include whether they express or repress their anger, if they seek support when they are angry, and if they show aggression. This correlational study will examine attachment styles, within a sample of college students recruited through social media from Salem State University, and compare it to how they control and express their anger. This research study will use self-report surveys to identify the participants’ attachment style using the Experiences in Close Relationships scale (Fraley, et al., 2000) and to determine how they respond to anger using the Behavioral Anger Response Questionnaire (BARQ; Linden, 2007). The results and their implications will be discussed. It is hypothesized that individuals with secure attachment are more likely to control their anger in an orderly fashion, while avoidant and anxious attachments repress and have less control over their anger. Possible gender differences will also be explored.

1:30-2:15  Board 52
Natasha Dimitruk
Tara Mandalaywala (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Does Exposure to Racial or Economic Diversity Shape the Development of Racial Stereotypes about Social Status?

Social hierarchies are ubiquitous and predict many outcomes, yet little is known about how children learn to organize the people and social groups around them hierarchically. The aim of this study is to determine how exposure to racial and economic diversity in children’s neighborhoods shape children’s beliefs about the social status of themselves and of the racial groups they are likely to encounter in their communities. Participants (N = 420, age = 3.5-6.9 years) were recruited from a children’s museum in a large city and completed two tasks to assess awareness of racial stereotypes about social status, as well as whether children applied these stereotypes to themselves (i.e., their subjective social status). We will examine whether exposure to racial diversity and/or economic inequality in each child’s community (quantified based on census data available for each child’s zip code) predict the age at which they express or apply racial stereotypes about status. Understanding the community-level factors that contribute to the development of racial stereotypes about status will help us understand how to reduce stereotypes and their downstream consequences.
This study investigated biases of college students towards the teaching profession, and assessed participants’ attitudes towards teachers in the areas of job satisfaction, work-related stress, and professional competency. The responses of college students and teachers were compared to assess discrepancies between perceptions and reality. The researcher recruited 57 college students to be randomly assigned to one of four experimental reading conditions. Participants evaluated an individual on job satisfaction, work-related stress and professional competency. In addition, 16 teachers were recruited from an elementary school and self-reported on the same three variables. An analysis of variance and several t-tests were used to assess the data. Teachers reported higher work-related stress levels than college students perceived teachers would have. This implies that the general public is not aware of the levels of stress that teachers experience from their jobs. Future research should focus on specific stress factors for teachers, and propose methods to decrease stress and increase retention of teachers. The public’s perceptions of teachers’ professional competency and other potential negative stereotypes of the field should also be further explored with a larger sample size.

Men and women differ in terms of color perception and labeling. Women tend to use more complex vocabulary to label colors than men. The current theory regarding differences in color perception and labeling between males and females is that it is not differences in biology, but differences in vocabulary dividing men and women. The current body of research on the topic of color labeling looked into hobbies, age differences, and occupation in participants in order to determine the cause for differences between men and women regarding color. The current study asked participants to label nine color swatches changing systematically from green to blue. The first group of participants used the labels “blue” and “green”. The second group of participants used “sapphire” and “emerald”. The third group of participants used “sorrow” and “energy”. The researcher found, consistent with current literature, that participants of different genders did not label colors differently when provided with color labels. This study also found that whether or not participants had art experience had no effect on how they labeled colors. The current study also found that participants in the Sorrow-Energy packet group did not perform differently than participants in other groups. These results support the current theory that vocabulary is partially responsible for differences in color labeling between men and women in that men label colors identically to women when provided the color labels. This indicates that men do not see colors differently, but that women are better at generating color labels than men.
1:30-2:15  Board 79
Alex C. Backer
Gerald W. Meuse
Amanda M. Nash
Paul Michael Galvin (Faculty Sponsor)
Department of Psychology, Framingham State University
Assessment of How Safe Students Feel on a College Campus

In our current society, campus safety has been a growing concern with the increase in reported sexual and domestic assaults at universities. The purpose of the current survey was to examine how students at Framingham State University feel about the safety on their campus. Thirty-eight participants (53% male students and 47% female students) were collected from a convenient sample and completed the survey packet including the 25-question Campus Safety Survey measuring the students’ overall feeling of safety on a college campus. The findings showed, students who are in relationships had a lower overall feeling of safety compared to those who reported they were not in a relationship. Freshman also showed to have a higher overall feeling of safety on campus in comparison to non-freshmen. Surprisingly, it was also found that male students feel less safe on campus than female students. However, on average, female students felt less safe on campus at night than male students. Determining the underlying reasons of why students might feel safe or unsafe on their campus may lead to programs promoting greater campus safety in the future.

1:30-2:15  Board 80
Derek Nelson
Rhiana Wegner (Faculty Sponsor)
Department of Psychology, UMass Boston
Drinking Game Behaviors as Intoxication Tactics to Perpetrate Sexual Violence

Intoxication tactics used to perpetrate sexual violence (SV) include giving someone alcohol to facilitate their intoxication or having sex with someone who is incapacitated. The objective of drinking games (DGs) is getting intoxicated and getting others intoxicated. Perpetrators (perps) may use DGs as intoxication tactics. We examine how perps and nonperps differ in their DG partner selection and drink allocation. Young, heterosexual men (N=272) completed our online survey. When choosing teams in Beer Pong, perps were twice as likely (20% vs 8.9%) to choose men vs. women teams when the women were not as skilled as the men. Perps may prefer playing DGs in teams that put women at a disadvantage to consume more alcohol. In a set of Memory DG scenarios, Ps had the option to assign two 1oz. drinks to other players (i.e., potential dating/sex partner, best male friend, or other woman). Perps assigned drinks to the target woman (dating/sex partner) across a greater number of scenarios than nonperps, suggesting their targeting behaviors might be part of a ‘long game’ to increase the woman’s intoxication. Future research should consider how game play is associated with SV at the event-level.
Many people rely on using various strategies, labeled by Baxter & Wilmott (1984) as “secret tests”, in order to help assess their romantic relationship statuses with their potential partners. This study extends previous research on romantic relationship initiation by focusing on how outness (disclosure of one’s sexual orientation) affects the types of secret tests lesbian individuals use, in attempts to contribute to limited research on the LGBTQ+ community and on early developing relationship initiations. Lesbian individuals (N=100), who are currently (or who have previously been) in a romantic relationship, will complete an online survey that asks about what “secret tests” they tend to rely on, as well as how those specific tests being used may affect the ways they might approach future relationships. Participants will also answer additional questions about their experiences with homophobia and internalized heteronormativity in order to observe how those factors also influence their secret test usage. It is generally expected that lesbian individuals, who are out, are more likely to use most of the secret tests compared to those that are not “out”. It is also expected that lesbian individuals use more secret tests if they experience less, or feel less affected by, homophobia and internalized heteronormativity.

In the United States, adolescent abuse of psychostimulants (e.g., Ritalin) is a costly condition impacting individuals’ school performance, physical health, familial relationships, and psychological health. As the adolescent brain undergoes developmental changes through the transition into adulthood, it is susceptible to drugs that interact with this plasticity. Further, drug exposure at this critical stage can cause alterations that may contribute to lasting vulnerability well into adulthood. Neuroinflammation drives plasticity in the developing adolescent brain acting at least through macrophages and microglia. Microglia express the TLR-4 receptor that is activated by the endotoxin lipopolysaccharide (LPS) as well as drugs of abuse. Previous data from the lab demonstrates that a single dose of LPS during adolescence augments the locomotor response to repeated amphetamine injections and a challenge dose after a 7-day withdrawal in male Long-Evans rats. One mechanism important for this effect involves altered microglial activation and expression of other neuroinflammatory markers. The current experiment was developed to evaluate changes in microglia and cytokines in brain reward areas in the LPS + amphetamine model in male Long-Evans adolescent rats. After behavioral tests, animals were sacrificed to remove brain tissue for immunohistochemistry.
labeling microglia and cytokine proteins (i.e., Iba1). Our preliminary findings indicate increased Iba1 protein levels in the nucleus accumbens in LPS + amphetamine treated animals and greater microglial activation. Taken together, the findings may identify endotoxin ‘stress’ as a potential risk factor creating drug vulnerability and highlight novel therapeutic neuroinflammatory targets.

1:30-2:15  Board 83
Kaitlin Parent
Vivian Ciaramitaro (Faculty Sponsor)
Department of Psychology, UMass Boston
Perception of Emotional Faces and Voices in Social Anxiety

Social communication relies on the accurate representation and interpretation of emotion. Yet, emotional perception can be biased. For example, socially anxious individuals tend to be hypervigilant toward threatening faces and perceive neutral or ambiguous faces more negatively than controls. Little is known about how information in emotional faces interacts with other emotional information to bias perception. We investigated if socially anxious individuals were biased in perceiving emotions which were seen (faces) as well as heard (voices) using an adaptation paradigm. For example, adapting to happy faces biases neutral faces to appear angrier, with stronger adaptation to positive emotion indicating a stronger negative bias.

In the current study, socially anxious individuals and controls were adapted to happy faces while hearing congruent (matching emotional valence) or incongruent (non-matching emotional valence) voices. We calculated each participant’s point of subjective equality (PSE), the face equally likely judged happy or angry, before and after adaptation to determine how the neutral point shifted. Given that socially anxious individuals tend to have a negative bias, we expected stronger adaptation for positive congruent emotional information in socially anxious individuals versus controls. Predictions for adaptation to incongruent emotional information were less clear as this may depend on the sensitivity of socially anxious individuals to negative auditory emotional information, for which they may show hypervigilance.

Contrary to our predictions, pilot data (N=83) to date suggests a trend for weaker adaptation to positive congruent emotions, and no difference for incongruent emotions, in socially anxious individuals versus controls.
Seeing Abstract Shapes Enhances Children’s Ability to Associate Abstract Shapes They Feel with Nonsense Words They Hear

The bouba/kiki effect, an ubiquitous example of crossmodal correspondence, is a naturally occurring association between an abstract shape, spikey or round, and a nonsense word, /kiki/ or /baba/, respectively. This effect is found across cultures, languages, development, and is manifest across different senses (reviewed in Spence, 2011). Previously, we found that, unlike adults, 6-8 year-olds show weakened associations between heard non-sense words and felt abstract shapes (audio-tactile: AT). Interestingly, AT associations in children could be strengthened by prior exposure with the same heard non-sense words and complementary abstract shapes seen on a computer monitor (audio-visual: AV). This AV exposure could enhance associations between sounds and mental images that then facilitate associating sounds with tactile shapes or could enable a mental image of the visual shape which facilitates translation of tactile shapes to visual representations. Here we consider if prior visual-tactile (visuo-tactile: VT) exposure could also enhance AT associations in children. VT exposure could enable formation of a mental image of abstract shapes which then facilitates translation of tactile shapes to visual representations, without enhancing visual-sound associations. We found that VT exposure could enhance AT associations in 6-8 year-olds. Our results suggest that prior exposure with either AV or VT stimuli can enhance AT associations in children, possibly by enhancing visual mental imagery which allows tactile representations to be translated into visual representations. Further research is needed to consider the role of visual input and imagery in developing associations between heard and felt abstract stimuli, as in the bouba-kiki effect.

We are Biased to Perceive More Attractive Faces are Happier

Our ability to perceive emotion is essential for social interaction, but is known to be biased. Here we examine how the attractiveness of a face can bias the emotion perceived in a face. We hypothesized that faces judged more attractive would be perceived as conveying more positive emotion, happier, compared to faces judged less attractive.

Participants viewed 8 unique face identities (4 male/4 female), each morphed along an emotional continuum (80, 40, 20, 10% happy; the complementary angry, and neutral) and had to judge if the face appeared happy or angry. After rating the emotional valence of all face morphs, participants judged the attractiveness of the neutral face for each unique identity (1: very unattractive; 7: very attractive).
Across participants, we calculated mean ratings of attractiveness for each face identity and determined the male and female faces judged most and least attractive across participants. We then calculated the point of subjective equality (PSE), the face judged happy or angry equally often, separately for the most and least attractive female and male faces.

Across 2 separate experiments, we found the most attractive female and male face were judged more positive in emotional valence compared to the least attractive female and male face, quantified by a lower PSE. Furthermore, differences in the PSE tended to be larger for the most versus least attractive, suggesting that attractiveness biases are stronger for female than male face. Our results suggest that more attractive faces need to contain less happiness to be seen as happy, i.e., our bias is to perceive attractive faces as conveying more positive emotion.

Room 168 1:30-2:15 Panel 5
Gwendolynne Weissinger
Teresa King (Faculty Sponsor)
Department of Psychology, Bridgewater State University
Mindful Phone Use

The rapid, global adoption of smartphones has undoubtedly affected users’ quality of life. Existing research has published mixed findings on whether these devices are beneficial or detrimental to users’ well-being. Phone use shifts a user’s focus away from the present moment and towards the device at hand. Mindfulness, or “the state of being attentive to and aware of what is taking place in the present,” has been shown to improve individual’s well-being through promoting self-awareness that allows for behavior regulation that is congruent with one’s basic needs (Brown & Ryan, 2003). The purpose of this project is to investigate the relationship between multiple factors: phone use and nomophobia (fear of being without a phone), personal well-being, and mindfulness. Measures include the Nomophobia Questionnaire, Ryff’s Psychological Well-Being Scales, and the Mindfulness Attention Awareness Scale. Participants will be randomly assigned to either a mindfulness condition, which involves the use of the phone application Moment (Moment Acquisition Inc., 2017), or a control condition. All participants will complete a pre- and post-assessment self-report survey and their screen time will be tracked using the Moment app. It is hypothesized that nomophobia will be negatively correlated with well-being and mindfulness, and that participants in the mindfulness condition will report decreased phone use and increased well-being. This research may help to identify strategies for reducing phone dependency and increasing well-being.
2:45-3:30  Board 48
Ashley Youngblood
Lisa Delano-Botelho (Faculty Sponsor)
Department of Psychology, Bristol Community College
Companion Animal Ownership: An Adjunctive Treatment for Mental Illness

In the United States, one in five adults live with a mental illness. Suicide is a leading cause of death, and there are twice as many suicides per year than homicides (National Institute of Mental Health, 2017). According to Young (2015), "More than 90% of suicides are directly attributable to untreated mental illness" (p. 9). Companion animals have long been documented as having positive effects on human well-being. Positive effects of companion animal ownership include psychological, social, and physical benefits (J. Jua & D. Hodgson, 2018). Corry and Jewell (2001) point out that effective mental health treatment should be viewed less as a single treatment tool, and more as a "box of tools" to achieve long-term rehabilitation and psychiatric wellness. A 2016 study found that pet ownership could be considered an extension of more traditional collaborative care methods after identifying the unique role pets play in the management of mental health (Brooks, Lovell, Rogers, Rushton, & Walker, 2016). Further, implementing programs to match persons living with mental illness with a companion animal could offset the 6.5 million animals living in shelters annually, as well as the 1.5 million euthanized (ASPCA, 2019).

2:45-3:30  Board 93
Kennedy Martin Damoah
Benjamin D. Jee (Faculty Sponsor)
Department of Psychology, Worcester State University
Reducing Misconceptions: Testing a Refutational Method of Instruction

Students encounter many self-imposed obstacles when learning the theory of evolution by natural selection. For example, students explain evolution as the intentional efforts of organisms to adapt to their environment. They also attribute the emergence of new traits in organisms as a response to their needs (Gali & Meinardi, 2011). This teleological bias—explaining biological phenomena in terms of goal, purpose, and function have been found to be the main obstacles students face (Kelemen, 1999). Compared to traditional method of teaching, the refutational method is the most effective for reducing students tendency to default into intuitive theories when explaining biological phenomena. Refutation is a step-by-step negation of prior misconceptions by presenting a scientific explanation (Vosnaidou, & Skopeliti, 2017). For example, parents do not pass on acquired characteristics to offsprings in the same way a professor's acquired knowledge is not passed on to his/her children. The present research tested whether the refutational method of teaching reduces students' teleological biases when reasoning about the concept of evolution. The study involved a pretest and posttest of evolutionary thinking and manipulated whether participants received refutational vs. non-refutational (control) instruction. It is predicted that participants who read the refutational passage will do better on the posttest task. I will present initial findings from this ongoing research project that speak to this prediction. Ultimately, the findings from this study could be applied to support science learning in a range of settings.

Keywords: Teleology, refutation, evolution, natural selection, intuitive theories.
The purpose of this study is to examine the perceived effects of psychiatric and physical disabilities, as well as criminal history on employability of a job applicant. Participants were 120 undergraduate students from a small public university and ranged in age from 18 to 26 years old. This current study expands on previous research by analyzing how the specific disability of an applicant, in addition to their criminal history, affects the applicant’s chances of being hired. This study differs from previous studies because participants are presented with scenarios that manipulate both criminal history and form of disability of imaginary job applicants, and places participants in the hypothetical position of hiring the applicants. It is predicted that applicants who: (1) are wheelchair users are more likely to be hired than those who are depressed; (2) do not have a criminal history are more likely to be hired than those with a criminal history; (3) do not have a criminal history and are physically disabled are more likely to be hired than applicants with a criminal history and depression. Data were analyzed using a 2x2 factorial ANCOVA. The results from the ANCOVA indicated an employability bias toward the applicant with a psychiatric disability. Due to these results people may be more accepting towards whose who have a criminal background. Human rights leaders, psychiatric and physically disabled people, and politicians can all benefit from the findings of the current study.

The purpose of the current study is to determine the perceived effects of gender identity and gender on a person’s attitudes towards transgender bathroom usage. The study consisted of 123 participants from a small liberal arts university in the Northeast. The majority of participants were Caucasian, cisgender, female, and heterosexual. Participants read through one of four scenarios about either a transgender man, transgender woman, cisgender man, or cisgender woman before completing questions from two scales that measured acceptance and transphobia. Participants also answered demographic questions regarding their gender identity, academic standing, political standing, sexual orientation, and age. The data were analyzed using a 2 X 2 factorial ANOVA. Results indicated transgender scenario characters received less acceptance from others than cisgender scenario characters. Also, participants who read the scenario about the transgender character were more trans-prejudice than those who read the cisgender character scenario. Significant findings were also discovered regarding
trans-prejudice and political standing, trans-prejudice and gender identity of the participant, overall acceptance and political standing, and overall acceptance and the gender identity of the participant. This study was conducted because transgender individuals face a large amount of prejudice and discrimination from other people. This study was designed to determine why trans-prejudice occurs, and what groups of people are the most likely to exhibit nonacceptance of transgender individuals.

2:45-3:30 Board 96
Annalyse Arnold
Nicole E. Rossi (Faculty Sponsor)
Department of Philosophy and Psychology, Framingham State University
The Effect of Gender and Willingness to Seek Treatment on Mental Health Stigma

Researchers examine the effect that gender and help-seeking behaviors have on a person’s mental health stigma. It is hypothesized that participants would perceive: (1) male scenario characters as having greater stigma toward mental illness; (2) scenarios characters who are less likely to seek treatment as having greater stigma toward mental illness; (3) male scenario characters who are not willing to seek treatment as having the greatest stigma toward mental illness. Researchers also hypothesized that participants who received mental health treatment in the past would report higher levels of help seeking behaviors, and participants who rated their treatment as more helpful would be more likely to seek treatment again in the future. A survey that measured participants perceptions of stigma toward mental illness and their previous help-seeking behaviors was given to 120 students at Framingham State University. A 2X2 factorial ANOVA measured the main effects and interaction between the independent (gender and help-seeking behavior) and dependent (stigma) variables. Researchers found there was no significant effect of gender on stigma and no significant interaction of gender and help-seeking on stigma. There was a significant effect of help-seeking on stigma. No significant difference between participants who previously sought treatment and participants who did not was found. There was a significant positive correlation between participants ratings of the helpfulness of the mental health professional with help-seeking behaviors. This study provides further knowledge on why perceived mental health stigma might hinder people from seeking treatment for a mental illness.
The purpose of the current study is to measure perceived levels of distress of scenario characters and participants' own attitudes towards homosexuality after reading scenarios depicting either a heterosexual or homosexual emotional affair in a heterosexual dating couple. An emotional infidelity (or affair) is defined as, “A relationship between a person and someone other than (their) spouse (or lover) that affects the level of intimacy, emotional distance and overall dynamic balance in the marriage,” (Moultrup, 1990, p. 27). Participants completed a survey in which the perceived distress to infidelity and their own attitudes towards homosexuality was assessed. A 2x2 factorial design was employed. It is hypothesized that: (1) an emotional affair committed by a male significant other would be perceived as causing higher levels of distress for the female scenario character; (2) a homosexual emotional affair would be perceived as causing higher levels of distress than a heterosexual affair; (3) a homosexual emotional affair committed by a male significant other would be perceived as causing higher levels of distress for the female scenario character. Finally, it is hypothesized males would hold more negative attitudes towards homosexuality than females. There was a trend for type of infidelity experienced, such that homosexual affairs were rated as more distressing than heterosexual ones. Strength of the manipulation variable and social desirability bias are some of the complications discussed.

The present study examines the perceived effect of mindfulness-based interventions (MBIs) and depression on self-esteem. Past research suggests MBIs lead to improvement in depressive symptoms and self-esteem. It is hypothesized that participants would perceive scenario characters who participate in mindfulness meditation as having high self-esteem, and that scenario characters with a diagnosis of depression would have low self-esteem. It is also hypothesized that participants would perceive scenario characters who participate in mindfulness meditation and who are not diagnosed with depression as having the highest self-esteem. One hundred eleven students attending a small state university read one-of-four different scenarios depicting diagnoses of depression and mindfulness practices. Participants then answered a survey that measured the perceived self-esteem of scenario characters. A 2x2 factorial ANOVA was used to analyze the main effects between mindfulness and self-esteem, depression and self-esteem, and the interaction between mindfulness and depression on self-esteem. Results were nonsignificant between mindfulness and self-esteem, but a trend was
examined between the two variables (scenario characters who practiced mindfulness were perceived to have higher self-esteem). Additionally, scenario characters who had a diagnosis of depression were perceived to have lower levels of self-esteem. However, there was no significant effect between mindfulness and depression. Finally, there was no significant difference between mindfulness practice and levels of stress in participants. It is valuable for clinicians to know what groups of people perceive MBIs to be effective; knowing who perceives MBIs as effective can be helpful in deciding to administer this form of intervention.

3:45-4:30    Board 2
Victoria R. Pike
Catherine Savini (Faculty Sponsor)
Department of English, Westfield State University
Overcoming Psychology and Stereotypes: An Analysis of the Causes and Potential Prevention of Victim Blaming

This paper will examine victim blaming’s psychological impact, theories that explain why individuals participate in victim blaming, how victim blaming looks in both female and male cases, and suggestions for prevention in cases of rape and sexual assault. Often times, when individuals report rape or sexual assault they receive blame for the crime committed against them. Serving as added trauma, this significantly complicates the survivor’s healing. Rape and sexual assault cases violate Just World Theory, and the idea that individuals are directly in control of what happens to them. Victim blaming serves as a coping mechanism (although this is often subconscious). These cases also oppose widely held stereotypes in relation to gender. Women are often told a list of “Safety Tips” to help them avoid being raped because of their perceived natural weakness. Men are believed to be strong, and therefore capable of stopping a potential rape or sexual assault. The biological function of an erection is used against them. In all of these scenarios, the crime is viewed as the victim’s fault instead of the perpetrators. Learning to identify what victim blaming looks like allows individuals to be able to change their behavior. By understanding why victim blaming happens, we can help get to the root of victim blaming to help create a lasting change in behavior within our society. This change will, in turn, allow victims to heal, putting the focus on telling rapists not to rape instead of telling people they must actively avoid becoming a victim.

3:45-4:30    Board 89
Christina Louise Chamberlin
Samantha C. Gray
Agnes Lacreuse (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Sex Differences in Sleep Patterns in Aging Marmosets (Callithrix jacchus)

Sleep disturbances in aging humans differ between men and women, but the exact nature of these differences remains unclear. Studies in nonhuman primate models of human aging and sleep may help clarify this issue. The common marmoset (Callithrix jacchus) is uniquely suited for longitudinal studies of cognitive aging, due to a relatively short lifespan (~ 10 years),
sophisticated cognitive abilities and patterns of brain aging that resemble those of humans. Unlike rodents, marmosets display human-like sleep patterns with consolidated sleep. We examined sleep patterns monthly for 48-hour periods with activity monitors (Actiwacth Mini by CamNTech) in male (n=7) and female (n=6) marmosets (mean age 8). We analyzed data using general linear mixed models. Males and females did not differ in the number of sleep bouts during the night, but preliminary evidence suggests a sex difference in sleep patterns. Specifically, females displayed a trend toward more immobile phases than males (F(1,25)=3.96, p = 0.06), but total time spent immobile during the night was greater in males than females (F(1,25)=8.89, p = 0.01). These preliminary analyses point to sex differences in sleep patterns for aging marmoset monkeys. Additional data will further clarify these results. Supported by NIH grant # AG046266.

3:45-4:30    Board 90
Zachary Alexander Meyer
Kirby Deater-Deckard (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Exploring the Non-shared Environmental Influences of Birth Weight and Maternal Negative Behaviors on Sibling Negative Affect Using a Twin Study Design

An objective of behavioral genetics is to ascertain the extent to which biological and environmental factors contribute to the development of behavioral outcomes. Environmental factors are typically split into two categories, shared and non-shared. Shared environmental influences serve to promote similarities amongst people exposed to them, whereas non-shared environmental effects promote differentiation. Researchers typically utilize identical twin studies when examining non-shared environmental factors, as the genetic similarities between identical twins help to address various confounds which result from biological variation. In other words, since identical twins share the same DNA, any observed differences in development should be explained by non-shared environmental factors. Much of the earlier research sought to investigate the effects of non-shared environmental factors on sibling temperament that occur postnatally. However, recent studies have investigated the possible impacts of the prenatal environment as well. This current analysis is an extension of recent research into the prenatal environment. The aim is to examine the possible associations between differences in twin sibling birthweight, and negative maternal parenting behaviors on the differential development of negative affectivity in identical twins. Pearson’s correlations are utilized in this secondary analysis of twin data (N = 85–98 pairs) collected during the longitudinal Western Reserve Reading and Math Projects study. As this study is still in its preliminary phase, the findings and discussion of results will be made available later.
3:45-4:30  Board 91
Skye Sharon Lynnae Clayton
Maureen Perry-Jenkins (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Perinatal Depression across the Transition to Parenthood among Low-Income, Women of Color, and White Women

Perinatal depression, which is depression experienced during pregnancy and up to one-year postpartum, is a global health problem that affects as many as one in four women (Flynn, O’Mahen, Massey, & Marcus, 2006). Yet, previous research on perinatal depression has largely focused on white, middle class mothers. However, women who have socioeconomic risk factors, such as low income, low education, and unstable work, are 11 times more likely than women who do not have these risk factors to have clinically elevated perinatal depression scores (Goyal, Gay, & Lee, 2010). In addition to socioeconomic risk factors, racial and ethnic minority women are at greater risk for perinatal depression (Orr, Blazer, & James, 2006). While, there are many factors that can affect perinatal depression symptoms, this study will focus on paid work. Navigating the work-family balance is challenging, yet, the impact of paid work on perinatal depression is mixed. Research suggests that for low-income, working women (“working poor”), returning to work after birth can improve mental health (Dagher, McGovern, & Dowd, 2014). In this study, I will use existing data collected as part of the Work and Family Transitions Project (WFTP), a longitudinal study that assesses life changes during the transition to parenthood, to examine mean differences in rates of perinatal depressive symptoms across the first year of parenthood among African American, Latina, and White women. Analyses will also examine how the return to paid work soon after birth is related to all women’s depressive symptoms, as well as by racial and ethnic group.

3:45-4:30  Board 92
Brianna Mary Forte
Nilanjana Dasgupta (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
The Effect of Anger on Unintentional Race Bias

This study examined whether anger affected participants’ performance on a race-related, weapon identification task. To identify the influence anger could potentially have on performance, participants were placed in one of two conditions: anger or the control. Participants described, in writing, a time when they were angry (anger condition), or their dorm room (control condition), before completing a weapon identification task designed to capture racial biases in participants’ responses. Researchers hypothesized that participants, when identifying an object paired with a black face, would be more likely to misidentify harmless objects as weapons than when it is paired with a White face (i.e. an unintentional race-related error); and that in addition, participants in the anger condition would make more unintentional race-related errors than participants in the control condition. To further understand unintentional race bias, researchers measured a brain wave associated with error detection, known as the Error Related Negativity (ERN), while participants completed the weapon identification task. Past research had shown larger ERN amplitudes to predict a greater effort to suppress racially
biased responses during the experiment, and improved performance on the task over time. The current study hypothesized that anger could attenuate ERN amplitude, thereby disrupting the neural correlates associated with detection of race-related errors and overall performance on the weapon identification task.

3:45-4:30 Board 93
Nicole Tommasi
Rebecca Ready (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Emotion Recovery and Depressive Symptoms in Older Adults with Mild Cognitive Impairment and Healthy Older Adults

The U.S. population is aging, and cognitive disorders of later life are on the rise. Mild Cognitive Impairment (MCI) – which is characterized by cognitive impairment but intact abilities to manage day-to-day tasks – affects approximately 15-20% of older adults. Persons with MCI have difficulty with emotion regulation, but it is not known how persons with MCI recover from a stressor. This study will determine if persons with MCI recover less efficiently from a negative mood induction than controls; if so, we will determine if the group differences are mediated by depressive symptoms, which are known to be greater in MCI than controls. Persons with MCI are predicted to have poorer recovery than controls and this group difference is hypothesized to be mediated by depressive symptoms. Participants (aged 65+) are healthy controls (n = 21) and persons diagnosed with MCI (n = 14). To assess recovery, a mood induction task was introduced in which participants watch a negative video, followed by a positive video to facilitate emotion recovery. Negative and positive affect are assessed before and after the recovery video. T-tests will determine if there are group differences in recovery of negative affect and positive affect following the positive stimulus. If there are group differences in recovery, we will determine if depressive symptoms mediate the differences. Results of this study will provide insight into the nature of emotion dysregulation in persons with MCI and could be used – in part – to develop interventions to manage emotion regulation in MCI.

3:45-4:30 Board 94
Samuel Joseph Carr
Sara A. Whitcomb (Faculty Sponsor)
Department of Education, UMass Amherst
Risk and Protective Factors of College Adjustment

The transition to college presents a host of challenges for students including rigorous academics, decreased social support, and an unfamiliar environment. While college enrollment has steadily increased over recent years, there has been an observed decline in college retention and graduation rates. With holistic health and wellness in mind, researchers have identified literature that points to multiple factors that may influence one’s college adjustment. These factors include sleep, substance abuse, physical activity, resiliency, self-efficacy, extracurricular activities, and social media use. In an attempt to better comprehend this
phenomenon, the researchers designed a survey-based study of validated measures to glean an understanding of associations among college adjustment and potential risk and protective factors. Research questions include: whether the sample is representative of the university’s student body; whether factors are associated with college adjustment and the strength of this relationship; and the degree to which each factor is predictive of college adjustment. The results of this study further facilitate the ongoing discussion of efficacious student support systems, university funding allocation, and college adjustment.

4:45-5:30   Board 81
Lena Marie Stone
Kyle Cave (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Exploring the Nature of Mental Color Representations That Guide Attention in a Complex Visual Search Task

Previous visual search experiments have found that searching for two visual targets is more difficult than searching for one alone, and that as the similarity between two target colors decreases, colors dissimilar to both targets are fixated more, thus decreasing search efficiency. If subjects in dual-target search are given alternative methods for identifying targets (such as searching for a single shape), they will likely favor those instead of using color to guide attention to a pair of targets. This experiment uses components from Stroud et al. (2012) and Chang (2017) to create a complex visual search task in which subjects look for two separate targets (which vary between trials) among distractors of the same shape, thus forcing subjects to use color as their guiding feature. The eye fixation patterns in this experiment are compared to those from a previous task in which subjects are given the same target colors each trial. The differences between consistent targets and varied targets indicate that subjects who search for different targets on every trial are more likely to create distinct mental representations of the target colors, while subjects who search for the same targets on every trial are relatively more likely to search for a single, unitary range that encompasses both colors. These results suggest that building a representation of a range of colors to guide attention may require time and practice with searching for specific targets.

4:45-5:30   Board 82
Olivia Marie Downer
Kyle Cave (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Memory Consolidation during Multi-target Visual Search

During visual search tasks, individuals hold representations of target information in their visual working memory (VWM). With practice at search, subjects may store search targets in long term memory (LTM). The motivation for this study was to determine if target information is eventually transferred from VWM to LTM in a search task with four unique targets, differing in color and orientation, which become predictable after repeated trials.
In order to determine the number of items in VWM at a given moment, an event-related potential component called contralateral delay activity (CDA) is used. CDA occurs after the cues are no longer visible on the screen, but before the search task begins. If target representations are transferred from VWM to LTM during the experiment, then CDA amplitudes will decrease. If there is no transfer, then CDA amplitudes will remain consistent.

In each trial, subjects responded if the cued target was present or absent from the given search array. By comparing the CDA amplitudes across the study, we can test whether the target information is consolidated into LTM with increased experience in a given condition. It is critical to determine whether target representations are transferred into LTM with practice, as the transfer of target information would result in a confound in many previous studies. This study will also help determine whether it is more efficient to hold items in LTM versus VWM during search.

4:45-5:30    Board 83
Adelle Meng Zhen Paquette
Quinnehtukqut J. McLamore (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Gender Effects: Glorification and Attachment

Recent research has investigated how group identification shapes how people conceptualize controversial actions that their group has been involved in. This research distinguishes between two modes of group identification: attachment and glorification. Attachment is defined as commitment to the ingroup and an extension of self-concept to include the group. Glorification is perceived superiority of the ingroup and feelings of respect for its central symbols (i.e. national flag). Research on conflict resolution and moral justice positively links glorification to the use of defensive coping strategies at both individual and group levels such as moral disengagement, ingroup collective action, and ingroup-uncritical collective communication. While these relationships are known, it is currently unknown whether glorification is higher or lower among different sub-sections of groups. However, because of the risk factors for aggression presented by masculine identity and androcentrism, it is possible that glorification may be higher among men than women. This hypothesis is further supported by social role theory, which elaborates the expectations of the masculine identity, and stereotype threat, which suggests that men will respond in accordance to preset expectations. By contrast, women may have higher attachment measures than men due to the opposite explanation. However, this hypothesis has yet to be robustly tested. Here, I conduct a meta-analysis using over 20 studies to investigate whether men are higher than women in glorification.
Research on intergroup conflict has found that threats to social identity (SIT) influence the perception of both the ingroup and outgroups. Additionally, disruptions to social identity are linked to defensive reactions, like justifying torture, and to non-defensive reactions, such as supporting diplomatic policies. Given this application, threat pattern recognition (TPR) and cardiac output (CO) could be linked to approach or avoidance behaviors, corresponding to challenge and threat patterns respectively. Defensive actions are consistent with a threat profile (Higher TPR, Lower CO) whereas non-defensive actions align with a challenge profile (Lower TPR, Higher CO). This could be predictive of participants’ ingroup defensiveness and support for conflict or their lack thereof. In this experiment, participants were randomly assigned to follow a story in which either their ingroup (American Soldier) or an outgroup (Australian Soldier) tortured an Iranian prisoner. Participants then viewed a clip of a confederate’s introduction. Next, participants were recorded introducing themselves to the confederate. Participants then silently prepared for the proposed discussion before taking a survey. Physiological and survey data reported that while condition (ingroup perpetrator vs. outgroup perpetrator) did not significantly affect the amount of TPR/CO reactivity experienced by participants, that this reactivity instead exhibited a significant interaction with the assigned condition where TPR/CO reactivity predicted defensiveness or non-defensiveness in the ingroup condition only. To the best of our knowledge, this study is the first to link physiological reactivity patterns to defensive/non-defensive reactions to social identity threat, opening a novel form of measurement for this phenomenon.

People with Intellectual Disability (ID) are treated differently than able-bodied individuals, especially in the domain of sexuality. This research investigates differences in the acceptability of sexual behaviors for people with ID compared to people with typical development, from the perspective of young adults. An online survey was used to collect data from 273 undergraduate students attending a university in the Northeast of the U.S. Participants rated the acceptability of sexual behaviors for “you and others students like you”, as well as “adults with Intellectual Disability”. They also indicated the extent to which they agreed with statements about relationships, sex, and marriage for people with ID. Additional background characteristics were collected, including gender, age, sexual orientation, political orientation, religiosity, and experience with people with ID. Students were significantly more likely to rate behaviors related to sexuality as acceptable for themselves and their peers than for people with ID, t(255)=6.86, p<.001. Older students (p<.05), those who identified as more liberal (p<.01), those who had
taken a college course on disability (p<.01), and those who felt more comfortable with people with ID (p<.01) found sexual behaviors to be more acceptable for people with ID, while other background characteristics were unrelated. These findings support the notion that sexuality for people with ID remains to be stigmatized. With greater knowledge of factors that influence beliefs about sexuality, it will be more feasible to alter these prejudiced beliefs and better educate people with ID.

4:45-5:30  Board 91
Caitlyn Wilson
Ashley Woodman (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
The Effects of Gratitude Interventions on Well-Being

In the field of Positive Psychology, researchers have begun to explore crucial promoters of happiness and how these may enhance our human experience. In particular, research in exercises that utilize gratitude expression have been shown to benefit both mental and physical well-being. Of these past studies that explore the effects of gratitude on well-being, most have excluded populations with intellectual disability (ID). This population is one that is often subjected to negative societal stigmas and categorized as “limited”. The present study examined the effects of these gratitude interventions on the well-being of 9 adults with ID. Well-being was measured before and after the intervention period through self-report questionnaires that included measures of resilience, optimism, helping attitudes, self-regulation, and subjective happiness. For each of the six intervention days, participants engaged in a gratitude exercise (i.e., writing a thank you letter, three ‘gratitudes’, or two ‘positives’ from their week) and a daily questionnaire that assessed affect and gratitude. Although our pre- and post-test analyses were limited due to small sample size and low statistical power, meaningful trends emerged. In utilizing a single case design, we analyzed each of the 9 participants' daily questionnaire responses, and qualitative data from their written responses. The results demonstrated increases in positive affect, and trends between affect scores and more meaningful engagements with the gratitude exercises (i.e., elaborating on some person or event). From these findings, we may infer that continued and meaningful practice of gratitude exercises may have short-term effects on positive affect and overall well-being.

4:45-5:30  Board 92
Anjali Devakumar
Kyle Cave (Faculty Sponsor)
Department of Psychological and Brain Sciences, UMass Amherst
Enlisting Principles from Cognitive Psychology to Design Secure Email Interfaces

Deceptive phishing occurs when attackers mimic a legitimate company and attempt to steal a customer’s credentials. This attack’s common vectors include email and websites and they usually work in tandem to create a false representation of legitimacy for average users. The fraudulent link loads malware that steals sensitive information when clicked on. The specific language in a phishing email body uses emotionally-charged writing to limit a user's critical thinking by raising fear, sadness, or anger to compel one to take immediate action. Additionally,
hackers aim to manipulate a user's mental models and visual perception lapses by crafting convincing spoof emails through believable branding. These tactics boast a high success rate, and its effectiveness is due to its manipulation of human behavior.

Through my thesis, I redesign existing email interfaces to present pertinent information that can aid a user in classifying whether a redirected link is legitimate or not. I focus specifically on deceptive emails as users typically end up on malicious websites by clicking on hyperlinks within the malicious email. This dynamic messaging can warn the user and prevent such phishing attacks before they even happen. Through a literature review and usability study, I evaluate colors, placement, and similar design considerations to improve the presentation of URLs within the email. Despite existing indicators, humans are still the best at validating whether a URL is secure. By presenting the URL in a more attention-grabbing way, this redesign offers a more proactive indicator of the redirected website's legitimacy for a user.
Incarceration is a crisis that disproportionately affects racial minority populations in the United States. The lifetime risk of incarceration is 1 in 3 for African American men aged 18 and older, compared to 1 in 6 Hispanic men, and 1 in 17 white men. Sentencing disparities in the criminal justice system that negatively impact minorities are attributed to these striking rates. Incarceration contributes to health disparities specifically related to increased rates in sexually transmitted diseases and other infections.

The objective of this paper will be to study the prevalence of STDs in incarcerated minority groups. Its participants will include minority male and female, roughly between the ages of 14-19 years old, specifically of the African-American race in several cities across the United States. Information on this paper will be gathered from articles found through reliable online databases such as PubMed, CDC, and Umass Amherst Library E-Journals with the use of keywords such as “STDs”, “Minority”, “African-American”, “incarceration”, etc. These articles will provide data collected using cross-sectional study methods and screenings that support their findings. This paper will explore the results of these findings, how it affects others when those incarcerated return home to their local communities, and what solutions can be implemented to reduce these disproportionate rates as well as possibly prevent it.

Working with the Public Health Institute of Western MA’s coalition, LiveWell Springfield, this project focuses on qualifying Springfield MA as an age friendly city. Using the criteria set by the World Health Organization, this project aims to use research around elder’s challenges with housing and transportation in their community to improve the city. A combination of data collected through walk audits, surveys, and focus groups has been gathered in order to assess the current situation with Springfield’s elderly population. This data is now being used to put together a summit for the community to learn about the issues people are facing. The summit includes a summary of the data found, testimonies of community members, and suggestions the community can take in order to improve the age-friendliness of this city. This presentation will present an outline of the project as well as preliminary findings of data collected.
Exploring Barriers and Facilitators of Medical Utilization in Refugee Populations

The World Health Organization estimates that there are 65 million people globally who have been forcibly displaced from their homes. Refugees who have faced trauma through oppression will be vulnerable to poor health outcomes including illnesses, infectious diseases, undernourishment and loss of family or property can develop Post-Traumatic Stress Disorder (PTSD) and other mental disorders. Migration can cause refugees to develop several mental health issues due to stress and anxiety. Once refugees have resettled, it is crucial that they have access to necessary medical services. However, there are many factors that impact medical utilization: immigration status, socioeconomic status, language spoken, literacy level, religious beliefs, and more. Our research intends to answer the question: What are some of the barriers preventing the refugee population from utilizing available medical services? We will be conducting a systematic review of 10 sources, both qualitative and quantitative. We will summarize and synthesize these sources to determine barriers preventing refugees from utilizing health care, as well as facilitators that can help increase medical utilization in the refugee population. Our research will help determine barriers preventing refugees from utilizing health care to provide guidance for future research and the development of program plans to increase medical utilization in refugee populations.

Sexual Education of Adolescents in the United States

Sexual education of adolescents has been a controversial issue throughout the United States for the past four decades. There are two major viewpoints, one that promotes abstinence and one that promotes comprehensive education. In the late 1990’s, the U.S. government adopted the singular approach of abstinence only until marriage (AOUM) sex education. Since then, some research has shown that this method of education may lack effectiveness. By 2009 half of the states chose not to take federal support because of their concerns with the efficacy of AOUM (KFF, 2018). Sexually transmitted infections are on the rise and teen pregnancy rates, although are not rising, are much higher than other developed countries. Some studies show
that AOUM has not been found to delay the initiation of sexual intercourse or reduce sexual risk behaviors (KFF, 2018). On the other hand, some research has shown that increased emphasis on abstinence in state laws and policies is positively correlated with teenage pregnancy rates for that state (Stranger-Hall & Hall, 2011). Twenty-four states require sex education and thirty-four states require HIV education (Hall et al., 2016). Also, currently only thirteen states require that information taught in sex education be medically accurate (KFF, 2018). In this study, we will examine research that has been collected about sexual education across the United States in order to determine the most effective sexual education program for youths.

8:30-9:15    Board 7
Hunter Marie Herron
Aanchal Gupta
Matt Garrett Olejarz
Emily F. Quinn
Richard Peltier (Faculty Sponsor)
Department of Environmental Health Sciences, UMass Amherst
The Effect of Socioeconomic Status on Healthcare in the United States

Health is a relative term in the United States - there are a variety of factors that contribute to one’s health both individually and within a population. One contributing factor is the accessibility, or inaccessibility, to healthcare within different populations. Unfortunately, quality of care is not consistent throughout populations – one’s socioeconomic status, age, race, and gender all play into the quality of care people receive. Other contributing factors include social class and the area in which a person lives. These factors play a major role in both the quality of and accessibility to health care.

Many citizens, mainly those of lower socioeconomic status or people in minorities, have poor access to health insurance, forcing them to receive a lower standard of care and garnering worse health outcomes and qualities of life than those with insurance. Private health insurance is neither practical nor affordable for many, forcing inadequate access to healthcare and a lack of coverage among underprivileged populations. The segregation of populations plays a major role in maintaining the socioeconomic divide that prevents people from accessing the healthcare they deserve.

To combat these persisting issues, various solutions should be enacted. First, access to health education and preventative care should be made available in all populations. Additionally, making healthier foods available and accessible would greatly benefit the nutrition and overall health of many populations. Additionally, a change in housing policy for minority and disadvantaged populations would allow better access to care.
Haiti is considered to be an extremely poor country in the western hemisphere, and with the devastation from the 2010 earthquake, Haiti’s capital, Port-au-Prince, was left in ruins. The aftermath of this earthquake can still be seen today through destroyed irrigation and sewage systems that cannot be repaired because of Haiti’s lack of access to fresh water. Subsequently, the earthquake has left an unclean water supply negatively impacting agriculture, sanitation, and overall health. This project aims to determine the susceptible groups of people who have had adverse health outcomes as a result of the earthquake as well as identify those adverse health outcomes. Further, the project will make suggestions to discover ways to work within these communities and promote health in an area where clean water seems to be limited. Research through a search of scholarly articles and, ideally, testimonies from people who live in and have witnessed Haiti will help determine which populations of people have been susceptible to disease from unclean water, learn what those disease are, and make recommendations to bolster health outcomes. In order to help better the consequences of unclean water, more steps need to be taken to identify the vulnerable communities and develop ideas to help them live healthfully after such a disastrous earthquake.

Peroxisome proliferator-activated receptors (PPARs) are essential transcription factors for lipid homeostasis. PPAR gamma (PPARγ) promotes the differentiation of preadipocytes into adipocytes, while PPAR alpha (PPARα) promotes fatty acid catabolism. Toxicants such as phthalates, butylparaben, and perfluorinated compounds are reported to have affinity for PPAR and have been previously shown to elicit adverse effects on the developing zebrafish pancreas. This begs the question of how disruption of PPAR activity during gestation may alter fetal metabolic processes that are carried into adulthood, specifically those of the pancreas. Here, we examine the effects of altered PPARγ and PPARα activity on the developing exocrine and endocrine pancreas in zebrafish embryos utilizing agonists and antagonists. Beginning at 24 hours post fertilization (hpf) embryos were exposed daily to Rosiglitazone, T0070907, GW 6471, or GW 590735 at concentrations of 0 (0.01% v/v DMSO), 0.1, 1, and 10 μM. 96 hpf larvae were examined for morphometrics and pancreas formation. Fish length and yolk sac area suggested developmental delays associated with PPARγ modulation. Promotion of PPARα activity increased fish length and yolk sac area, while...
no effect occurred with inhibition. Furthermore, PPARg modulation impaired craniofacial formation while PPARa inhibition increased pericardial edema. PPARg inhibition displayed decreased islet area and exocrine pancreas length while neither PPARg activation nor PPARa modulation affected pancreatic size. PPARg activation, however, resulted in an increased occurrence of exocrine and endocrine pancreatic deformities. This demonstrates morphological and pancreas specific effects of PPARg modulation, but non-pancreas specific effects of PPARa modulation.

8:30-9:15 Board 95
Joseph Lawsel Williams
Brian Whitcomb (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Cholera Vaccination in Pregnancy: A Systematic Review/Meta Analysis of Fetal and Prenatal Mortality and Morbidity

Background: Cholera is a waterborne bacterium that causes rapid dehydration and 50% mortality without treatment. Infection of pregnant women carries a 2-36% mortality rate for prenatal infants/fetus. Vaccination provides an effective option for prevention of cholera; however, limited data exist regarding safety of vaccination for pregnant women. Addressing the gap, we conducted a systematic review/meta-analysis, evaluating published epidemiologic studies of vaccination and adverse pregnancy outcome risks.

Materials/Methods: A PubMed search used key terms: Cholera-vaccine AND Pregnancy/Pregnant, Shanchol AND Pregnancy/Pregnant to retrieve published peer-reviewed research. Publications in English before January 2019 including data for a vaccine and comparison group were included. Meta-analysis was used to estimate risk differences and 95% confidence intervals (CI), and estimates of heterogeneity for the association of vaccination with risk of pregnancy-loss and congenital anomalies.

Results: The literature-search yielded four papers eligible for inclusion—data retrieved included 2,412 total women; one paper evaluating Dukoral was considered separately. Accordingly, 2,216 Shanchol-vaccinated-women were compared with 1176 non-Shanchol-vaccinated women. Fixed-effects meta-analysis estimated a risk difference of 0.01(-0.00, 0.03) for pregnancy loss and heterogeneity among the included studies was very low ($I^2 = 0\%$, $P=0.85$). There were too few cases to compare risk of congenital anomalies.

Conclusions: Findings suggest Shanchol vaccination may be associated with a small increased risk of pregnancy loss. Further research using larger populations is necessary to evaluate other outcome risks. The small increased risk of pregnancy loss should be taken into consideration with the established risks in pregnancy related to cholera for clinicians and policy makers.
8:30-9:15  Board 96
Rebecca Hayes Castonguay
Chaitra Gopalappa (Faculty Sponsor)
Department of Industrial and System Engineering, UMass Amherst
Models for Predicting Degree Correlations in Scale-Free Graphs for Improving Stability of the Evolving Contact Network Algorithm

The Evolving Contact Network Algorithm (ECNA) is used for generating scale-free network graphs to simulate disease spread for epidemic projections. The ECNA aims to solve several issues that arise in the modeling of low prevalence diseases, such as HIV, where the contact structure of individuals highly influences the spread of the disease. Traditional modeling algorithms are insufficient for these diseases, in that they are either too broad in their application of transmission or too granular in their tracking of individuals in the population. Therefore, instead of a static network of the full population, the ECNA generates a dynamic network of only infected agents and their immediate contacts, which reduces computational power requirements. However, as new persons become infected, generating these dynamically growing subgraphs of only infected persons while maintaining the overall population network dynamics is a major challenge. Based on the concepts of degree correlations between neighboring nodes in static networks, which are the fundamental mechanics of contact formation in scale-free graphs, my thesis studied and developed prediction models for degree correlations in different types of dynamic contagion networks. This included developing a neural network prediction model for degree correlations, implementing it in a simulation model with ECNA for predicting the spread of disease in a hypothetical population, and testing its performance by comparing with epidemic predictions from an agent-based simulation model. I will discuss this work and our findings on the model’s robustness by testing it on networks of different properties.

8:30-9:15  Board 97
Jenson Jose Kaithamattam
Cynthia Jacelon (Faculty Sponsor)
Department of Nursing, UMass Amherst
Engagement in Research of Honor and Dignity at Soldiers Home

Objective: The purpose of this study will be to understand how dignity shapes the care provided to veterans at the Soldier’s Home in Holyoke, MA using patient, family and care giver narratives. One of the primary goals of this research will be to review literature, research, and articles that discuss the value of dignity in elder population.

Background: Dignity is a core value of health professions. The proposed research will explore the Soldier’s Home mission of “Care with honor and dignity”. The research will help the Soldier’s Home to improve care that will enhance the honor and dignity of veterans, family, and staff.

Methods: The research will consist of reading literature and empirical studies written by Dr. Jacelon and other leaders in the field. In addition, qualitative, descriptive analysis will be used. Data will come from audio taped interviews of study participants. The data will be analyzed with
the team using the constant comparative method to identify themes in the study regarding honor and dignity.

Results: This study will clarify the meaning of dignity and provide evidence upon which to develop interventions to enhance the care provided. The goal is to use the interviews to enhance the honor and dignity of veterans, family, and staff.

Conclusion: In conclusion, gaining insight into the understanding of the mission statement, “Care with Honor and Dignity” of veterans, caregivers, and friends of the Soldier’s Home will be beneficial in guiding staff to provide better care with honor and dignity.

8:30-9:15 Board 98
Clare Julia Surette
Julianna Kathryn Murray
Richard Peltier (Faculty Sponsor)
Department of Environmental Health Sciences, UMass Amherst
Depression, Anxiety, and Suicide among College Students in the US

The purpose of this project is to educate others on how prevalent anxiety and depression disorders are among college students in U.S., and how it is associated with the increase of suicides. Our research includes articles from peer review journals and other credible web sources such as World Health Organization and the American Foundation For Suicide Prevention, which all show how common anxiety and depression disorders are among college students and how it is associated with the increase of suicides. In addition to outlining the prevalence of depression and anxiety among college students in the U.S., we have also included resources that are aimed to help those who are suffering or who know someone who is suffering from these mental health issues. One of those sources includes the Anxiety and Depression Association of America; this website includes facts sheets as well as a list of resources that can help people during a mental health crisis. Our research is aimed to educate others on the high prevalence and seriousness of anxiety and depression disorders among the U.S. college population, as well as teaching others about what prevention and treatment resources are available to them.

8:30-9:15 Board 99
Cassandra Georges
Emely Betancourt
Richard Peltier (Faculty Sponsor)
Department of Environmental Health Sciences, UMass Amherst
Examining Misconceptions of Vaccinations (Keeping Infectious Diseases at Bay)

Diseases that were once eradicated, many of which had high morbidity and mortality rates are being reintroduced into the general public, mainly through misinformed individuals choosing not to vaccinate their children. Common misconceptions amongst vaccinations include the belief that it leads to autism, that they are infectious, cause several defects and death, and that they...
overload the immune system. With public health being the first line of defense against a misinformed general population, an informative campaign initiative needs to be implemented addressing the common misconceptions of immunization and why one should be “pro-vax”. The existing literature out there is neither clear nor concise, and we will identify ways to disseminate this information in a better way. This project will address parental barriers to getting vaccinations as well as the common misconceptions and why they are false. Overall this will be a comprehensive report discrediting various scientific fallacies that have led to popular myths around vaccinations.

Room 168  8:30-9:15  Panel 1
Allyson Joy Rosati
Rick Pilsner (Faculty Sponsor)
Department of Environmental Health Sciences, UMass Amherst
Sperm Mitochondrial DNA Biomarkers and Couple Fecundity: The Longitudinal Investigation of Fertility and the Environment (LIFE) Study

Introduction. Mitochondrial biomarkers such as DNA copy number (mtDNAcn) and DNA deletions (mtDNAdel) have been linked to poor semen parameters and fertilization rates. However, no study has investigated the associations between sperm mtDNAcn and mtDNAdel with conception probability among couples from the general population.

Methods. As part of the LIFE Study, 386 semen samples were processed via a one-step gradient fractionation method before isolating DNA. A triplex probe-based qPCR method was used to quantify sperm mtDNAcn and mtDNAdel. Time-to-pregnancy (TTP), the number of menstrual cycles before a confirmed pregnancy, was used to measure fecundability. Cox proportional hazards models were used to estimate fecundability odds ratios (FOR) relating TTP to mtDNA biomarkers and to generate survival curves. Analyses were run using continuous mtDNA biomarkers as well as in quartiles to allow for non-linear relations, and were adjusted for male age and BMI, race and ethnicity, site of sample collection, cotinine, and qPCR batch.

Results. Sperm mtDNAcn was associated with lower fecundability and longer TTP (FOR: 0.34; 95% CI: 0.20, 0.58; p=0.0001). With the first quartile of mtDNA as the referent, the second quartile FOR was 0.81 (95% CI: 0.53, 1.24), the third was 0.65 (95% CI: 0.43, 0.98), and the fourth was 0.52 (95% CI: 0.34, 0.72). Sperm mtDNAcn and mtDNAdel were correlated (r=0.45, p<0.0001); however, no association was observed between mtDNAdel and TTP.

Conclusions. Sperm mtDNAcn was associated with two-fold lower odds of cycle-specific conception and thus longer TTP, suggesting sperm mtDNAcn as a biomarker to assess couples’ fecundity.
Lung cancer is a disorder that develops in one or both lungs and is caused by the uncontrollable growth of abnormal cells within the lung walls, forming tumors within the lung that interrupt its normal functioning. The American Lung association estimated that about 155,000 Americans were expected to die from lung cancer in 2018, as lung cancer make up 25% of all cancer deaths in America. The main causes of lung cancer are smoking, second hand smoke, radon exposure, and hazardous occupational environments - such as those that have high concentrations of asbestos, uranium, and coke, a fuel with high carbon content. High unemployment rates, lack of education, and low income within a specific geographic region are associated with these known risk factors. Appalachian Kentucky has the highest rates of lung cancer in the United States. This study primarily focuses on Appalachia Kentucky, where the population has a higher probability of developing lung cancer due to the elevated risk factors in the region. We will conduct a comprehensive literature review of lung cancer as a public health problem. We will create recommendations that are deemed to be successful at reducing lung cancer risk specific to these communities. To conclude, we plan to build a set of policy and program recommendations for Appalachian Kentucky to decrease the rising rates of lung cancer.

Parkinson's Disease is a neurodegenerative disease that affects almost 10 million people worldwide. This disease affects both the motor and non-motor functions of the body. The motor functions that are affected include: resting tremor, bradykinesia, rigidity and postural instability. Non-motor functions that are affected consist of: neuropsychiatric, ICDs, sleep disorders, autonomic dysfunction, and sensory. These functions can greatly affect how an individual's live, function and engage in daily activities. Parkinson's disease is a slowly progressing disease, that progresses as small groups of dopaminergic neurons in the midbrain die. This results in the reduction of an important neurotransmitter, dopamine, which is in charge of transmitting message to parts of the brain that manage muscle movement. There have been studies on chronic pain and how it affects patients with Parkinson's disease. Many patients experience some type of pain. Parkinson's disease patients experience pain, two to three times more frequent in the population than in matched healthy individuals. Chronic Pain has become a serious health issue for those with Parkinson's disease. This debilitating pain is connected to affecting how an individual functions, sleeps, their daily activities, working, socialization, inabilities to cope and leads to emotional upset. There have also been various studies conducted on the quality of life of individuals with Parkinson's disease. The quality of life is negatively affected. As the disease progresses, the
Lead poisoning is the acute poisoning due to the absorption of lead into the bloodstream, and affects children and adults across the country. Lead is 1 of 10 chemicals identified of major public health concern worldwide. Risk factors include lead in paint, water pipes, and items like toys or jewelry. Exposure is especially dangerous for young children, who can develop cognitive dysfunction and other negative health effects, which cannot be cured with treatment. In 2016, lead exposure accounted for 540,000 deaths and 13.9 million years of life lost worldwide. Nearly ⅓ of the water systems reported their lines containing lead in the United States. The city of Flint, Michigan, experienced a sudden, high level of lead poisoning in 2014 which resulted in a publicized crisis that brought to attention the lack of prevention methods in place for lead poisoning and the lack of treatment available. This event highlighted how children in lower-income areas have a higher risk and higher prevalence of lead poisoning due to old infrastructure. Negative health impacts due to lead exposure are completely preventable, and there have been laws enacted to reduce or eliminate lead content in products. Current treatment involves removing lead from the patient’s environment, adjusting diet, and chelation therapy, which is an intravenous procedure designed to remove heavy metals from the body. Through conducting research, we will identify possible solutions to reducing the amount of lead exposure in the US and build a set of recommendations for preventing lead exposure in Flint, Michigan.
food insecurity estimates across varying counties and congressional districts within Mississippi, Jefferson County ranks highest with a food insecurity rate of 36%. Within this community, 42% of adults have obesity and 17% of adults have diabetes. The combination of these risk factors provide explanation for the adverse health outcomes apparent throughout Jefferson County.

Methods: We will conduct a comprehensive literature review to identify programs and policies that have been shown to be effective in addressing risk factors of food insecurity, and in reducing rates of food insecurity particularly in rural populations.

Prospective Results: We will identify and develop strategies and recommendations specific to the county of Jefferson, Mississippi in order to aid in addressing the risk factors present in this community.

Adverse Childhood Experiences (ACEs) are stressful or traumatic events that include exposure to abuse, incarceration, mental illness, and other experiences that occur before age 18. The ACE Index is one of the first measures to quantify ACEs and link them to later health outcomes. Previous research suggests approximately two-thirds of U.S. adults report experiencing at least one ACE, and high ACE Index scores have been associated with premature mortality and various chronic illnesses. However, ACEs are not always identified as such in research, thus tracking and intervention efforts are difficult. In this study, I will summarize the current state of ACE research available that follows the Community Based Participatory Research (CBPR) approach. The CPBR approach is important as it identifies interventions ready for dissemination and sustainable because they are developed with community engagement. I will conduct a scoping literature review of CBPR projects that address one or more issues considered an ACE. Using PubMed, PsycInfo, and Web of Science, I will identify relevant projects, eventually selecting 10 articles for in-depth analysis. These articles will be chosen based on use of more than one ACE and adherence to CBPR methodology. Preliminary results suggest that ACE CBPR is unevenly researched, with substance abuse and mental illness being popular issues for intervention, and child neglect, abuse, and divorce being less visible amongst the databases searched. Both CBPR and ACE research are newly trending fields, and this research may serve as a foundation for others hoping to undertake related projects.
An Examination of Food Insecurity and Stress Levels in Low-Income African American Men

In 2017, approximately 15 million United States households were food insecure at some point throughout the year. In previous studies, food insecurity has been associated with chronic diseases, which in turn have been associated with increased stress. For low-income African American men who are already at risk for food insecurity, this stress increases the risk of chronic diseases such as heart disease and obesity. It is hypothesized that when an individual is more food insecure, then the levels of cortisol stress will increase defining a strong correlating relationship. In this study, a secondary analysis of quantitative data collected as part of “MOCHA Moving Froward”, a multi-year study of health among low-income Black/African American men 35-70 years of age living in Springfield, Massachusetts, will be conducted. Using linear regression, the relationships between food insecurity and cortisol levels will be determined. With the data, the relationship can determine whether food insecurity plays a direct role in the stress that low-income African-American men face. The information found from this study can then be used to improve public health interventions such as MOCHA Moving Forward by targeting food insecurity among the population. Moreover, the information found can be used to improve policies in place that aim to reduce food insecurity, so that African-American men can experience improvements in their health. In conclusion, understanding the relationship between food insecurity and stress can lead to improved health outcomes and reduce the prevalence in heart disease among African-American men.

Maternal Mortality among Black Women in the US

Background: The United States has one of the highest maternal morbidity and mortality rates of all industrialized countries. The United States is one of the only developed countries where maternal mortality rates continue to rise. Black women are four times more likely to die from complications during pregnancy and birth compared to white women of the same socioeconomic class. The Center for Disease Control and Prevention defines pregnancy-related deaths as the death of a woman while pregnant or within one year of the end of a pregnancy – regardless of the outcome, duration or site of the pregnancy—from any cause related to or aggravated by the pregnancy or its management. Complications that lead to death, include but are not limited to, hemorrhage, pregnancy-induced hypertension, and embolism.

Methods: After conducting a comprehensive literature review, we will identify the key risk factors for high maternal morbidity and mortality rates among black women. We will identify
three evidence-based approaches to lower the risk of these potentially fatal pregnancy complications.

**Preliminary Results:** After our preliminary search we have found that the risk factors among black women include: lack of access to quality healthcare before pregnancy and during pregnancy, socio-economic status, and structural inequalities within the healthcare system. Other lifestyle factors contributing to the high maternal mortality rate of women include smoking, consuming alcohol, and poor nutritional habits.

**Conclusion:** After comparative research of literature reviews, our interventions will increase the quality and access to healthcare among Black women for prenatal and postnatal care. Our interventions aim to decrease the maternal morbidity and mortality rate among black women, while addressing the disparity between health access.

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10:45-11:30    Board 11
Widad Bakkal
Ariana Elizabeth Avila
Malik Gilyard
Susan Sturgeon (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Strategies for Lowering Lead Poisoning in Low-Income Children

Background: Lead is a naturally occurring element, but even at low levels can be toxic. In 2014, the Centers for Disease Control and Protection reported that 4.2% of children in the United States had elevated blood lead levels, defined as 5 mcg/dL or higher. Certain low-income urban areas in the Midwest have a higher prevalence of children with elevated lead levels. For example, in Milwaukee, it is estimated that 10.8% of children have elevated blood levels. Elevated blood lead levels in children can result in behavior and learning problems and physical complications, such as damage to a child's nervous system, kidneys, and reproductive system.

**Methods:** We will conduct a literature review using peer reviewed sources to identify the potential risk factors for elevated lead levels in children, and we will also identify three evidence-based interventions that address the major risk factors of elevated lead levels in blood, particularly for children residing in low-income urban areas in the Midwest.

**Results:** Based on our preliminary research, we have identified several major risk factors for higher lead levels including poverty, exposure to drinking water from lead-based pipes, and oral exposure to certain children toys, and peeling lead paint. We will also identify three evidence-based public health interventions that address major risk factors of higher lead levels in blood found in children in low-income areas.

**Conclusions/Recommendations:** Our findings have the potential to reduce lead exposure in children in low-income areas in the Midwest.
10:45-11:30  Board 6
Arianna Kazemi
Connor Ian Kennedy
Gabri Silverman
Nicholas G. Reich (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Statistical Analysis of the Treatment of Opioid Addiction within the Criminal Justice System

It is estimated that 65% of those incarcerated in the United States have a substance abuse problem. Of these individuals, those with opioid addiction have been shown to have a higher rate of recidivism compared to individuals with other addiction disorders. We decided to study the treatment of opioid addicts who interact with the criminal justice system. Our goal was to identify whether race has an effect on how addicts are treated, specifically in admissions to addiction treatment centers. We also looked at the treatment of opioid addicts in prison, as only 11% of inmates receive methadone or buprenorphine treatment while they are incarcerated. Through analysis of publicly available data, we concluded that American Indians and Asian or Pacific Islanders were arrested and referred to treatment centers by the criminal justice system more than other races in 2014. In addition, statistical analysis suggests that methadone treatment within prison is more likely to prevent rearrest than detox while in prison. Given our above conclusion that many addicts are not being referred to public treatment centers, methadone treatment in prison could be an effective method of treating such addicts in the criminal justice system.

10:45-11:30  Board 7
Achala Narayanan
Ugonna B. Ezeaka
Ibiyemisi Gbenebor
Matthew Henry Keefe
Nicholas G. Reich (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Understanding the Prescription Opioid Epidemic in West Virginia

The opioid crisis is a nation-wide epidemic that is afflicting the United States. Over the past decade, West Virginia has consistently had the highest opioid fatality rates per capita. We set out to understand the extent of the crisis in West Virginia, focusing on prescription opioids. We studied this group of opioids to determine whether death rates were correlated with legislative policies on prescription rates of opioids. We chose to include Massachusetts in our analysis: it had a significantly lower prescription rate than West Virginia. We compiled a dataset from the CDC Wonder repository and analyzed average annual death rates between 2012 and 2016 in West Virginia, Massachusetts, and nationwide. We compared this with state-level prescription rate data to identify a possible correlation between death rates and prescription rates. We built a model to determine whether state legislation on prescription rates had an effect on deaths rates. We found that from 2012-2016, the prescription rate declined nationally and in both states. We found that in spite of declining prescription rates, death rates were increasing. Rather than decreasing the number of deaths per year, our results show an increase in deaths with prescription regulation. We hypothesize that as prescription rates decline, supply of drugs shifts to the black market and sales increase.
**Background:** Asthma is one of the most common chronic lung diseases in children in the United States. In 2015, asthma affected 12.9% of children in the state of Massachusetts. Asthma is a condition that can be managed with treatment, however uncontrolled asthma can occur when the necessary treatments are not prescribed. Massachusetts has the highest rate of uncontrolled asthma in the United States, at 41%. Uncontrolled asthma is strongly associated with increased emergency room visits, absences from school, and hospitalizations.

**Methods:** We will conduct a literature review using peer-reviewed articles to identify the risk factors for uncontrolled childhood asthma in urban areas in Massachusetts. In addition, three evidence-based strategies that address key risk factors and have the potential for lowering uncontrolled asthma rates in these areas will be identified.

**Results:** Based on a preliminary review of the research of existing literature, major risk factors of childhood asthma include exposure to air pollution, low birthweight, and smokers in the household. Research has found that risk factors for childhood asthma are most commonly found in urban home environments, where dust, pests, pets, and mold are common. We will also identify three evidence-based interventions that address these risk factors that are particularly applicable to urban environments.

**Conclusion:** In recommending three evidence-based strategies to prevent new cases of uncontrolled childhood asthma in urban areas of Massachusetts, we will consider the needs and resources in Massachusetts. Our recommendations will have the potential to reduce uncontrolled asthma prevalence in our target population.

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**The Association between Breast Cancer Risk and Endocrine Disrupting Chemicals: A Systematic Literature Review**

This systematic literature review aims to investigate the association between breast cancer risk and endocrine disrupting chemicals (EDCs); specifically bisphenol A, phthalates, polychlorinated biphenyls, and polybrominated biphenyl ethers. With EDCs being found in products such as flame retardants, plastics, can packages and so much more, the effect on human biology needs to be investigated. Breast cancer is the most frequently diagnosed cancer...
in women, with several potential environmental risk factors that have yet to be identified. This systematic literature review used the databases PubMed (Bethesda, MD, USA), Web of Science (Boston, MA, USA), and Google Scholar (Mountain View, CA, USA) to identify human, epidemiological studies that examined the association between the four endocrine disruptors and female breast cancer risk. Key words included “breast cancer” and any combination of the following terms: phthalates, bisphenol A, BPA, polychlorinated biphenyl, PCBs, polybrominated diphenyl ethers, and PBDEs. A total of 43 papers are currently included in the systematic literature review. Each study will be analyzed in accordance to a standard form adapted from the STROBE guideline checklist for observational studies (von Elm et al, 2018). Future research will be needed to corroborate any findings that this study will have, as it will assist in further understanding of how endocrine disruptors affect women’s health, especially in breast cancer risk, as well as implement new practices or environmental guidelines to better the health of the population.

10:45-11:30    Board 97
Amber Landry
Haruna Bature
Caterina Elizabeth DiBiase
Daniel Gray Kruger
Krishna Poudel (Faculty Sponsor)
Department of Health Promotion and Policy, UMass Amherst
E-Cigarette Use among Adolescents: A Growing Public Health Concern

Electronic cigarettes, commonly referred to as “vapes,” are largely used by adolescents across the U.S. These battery-operated devices resemble regular cigarettes, and often contain nicotine. According to the National Institutes of Health, the rate of e-cigarette use is dramatically increasing among adolescents. For example, e-cigarette use increased from 11.7% in 2017 to 20.8% in 2018 in high schoolers. Because adolescent brains are not fully developed, vaping can cause additional harm beyond the well-known consequences of smoking. Adolescent vaping can put them at greater risk of other addictions and potential harm to the brain. Evidence suggests that many adolescents are unaware of these associated risks. We aim to assess the current efforts to curb e-cigarette use in adolescents, based off of the health determinants now known. Our research indicates that there are numerous possible risk factors that contribute to the use of e-cigarette among adolescents. These factors include lower socioeconomic status, exposure to advertisements of e-cigarettes, and adolescent caffeine consumption. Through understanding the risk factors, the creation of detailed educational materials and focused policies will curb e-cigarette use. We will undertake a systematic literature review to fully understand the risk factors of e-cigarette use among adolescents and existing prevention interventions. We will evaluate existing practices and make recommendations for action to address this emerging public health problem.

Keywords: vaping, e-cigarette, adolescents, education
10:45-11:30    Board 98
Ania Amedee
Jala Chery
Crystal A. Molloy
Bridget Reilly
Krishna Poudel (Faculty Sponsor)
Department of Health Promotion and Policy, UMass Amherst
Mental Illness in Jails and Prisons: A Review of Mental Health-Related Needs and Existing Services
The prevalence of mental health illness among prisoners is 4 times higher than the general population in the United States (U.S). According to the United States Bureau of Justice Statistics, there are 2 million prisoners in the U.S and approximately 66% of them have mental health-related problems. Prisoners are also at greater risk of suicide, violence, victimization, and all-cause mortality. It is not clear to what extent imprisonment increases the risk of mental illness. However, evidence has shown low rates of screening and management of mental health illnesses among prisoners. We aim to review the mental health-related needs and existing services in jails and prisons in the U.S. The preliminary results of our literature review suggest that there are limited mental health services within the prison system. Overall, we found lack of mental health-related knowledge among staff members, lack of mental health assessment and treatment services, and higher burden of the problem in women than men. We will conduct a systematic literature review to identify mental health-related needs and existing services in Jails and Prisons. Then, we will evaluate existing services and make recommendations for actions to address this important public health problem.

10:45-11:30    Board 99
Meera Chaddha
Joshua Civin
Nina Kuhn
Hannah Rutley
Krishna Poudel (Faculty Sponsor)
Department of Health Promotion and Policy, UMass Amherst
Opioid Use among High School Students in Middlesex County, Massachusetts
In the past nineteen years, Massachusetts has seen an increase in unintentional opioid-related overdoses, overdose fatalities and people seeking treatment for the use of prescription opioid painkillers, fentanyl, and heroin. From 2000-2017, Middlesex County has had 2,913 opioid-related deaths – this being the highest number for a county in Massachusetts. The opioid epidemic is unique because it does not discriminate. Unlike certain epidemics that only affect a specific population, this one has affected the rich and poor, the urban and suburban, and the educated and uneducated. While the prevalence of opioid-related deaths among high school students is very low, the post-college (25-34 years) population has the highest prevalence
making up 58% of all opioid-related deaths in Massachusetts. Evidence has shown the association between participation in brief interventions during adolescence and lower rates of prescription opioid misuse in young adulthood. With this, we believe that the opioid prevention interventions among adolescents might be effective to address this important public health problem. We will conduct a systematic literature review to examine factors associated with opioid use and existing prevention interventions in the high school population (14-18 years) and make recommendations for actions in high schools of Middlesex County, Massachusetts.

**Keywords:** Massachusetts, Opioid abuse, prevention

**Room 162  10:45-11:30  Panel 2**
Kathryn Franklin
Deepika Marya (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst

Private versus Public Healthcare Structures: A Comparative Analysis of Maternal Mortality Rates in the United States and Greece

Ensuring maternal and child health serves as a foundational component for the wellbeing of societies. Additionally, the ability of a nation to care for women during their pregnancy and delivery of a child reflects the capabilities of the nation’s overall capacity to provide healthcare for all. The United States has recently been deemed “the most dangerous place in the developed world to give birth” due, not only, to the high rates of maternal deaths compared to other developed nations, but also to the continual increase in the nation’s rate of maternal deaths over the past few decades. This paper will examine both the United States and the contrasting case of maternal care in Greece, which has maintained a globally low maternal mortality rate in the past few decades. Greece is a particularly interesting example due to its ability to maintain such notable maternal health care in spite of its economic crisis. An analysis of differing maternal mortality rates between the United States and Greece presents stark differences in maternal health care that connects to the dissimilarities in the overall composition of each nation’s healthcare system, namely the difference between privatized and public healthcare. This analysis explores how different political and economic decisions, manifested in the implementation of private (neoliberal) versus public systems, impacts the delivery of maternal healthcare.

**Room 803  10:45-11:30  Panel 2**
Christopher W. Havens
Victoria Ann Robinson
Brett Romano Ely (Faculty Sponsor)
Department of Sport and Movement Science, Salem State University

The Impact of Post-exercise Water Immersion on Heart Rate Variability

Many athletes seeking to gain a competitive advantage will engage in post-exercise recovery strategies, including cold or hot water immersion. Regular post-exercise cold water is thought to reduce inflammation and soreness, while regular hot water immersion is associated with a
variety of benefits, including enhanced heat tolerance and improved aerobic performance. However, whether these hot or cold water immersion strategies enhance or impair recovery from an acute exercise bout is unknown. Currently, many athletes monitor systemic recovery from exercise by tracking heart rate variability (HRV), using commercially available applications such as Ithlete™, with a higher HRV indicating improved recovery from exercise. The purpose of this study is to examine HRV in well-trained individuals during recovery from intense exercise. Briefly, healthy men and women who exercise >4 hours per week are being recruited to take part in 3 trials consisting of matched exercise (8-10k of treadmill running with 8x400m intervals) with a post-exercise treatment of either cool (10-14 ºC) water immersion, hot (39-40 ºC) water immersion, or time control (passive recovery in seated position). HRV is being tracked pre-exercise, immediately post-exercise, post-treatment (hot tub, cold tub, or time control), and the following morning (~12h post-exercise). We hypothesize that both cold and hot water immersion will enhance recovery (measured by HRV and resting heart rate) as compared to control (passive recovery).

Room 908  10:45-11:30  Panel 2
Caroline McGrath
Melody J. Slashinski (Faculty Sponsor)
Department of Public Health, UMass Amherst
Healthcare Access by Zip Code: Racial and Socioeconomic Status in the City of Boston

Background: There is an extensive body of literature that demonstrates how marginalized urban communities access/receive healthcare and interact with medical providers. However, there are limited data describing the structural and environmental barriers to healthcare access in the City of Boston. I will analyze the structural and environmental barriers to healthcare access across every zip code in the City of Boston. For the purposes of this paper, healthcare access will be defined as access to insurance coverage, geographic availability of care, and the availability to form personal relationships with healthcare providers.

Research question: How does healthcare access in the City of Boston vary by zip code? How do Boston residents’ racial ethnic identity and socioeconomic status vary by zip code?

Methods: I will conduct a secondary analysis of quantitative data, using censuses, Healthy People 2020, and ProPublica, throughout this paper. Beginning with a demographic overview of each zip code, I will present descriptive statistics including median household income, average level of educational attainment, common employment industry, and racial ethnic demographics of each area’s residents. I will examine the types of healthcare facilities available in each zip code, including level 1 trauma centers, urgent care facilities, average ER wait times, and primary care physician ratios. In terms of transportation, I will compare the walkability index, number of MBTA lines, and number of shuttle busses in each region. This data analysis will highlight what barriers need to be alleviated in each zip code to increase overall access to healthcare.
In 2018, the MGM-Springfield Casino was opened, becoming the first and only casino in the Western Massachusetts region. Commercial casinos were legalized in Massachusetts in 2011 as a means to generate new jobs and improve local economies. However, casinos and casino gambling have been associated with a wide range of health concerns from every level of the social ecology: individual, community, environmental, and structural. For example, casino gambling has been associated with increased use of alcohol and other drugs, mental illness, and exposure to second-hand smoke. Current research comes to conflicting conclusions about the health impacts of a casino presence for a community. The Springfield community is already at high risk of poor health outcomes due to demographic characteristics such as high rates of poverty, high levels of violent crime, and low levels of educational attainment. The purpose of my research is to explore the question: What are the potential public health impacts of the MGM Casino in Springfield, Massachusetts? To answer this question, I will conduct semi-structured qualitative interviews with five key informants. Key informants will be recruited from the Social and Economic Impacts of Gambling in Massachusetts (SEIGMA) project. Using thematic analysis, I will examine informants’ perspectives on health, social, and economic impacts of casino gambling. I will also examine perspectives on why casino research has resulted in such inconsistent conclusions. This research will provide a foundation for future research into health impacts of casino gambling, particularly in relation to the Springfield, Massachusetts community.

This study reports the results of a Community-Based Participatory Research (CBPR) needs assessment of programs, services, and support systems for Latinx youth in Holyoke, Massachusetts. The main questions are what the youth needs are, what needs are being met, and what needs are going unmet. Holyoke Massachusetts has a high poverty rate and high Latinx population. Poverty and racial/ethnic segregation have detrimental effects on the populations being marginalized. High rates of poverty, substance abuse, homicide, high school drop-out rates, and unemployment rates have been shown to contribute to powerlessness, depression, and a decreased sense of purpose in life. More outcomes also include susceptibility to ill health and decreased health-promoting behaviors. Prosocial services for youth aim to diminish the burden of these problems by giving them a voice and empowering them to make changes in their community. To enact a CBPR approach, I will conduct an environmental scan of youth programs in Holyoke, Massachusetts. This environmental scan will include documenting available youth programs (n=5) and conducting semi-structured qualitative interviews with five youth program providers. The environmental scan will identify community
needs and assets that can support youth programs. The results of this project might lead to the creation of new youth programs for health promotion and education or changes to current youth programs.

Room 909  10:45-11:30  Panel 2
Damascus Allair
Bria Lee Shannon
Penelope Pekow (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Improving Access to Prenatal Care among Hispanic Women in Texas

Healthcare during the prenatal period is crucial for the wellbeing of both infant and mother. Lack of access to prenatal care can lead to negative health outcomes such as maternal and infant mortality, low birth weight, and long-term disability. Personal and institutional barriers such as low health literacy, language barriers, and cultural mores all contribute to the challenges women face when pursuing care. These risk factors are especially prevalent among Hispanic women. Living in Texas was associated with low rates of first trimester prenatal care among Hispanic women, according to a 2017 study. A complementary study from the Hispanic Health Care International Journal compared Latina women to their Black and White counterparts, and concluded that these women are more likely to have late or no prenatal care. We will conduct a comprehensive literature review of programs and policies that improve access to prenatal care through use of databases such as PubMed, ScienceDirect, and Sage Journals. Using the findings, we will formulate suggestions for programs to improve access to prenatal care for Hispanic women in Texas.

11:45-12:30  Board 11
Han Mai Le
Monica Poole (Faculty Sponsor)
Department of Interdisciplinary Studies/BDIC, Bunker Hill Community College
Sleep Smart: Managing Sleep Disorders with Artificial Intelligence

Sleeping well regulates your mood and also promotes your productivity. Many people believe eight hours of sleep is optimal, but the quantity is not the only important factor -- sleep quality matters, too. Difficulty staying asleep greatly decreases the quality of sleep. While medicine can be used to treat sleep disorders, there are many effective approaches to improving sleep that do not require medication, such as Cognitive Behavioral Therapy for Insomnia (CBT-I). Non-pharmaceutical approaches, however, often need to be customized to an individual's particular needs and habits. Customization requires data, but it can be difficult to collect data on a sleeping person. Traditionally, a patient spends a night in a sleep clinic in order to have their sleep monitored so that data can be collected. Nevertheless, sleeping in the clinic is unusual for the patient, so the data collected is not perfectly reflective of the patient’s normal sleeping experience. Smart mattresses and wearable devices can monitor a person’s sleep in their “natural environment,” and machine learning approaches can be used to analyze the data. This data can inform a person’s own sleep pattern and help implement appropriate techniques to
improve a person’s sleep without medications, such as CBT-I and related therapies. Moreover, smart mattresses, smart lights, and other “smart home” elements can learn what kinds of environments improve a specific individual’s sleep, and adjust themselves accordingly. This project will investigate the potential for machine learning to be applied to respond to sleep disorders and improve quality and quantity of sleep.

11:45-12:30    Board 21
Sandra Negron
Monica Poole (Faculty Sponsor)
Department of Interdisciplinary Studies/BDIC, Bunker Hill Community College
How Can Your Mobile Device Help Diagnose a Disease? Applying AI to Improve Healthcare Access in Bolivia

Bolivia has one of the less developed healthcare markets in the world, and they are also newcomers to the use of Artificial Intelligence (AI). Exploring how to use AI to support healthcare in Bolivia is a promising direction for research and development. The total population of Bolivia is about 11 million; out of those 11 million, 7 million users are mobile users. Shafi Ahmed conducted the first operation that was streamed live via Google Glass in London. Thanks to the invitation of Martin Dockweiler, President of Udabol University Bolivia, Ahmed will lead the latest technologies-enhanced “digital hospital” in Bolivia. New technologies will be incorporated, staff will be trained in these technologies, and work processes will be designed to encourage collaboration and constant innovation. The use of mobile devices will be an essential component to help Bolivian patients to get the adequate care they need. Some new developments indicate the value of AI for medical diagnosis. These are especially promising ways to improve access to healthcare among remote and historically underserved populations. Taking a simple selfie and uploading it into a database can help analyze and diagnose a disease. Portable devices are powerful, experts believe that images taken from smartphones and other consumer-grade sources will be an important supplement to clinical quality imaging especially in underserved populations or developing nations. Using smartphones to collect and transmit images of eyes, skin lesions, wounds, infections, medications, or other subjects, and then incorporating AI in the diagnostic process, may be able to help underserved areas cope with a shortage of specialists while reducing the time-to-diagnosis of specific complaints. This project will review existing work in this field and explore its applications to Bolivia, highlighting strengths, offering critical analysis, and suggesting directions for further development of AI to improve healthcare access in Bolivia.
11:45-12:30    Board 22
Angelica Judith Cabrera
Monica Poole (Faculty Sponsor)
Department of Interdisciplinary Studies/BDIC, Bunker Hill Community College
Integrating Holistic Health and Artificial Intelligence to Support HIV+ Patients

Artificial intelligence and holistic health practices are two approaches that have been beneficial to HIV+ patients. Artificial intelligence has played a major role in supporting HIV patients by optimizing medication use. Likewise, holistic health has been demonstrated to be an effective component in treating HIV and improving quality of life for HIV+ people. Balance, moderation, and harmony are the three foundations of holistic health, and holistic healing approaches focus on the intersection of these three spheres. It’s important not to underestimate the power of eating well, exercising, sustaining a healthy mental well-being, and getting proper rest. How might artificial intelligence be used to support a holistic approach to treating HIV+ patients? For instance, a wearable device could monitor the individual’s habits and tie into a mobile app to collect data. Could data collected by a wearable device, analyzed with the support of AI, help care providers and patients to use holistic approaches to improve quality of life and longevity? Could data-driven holistic approaches mitigate the side effects of medications such as nucleoside reverse transcriptase inhibitors (NRTIs), and manage HIV symptoms? This project will explore approaches to integrating these two powerful tools -- AI and holistic health -- to support HIV+ patients.

11:45-12:30    Board 23
Nacura Adam Toure
Monica Poole (Faculty Sponsor)
Department of Interdisciplinary Studies/BDIC, Bunker Hill Community College
Using Robotic Surgery to Complement Traditional Surgery

Surgery is a medical domain that requires precision, perfection, and control. Could you ever imagine that a machine would assist a surgeon to perform a procedure inside a human body? In fact, machines are often more precise than a human’s hand, especially when it comes to simple tasks like suturing. More and more, robots are outpacing humans when it comes to physical precision. Robots’ hands don’t shake, and robots don’t get tired during a long operation. According to Tamás Haidegger, the technical lead of medical robotics research at the Antal Bejczy Center for Intelligent Robotics in Hungary, with robotics we are moving to expand beyond physical human capabilities. The combination of machines and humans will provide better results than the work of a human surgeon alone. Although there are limitations in the intelligence currently possible in robotic surgery, having robotic assistants to human surgeons will make the best use of both: human intelligence, and robotic physical precision. This research will explore the possibilities of robot-human collaborative surgery.
Epidemiological studies suggest that high levels of circulating endocrine-disrupting chemicals (EDCs) are associated with higher densities of mammographic breast tissue. This is important because breast density is one of the strongest risk factors of breast cancer, and therefore, avoiding EDCs could provide a means of reducing breast cancer risk. However, the positive relationship between EDCs and breast density has been questioned due to methodological approaches used in previous studies. Specifically, previous studies reported levels of EDCs in blood collected at a single time point, which does not capture a woman's true exposure to EDCs. One way to address these limitations is by collecting 24-hour urine samples. With the collection of three 24-hour urine samples, we will capture a more reliable measure of EDC-exposure, including BPA, phthalates, and analogous compounds used in the manufacture of common household products.

Our pilot study aims to determine the feasibility of collecting 24-hour urine samples to assess the relationship between EDCs and breast density. We will focus on college-aged women because women between the age of menarche and first childbirth who have a lower body mass index are at a higher risk for increased tissue density when exposed to EDCs. Breast density will be measured with non-contrast MRI because MRI provides the opportunity to measure breast density in younger women without the risk of radiation exposure. Levels of EDCs in the urine samples will be measured by mass spectrometry. Findings from this pilot study will be used in the design of a larger study.

Female genital mutilation (FGM), the removal of external female genitals, affects over 200 million girls worldwide, and is highly prevalent in Africa. FGM is performed for non-medical purposes, primarily to retain premarital virginity and avoid extramarital sexual acts. These methods deliberately harm the female genital organs, providing no health benefits. FGM may cause severe complications, such as bleeding, pain, infections, increased risk of miscarriages, and even death. We examined pertinent risk factors of FGM in Sub-Saharan African nations, including Somalia, where 98% of women aged 15-49 experience FGM. We searched literature
in PubMed, CINAHL, and PsycINFO, utilizing the keywords 'FGM', 'Africa', 'prevention interventions', and 'cultural prevalence.' Risk factors for FGM include living in an ethnically homogeneous community, religious influence, and education level. Living in a diverse community and sufficient understanding of the negative health outcomes, by both the female and her family, are protective factors. Educational awareness and medical/psychological support for affected women, as well as increased political support through international collaborations, may decrease the prevalence of FGM in African nations. Certain nations within the region have taken proactive steps implementing anti-FGM policies and preventative interventions. Although the rates of FGM have slightly decreased in such countries, the prevalence still remains high. We will conduct a systematic literature review to identify other potential risk factors of FGM in Sub-Saharan Africa and examine existing prevention interventions. After we evaluate the existing interventions, we will make recommendations to address this public health issue.

Keywords: Genital mutilation, Africa, prevention interventions, cultural prevalence

Room 903  11:45-12:30  Panel 3
Matthew Goldstein
Taylor E. Lively
Penelope Pekow (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Strategies for Preventing and Treating Traumatic Brain Injuries in Youth Football

A traumatic brain injury (TBI) is a disruption in the normal function of the brain that can be caused by a bump, blow, or jolt to the head or a penetrating head injury. According to the CDC, 3.2 million-5.3 million people in the U.S. currently live with a TBI-related health issue. These issues can range from difficulties with memory, attention, learning, and coordination to headaches, fatigue, and sleep disturbances. Adolescents and adults who have suffered moderate to severe traumatic brain injuries were more than twice as likely than their peers of similar age, race, and gender, to die about 3.5 years after their injury. Risk factors for traumatic brain injuries include age, athletic activity, military service, and incarceration status. We will be conducting a literature review into preventive and treatment strategies for TBI. We will then look to establish a plan that looks to help individuals who participate in youth football programs across the United States.

Room 908  11:45-12:30  Panel 3
Rachel Haley
Melody J. Slashinski (Faculty Sponsor)
Department of Public Health, UMass Amherst
Chronic Disease among Dominican Nationals and Dominican Immigrants: A Comparative Study

Recent studies suggest the health of Latinx immigrants worsens upon arrival to the U.S., indicating an association between chronic disease and immigration. For Dominicans immigrating to the U.S., research suggests chronic disease is associated with transition to a foreign diet, lifestyle changes, and lack of healthcare access. In the Northeast, Dominicans are
a thriving immigrant group, yet there is a dearth of research examining how the transition from the Dominican Republic to the U.S. shapes the experience of chronic disease.

Using comparative ethnography, this study draws from two cohorts to investigate the difference in the lived experience of chronic disease between Boston and Santo Domingo. I conducted semi-structured qualitative interviews in Spanish with 8 Dominican nationals living in Santo Domingo, and 5 Dominican immigrants in Boston, MA. All participants self-reported one or more chronic disease(s) and were interviewed twice. Guiding questions focused on family structure, diagnoses and medical treatment, transition from the DR to the US, and socioeconomic position. Further, I conducted participant-observation [of these places] and recorded field notes.

Preliminary results show how immigration shapes family and community networks, community involvement, treatment access, financial feasibility, and mental health status. Future applications for this project include supporting healthcare provisions in Dominican immigrant communities living in the Boston area, and informing policies to increase healthcare accessibility. Findings from this study can be used to support comprehensive healthcare practices for Dominican immigrant communities living in Boston, MA.

Room 908  11:45-12:30  Panel 3
Lidzt G. Lubin
Melody J. Slashinski (Faculty Sponsor)
Department of Public Health, UMass Amherst
The Lived Experience of Type II Diabetes among Haitian Women

In the United States, many people live with chronic conditions such as diabetes. According to the National Institute of Diabetes and Digestive Kidney Diseases (2017), approximately 2.3 million U.S. residents have been diagnosed with diabetes, and previous research suggests 86 million are at-risk for type II diabetes (McCarty, 2017). Diabetes is the seventh leading cause of death, and the leading cause of kidney failure, lower limb amputations, and adult-onset blindness. Marginalized communities are at increased risk for type II diabetes largely because of factors such as the lack of access to health care, healthy foods, and time to exercise. These factors are particularly salient for Haitian women since many of them are uninsured, live in food deserts, and have extensive work and family demands to attend to that leave little time for self-care. There is a dearth of research on how Haitian women experience type II diabetes, limiting our ability to provide comprehensive care. The purpose of this study is to examine the lived experience of type II diabetes among Haitian women living in Boston, MA.

In this study, I will conduct semi-structured qualitative interviews with six Haitian women living in Boston, Massachusetts. Using a phenomenological approach, I will identify Haitian women’s lived experience of type II diabetes, focusing on their personal everyday life experiences, how long they have been living with diabetes, and their access to health care with the condition. The findings from this research may shed light on the various ways Haitian women experience type II diabetes in their everyday lives, which can inform public health programs and policies.
The Financial Technology (Fintech) industry is loosely defined as start-ups using advanced Information Technology (IT) applications to provide financial services. The Fintech industry is transforming the range of non-bank alternative financial services available to consumers. Operating outside of the insured banking system, Fintech lenders (i.e., online, marketplace, digital, or peer-to-peer lenders) can offer quick and easy access to credit, but they can also become predatory debt traps. Current literature shows that long-term debt, and frequent short-term borrowing, can be detrimental to public health. Navigating the landscape of financial services is particularly challenging for unbanked households, (i.e. those without a bank account), and underbanked households (i.e., those who have an account at an insured institution, but also need to obtain financial products or services outside of the banking system). As Fintech lending grows, it will be increasingly difficult for consumers to make smart and informed decisions about borrowing money. As policymakers debate how Fintech lenders should be regulated, local communities should begin educating consumers about the risks and/or benefits associated with specific Fintech lenders. Using the Social Ecological Model, this conceptual analysis will explore how the latest Fintech lending services compare to the needs and socioeconomic vulnerabilities of unbanked and underbanked households. I will use data from the FDIC National Survey of Unbanked and Underbanked Households (2017) to evaluate the public health implications of the products and services listed in Forbes’ “FinTech 50 2018” report. The findings from this analysis can inform education programs for un/underbanked households.

Antibiotic stewardship programs (ASPs) are one of the great installments used to combat the war against antibiotic resistance. After the Center for Disease Control (CDC) released The Core Elements of Hospital Antibiotic Stewardship Programs, hospitals across the country have been improving their ASPs. ASPs are expected to reduce the amount of drug resistance microbes as well as the spread of infection. In response, this research proposes that they may also play a role in reducing the number of healthcare acquired infections (HAIs) when implemented in acute care hospitals. The goal of this research is to observe a possible correlation between decreasing trends in the number of healthcare associated infections and higher percentages of acute care hospitals that have antibiotic stewardships with the 7 CDC-recommended ASP characteristics by state. To do this, data collected by the CDC on the total occurrences of HAIs in acute care hospitals in each state will be compared to each state’s percentage of acute care hospitals with antibiotic stewardships.
hospitals that have the attributes of an ASP that the CDC recommends. These data sets will be evaluated over an 8 year period (2009-2016). To date, data has been compiled on 4 types of infections (CLABSIs, CAUTIs, MRSA, and CDIs). No comparisons between infection trends and antibiotic stewardship characteristics have been made thus far. With this research, medical professionals and law makers may be able to identify aspects of ASPs that lead to less HAI and better experiences for inpatient care.

12:40-1:25    Board 36
Holly Marie Levenstein
Vanessa Harripersaud (Faculty Sponsor)
Department of Public Health, UMass Amherst
iCons: Tactics Against Misinformation

Anti-science rhetoric and the general distrust of science experts have gained influence and credibility in recent years. This is seen most evidently in the anti-vaccine movement. Anti-vaxxer groups, without any scientific basis to back their claims, have been able to pass legislation in multiple places across the world that allow for more vaccine-hesitant behavior—putting public health in grave danger. It is important to view and understand anti-vaxxers not as a fringe group, but as laypeople trying to understand and relate to complex issues that regard their wellbeing. In this study, the success of anti-vaccine communication is analyzed, and contrasted to that of the dissemination of science generally accepted as fact. It is clear that the anecdotal nature of anti-vaccine communication is extremely appealing to the general public. This is their main method used to catch the attention of people on the fence about vaccines. In addition, all of the information they put out is easy to understand and accessible to the average person, with a large presence on social media. This makes it so someone does not necessarily have to search for such information in order to come across it. In contrast, public health officials make statements mostly on mainstream news media—something that people are increasingly losing trust in. In addition, the information is not easy to understand or relatable. It’s filled with statistics, jargon, and can leave the audience feeling patronized. To effectively maintain public health, officials must match the communication tactics of anti-vaxxers, and appease to the average person.

1:30-2:15    Board 16
Lily Martin
Melody J. Slashinski (Faculty Sponsor)
Department of Public Health, UMass Amherst
Yoga as Therapy for Women with Anorexia Nervosa

The importance of broadening the public’s understanding of and treatment for eating disorders among young women is key to improving the health and wellbeing of the population. The deadliest chronic mental illness among women is Anorexia Nervosa, a condition described as a form of self-starvation with an intense fear of weight gain, continuous restriction of food, inadequate caloric intake, and body dysmorphic attitudes. The recommended treatment is
ineffective for long term recovery, suggesting a need for alternative therapies during the maintenance stage, in which yoga as a form of mindfulness and meditation could prove beneficial. The purpose of this research is to examine how yoga can be used to support women recovering from AN. Literature is evaluated using a conceptual analysis method, including an analysis of qualitative and quantitative research articles, along with various texts. Specific themes and patterns across resources are documented using a biopsychosocial perspective to express the parallels between yoga’s philosophy and women with AN. Flexibility of mind and body, acceptance and awareness, habituality and autonomy are commonly shared themes between AN and yoga. Studies on the biological and psychological effects of yoga for AN express the numerous benefits that women have found with continuous, safe practice. Yoga is sustainable, easily accessible, and a non-invasive approach to bolster the traditional treatment plans and aid in maintaining recovery of AN long after treatment is terminated.

1:30-2:15  Board 4
Leah M. Boutelle
Melody J. Slashinski (Faculty Sponsor)
Department of Public Health, UMass Amherst
Echoes of Responsibility: A Participant-Observation Qualitative Study of Adolescent Experience of Food Deserts in a Western Massachusetts City

In 2017, an estimated 11.8 percent of households in the United States were food insecure, defined as experiencing a time when the food required for living a healthy, active life was inaccessible. Adolescents living in food deserts are impacted by decreased access to food that would support a nutritionally complete diet. Food insecurity and food deserts disproportionately affect communities marginalized by racial ethnic identity, low income, and geographic location. School food programs that offer free or reduced meals aim to mediate the impact of food insecurity on students. While there is substantial research examining the epidemiological landscape of food insecurity and food deserts, there is considerably less qualitative literature describing adolescents’ experiences of food insecurity and food deserts. I conducted a nine-month observational study with adolescents 12-15 years of age while teaching nutrition classes in a Western Massachusetts middle school located in a food desert. I documented via field notes adolescents’ relationships to food, one another, and teachers and administrators. I analyzed data using thematic analysis, focusing on emergent themes and patterns. Preliminary findings suggest that school food policies, institutional racism, body image, and a school-student disconnect counteract the effectiveness of school food programs, therefore do not mediate adolescents’ food insecurity effectively. Students embody food insecurity through internalizing experiences related to food desert environment that present as biological, psychological, and social conditions. Findings from this study can contribute to improving school food programs and provide insight into building rapport and interacting with adolescents who live in food deserts.
Phthalates in plastics and cosmetics have been reported to play a role in a host of behavioral, metabolic, and reproductive issues, such as ADHD, diabetes, and poor sperm quality. However, little is known about how adult exposure affects sperm epigenetics and offspring health. Without such knowledge, our understanding of paternal environmental determinants of offspring health is limited. We hypothesized that paternal phthalate exposure in mice would induce behavioral and metabolic changes in offspring phenotypically similar to ADHD and diabetes in humans. Exposed adult reproductive age male mice (F0) were treated with 5.0 mg/kg/day of DEHP, 5.0 mg/kg/day of DBP, or a mixture of the two (DEHP and DBP each at 5.0 mg/kg/day) for 70 days. Controls were exposed to vehicle only. F0 mice were then bred, and a male and female from each F1 litter was selected for phenotypic testing. Open field, elevated plus maze, sociability, glucose tolerance, and insulin tolerance tests were conducted for each F1 mouse. Behavioral testing results thus far indicate a statistically significant increase in time spent in the center of the open field during testing for both male and female offspring of DEHP-exposed mice (p = 4.03E-5). Additional results for behavioral and metabolic testing will be presented. However, we can conclude that, paternal phthalate exposure appears to have some sort of statistically significant effect. However, what this effect actually means will become more clear with additional behavioral and molecular testing of the F1 generation, and and correlation of sperm epigenetic data from F0 males.

As minority linguistic communities continue to grow in the US, the prominence of language as a barrier to healthcare has given rise to an abundance of interdisciplinary research on the relationship between language, access to healthcare, and health outcomes. In the Northeastern US, the profound growth of the Latino population in recent years has led to the increasing presence of linguistic subgroups in Latino communities that are generally of Caribbean descent, but predominantly comprised of Puerto Ricans. Within these communities, disparities in access to health education and resources have produced adverse health outcomes. Health indicators for the Latino adolescent community in particular represent the consequences of inequitable access to health information, as high rates of adolescent pregnancy, obesity, diabetes, and asthma are repeatedly observed among Latino adolescents. Language plays an integral role in health education for bilingual Latinos, whose nuanced use of language impacts which resources they use for health information and how they access them. This research study will compare the
health education resources that exist for bilingual Latino adolescents in a community in New England with what they perceive as health education resources and analyze how their linguistic preferences affect how they locate, obtain, and use those resources. The study consists of an inventory of existing resources, a language background questionnaire, and two longitudinal focus groups of 6-10 participants each. It is hoped that the results of this study will enable health education to better respond to the unique linguistic and health needs of bilingual Latino adolescents.

1:30-2:15  Board 48
Lindsey T. Tolan
Mary Andrianopoulos (Faculty Sponsor)
Department of Communication Disorders, UMass Amherst

Acoustic-Perceptual Characteristics of Speech in Teenagers with Autism Spectrum Disorder

The speech of individuals with Autism Spectrum Disorder (ASD) is often described as sounding odd or atypical. It is frequently described as monotone, robot-like, high pitch, and lacking emotion. It is not clear if these perceived differences are related to the organization of their sentences, sound of their voices, duration of their utterances, pitch, loudness, or prosody of their speech. The aim of this research was to identify the specific acoustic-perceptual features of speech that human listeners distinguish as sounding unnatural in speakers with ASD. This investigation studied speech samples of 22 individuals, 11 with a diagnosis of ASD and 11 typically developing (TD) peers matched for age, gender and receptive language. Twenty (20) judges comprised of 10 first year (unseasoned) and 10 second year (seasoned) Speech-Language Pathology graduate students were recruited for the study. Judges were blind to the participants’ diagnoses and were presented randomized samples of spontaneous speech, lexical and phrase stress tasks. The judges applied an acoustic-perceptual rating tool developed by the authors to determine whether the speech samples sounded “natural” or “unnatural”. The results of this pilot study showed that judges rated participants with ASD as sounding “unnatural” more often than their TD peers. The parameters that influenced the judges’ perception included atypical prosody, longer duration of utterances, and pitch. It is important to establish the underlying mechanisms of atypical speech in individuals with ASD, so that appropriate evidence-based interventions may be developed and implemented by clinicians to help those individuals seeking such services.

1:30-2:15  Board 49
Abigail Nylander Lent
Paula Stamps (Faculty Sponsor)
Department of Health Promotion and Policy, UMass Amherst

The History and Ethics of Human Experimentation in the United States

The United States has a tragic and extensive history of violating human rights in the name of science. The most commonly abused populations were those of minorities, including African-
Americans, imprisoned populations, and orphans. It is imperative that these cases are studied to find ways to ensure that these abuses of power are not repeated in modern medicine. This thesis will first analyze the exploitation of slave women in experimental medical procedures. It will then evaluate the concept of volunteering for a study with cases involving payment and reduced sentences for prisoners in the United States. Finally, this thesis will cover the horrific mistreatment of orphans in the name of science who endured everything from vaccine testing to induced diseases such as scurvy and rickets. The purpose of this thesis is to critically analyze research articles about experiments that have taken place in the United States. This will lead to an evaluation of the past and current ethical criteria for scientific experimentation. This will allow for a critical analysis of how current ethical codes have stemmed from the United States’ history of human experiments and whether or not these codes will be enough to ensure the rights and safety of test subjects in the new age of technology in modern medicine.

1:30-2:15  Board 50
Mehak Ratan
Sara Duncan (Faculty Sponsor)
Department of Environmental Health Sciences, UMass Amherst
Socio-Economic Status in the United States and Its Effect on Childhood Obesity

Childhood obesity is a major health issue that continues to impact many Americans. According to the CDC, childhood obesity affects 1 in 5 children in the United States. Studies have shown that childhood obesity can lead to a plethora of ailments in adult life, including high cholesterol and type II diabetes. In the United States, some populations are particularly vulnerable to childhood obesity. A major predictor of childhood obesity is socio-economic status. Research has shown that there is an inverse association between socio-economic status and body size. This presentation will discuss how different factors of socio-economic status such as parent education and social gradient can influence a child’s risk of obesity as well as the likelihood of them subsequently overcoming it.

1:30-2:15  Board 86
Christian Letizia
David Sigmon (Faculty Sponsor)
Department of Biology, UMass Boston
Oral Health Literacy and Dental Utilization at UMass Boston

The objective of this study was to assess oral health literacy levels among college students at the University of Massachusetts Boston and to analyze the relationship between literacy rates and dental utilization. A survey and short questionnaire was conducted among students who were recruited via word of mouth, social media promotion, as well as mass email. Oral literacy was measured using the Comprehensive Measure or Oral Health Knowledge (Macek et.al, 2010) and was assessed on a scale of low (≤60) and high (61-100). Dental utilization was assessed by visits to a dentist’s office or other form of dental care provider within the last year. Students with low oral health literacy may be less likely to utilize dental care, thereby decreasing
their opportunity to increase dental knowledge. Further considerations regarding on-campus dining and food choices in regard to oral health among students were also discussed.

1:30-2:15  Board 87
John Edward Carrigan
Jason Roush (Faculty Sponsor)
Honors College, UMass Boston
Prescription Opioid Addiction among Adolescents

Drug abuse is becoming more common every day in America. Typically, individuals associate illegal drugs such as cocaine, LSD, and heroin with abuse while failing to realize that legal drugs such as alcohol, tobacco, caffeine, and physician-prescribed medicines can be just as harmful. As a matter of fact, prescription opioids are frequently misused/abused which leads to many prescribed patients becoming addicted. Over the recent years, awareness of this issue has been raised. However, the opioid epidemic does not seem to be slowing down.

Although individuals of all ages become addicted to prescription opioids, this paper is going to focus on the addiction to prescription opioids among adolescents. Adolescents are the future of this country and if we can prevent them from becoming addicted to these prescription drugs, we, as a society, will be protecting our future. These adolescents will eventually grow up and become the role models of the future generations. That is why it is our job to provide the proper parenting and education to the younger generation before it’s too late. If they are parented and educated properly as adolescents, they will be better prepared to parent and educate the generations to come. This study identifies the severity of opioid abuse among adolescents, the well-documented or unclear contributing factors, and the actions that have been taken to date. In addition, it focuses on what could be done differently and what future steps should be taken to bring prescription opioid addiction to an end once and for all.

1:30-2:15  Board 88
Kendal Lysa Haley
Nicole Porther (Faculty Sponsor)
Department of Biology, Massachusetts College of Liberal Arts
Spatial Analysis of Food Access Points and Community Garden in North Berkshire County, Massachusetts

Food deserts, areas with restricted access or availability to fresh and nutritious foods, are a major public health concern. Community gardens, if situated properly may mitigate the impact of food deserts in economically depressed and rural communities. This study assesses the spatial relationship between community gardens and food access points (food pantries, grocery stores) in North Berkshire county, Massachusetts and will be use to determine best practice and improvements to food outreach programming.
A Pilot Test of a Capacity-Building Training for Community-Based Practitioners in the City of Lawrence, Massachusetts

Evidence-based programs (EBPs) have been shown to be a successful way to implement health promotion interventions in underserved communities. U54 Outreach Core researchers at the Center for Community-Based Research at Dana-Farber Cancer Institute (DFCI), in collaboration with the project Community Advisory Board, developed and provided a capacity building training for community-based practitioners in Lawrence, MA. By encouraging the use of EBPs, researchers aim to reduce health disparities and improve health. To help inform the development of the capacity building training, researchers utilized data from 15 key informant interviews and four focus groups to assess community needs, challenges and knowledge of EBPs. Seventeen practitioners enrolled in a one-day capacity building training, that was conducted at a local community college. Study staff administered a baseline survey at the training and a 2-week posttest thereafter. Post training support was provided through community health educators at DFCI and through planetmassconect, an online interactive website where practitioners can access training materials and resources. When providing these resources, researchers considered both the facilitators and barriers to EBP use. The data suggest that while most participants were aware of the importance of choosing an EBP that would benefit their community needs, they did not thoroughly evaluate its effectiveness. By performing the suggested 6-step approach on planetmassconect, CBOs can increase the likelihood of choosing successful interventions.

Community Engagement in the African American and Caribbean American Community to Create Target-Specific Interventions for High-Risk Men

The Massachusetts Statewide 2017-2021 Cancer Plan indicates 60% greater chance men of color are diagnosed with prostate cancer. In Boston, Black men are 2.1 times more likely to be diagnosed, and 2.7 times more likely to die from prostate cancer than White men. The current recommendation from the United States Preventive Services Task Force (USPSTF), is a C rating for prostate cancer screening (i.e., use of Prostate Specific Antigen (PSA)), no screening for men >70 yr and shared decision making for men 55-69 yr. Currently, however, there are no recommendations for Black men who are diagnosed younger and with a more aggressive disease than men at average risk. The purpose of this community engagement study was to augment City of Boston prostate cancer data through three focus groups with 40-70 y/o African American men (PSA screened), men 40-50 y/o (not PSA screened), and Influencers of health behavior. Further, six Key Informant Interviews were conducted in the Caribbean American community: 2 interviews with community members, four interviews with healthcare professionals.
and researchers. Participants were asked questions about how men source their health information, relationships with physicians, knowledge about prostate health, cancer, and screening. Transcripts revealed that men acknowledged the importance and life-saving ability of screening. Although Black men valued and used their physicians for health, many harbored distrust of the health care system, sourced health information from spouses, family members, and the internet. Lastly, men suggested a holistic approach addressing prostate health, as opposed to focusing on prostate cancer.

Room 808  1:30-2:15  Panel 5
Isabella Elizabeth Ciccolini
Griffin Willis
Penelope Pekow (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Prevention Strategies against Opioid Relapse in West Virginia

Opioid addiction in the US has a negative impact on the emotional, mental, and social aspects of an individual’s health, and also affects the population on a broader scale, with 130 people dying every day from an opioid-related overdose, and the economic burden is around 78.5 billion dollars yearly in regards to healthcare, lost productivity, addiction treatment, and criminal justice involvement. Our focus is on relapse prevention in communities after patients are released from rehab. West Virginia, in particular, has the highest rate of opioid-related overdose deaths, and when an individual is already a recovering addict they are at a higher risk of abusing opioids again which is why we chose to focus our research on this. Opioid relapse occurs more frequently than any other substance at a rate of 70-80 percent, and in West Virginia, the rate of overdose deaths is on the rise by 9.67 percent. In order to research this issue, we will be conducting a comprehensive literature review to draw conclusions on relapses with newly discharged patients and how these individuals re-acclimate to society. We will be studying what prevention strategies are most successful in order to develop a set of recommendations that will help former addicts live a healthy lifestyle and stay clean in the presence of potential temptations/triggers. We hope to help inform the public on the dangers of opioid addiction and the scope of this disease while also providing a holistic approach on the best way to stay sober for former addicts.

2:45-3:30  Board 11
Jasmine Inim
Deborah Keisch (Faculty Sponsor)
Department of Civic Engagement & Service-Learning, UMass Amherst
Bridging the Gap: Incorporating Cultural Relevancy into Standardized Test Preparation for Underrepresented Communities

Standardized testing is utilized to provide assessments of student success among institutions in the United States. The SATs have become a benchmark for college admissions with its examinations of critical reading, writing, and mathematics. Low test scores have shown to
impact high school students from underserved and underrepresented communities from low-income families the most due to the lack of resources and support to prepare students for SATs. My research will examine the effectiveness of a SAT preparation workshop that I designed and facilitated in collaboration with Upward Bound staff in order to improve critical thinking skills and test performance among students in Springfield, Massachusetts. The preliminary effectiveness and impact of this study will be measured through student surveys. This analysis will examine three key questions: (1) Is there a difference between social change and direct service? (2) How is inequity in education further expressed through the use of standardized tests? (3) Though this research is still on-going, how might the process and impact of the workshop show the importance of direct service in communities, while acknowledging the need for understanding the flaws in education and in particular, standardized testing. The goal is that the implementation of cultural relevancy in this workshop will cater to students from underserved and underrepresented communities and better prepare them for the SATs.

Room 808    2:45-3:30    Panel 6
Brianna Fox
Ciara Elise Plucinsky
Penelope Pekow (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Low Vaccination Rates in the West Coast Leading to Disease Outbreak

Low vaccination rates have been associated with a number of preventable disease outbreaks such as measles, polio, whooping cough, pneumococcal disease, and chickenpox. Vaccines are treatments that activate the adaptive immunity of an individual to a certain pathogen, leading to the prevention of acquiring disease. According to WHO, immunizations currently prevent two to three million deaths per year among all age groups. In recent years there has been an increase in the rates of individuals who are not vaccinated. There are many reasons that individuals may be un-vaccinated such as parental refusal, lack of access to healthcare and immigration status. The aim of this research is to better understand the reasons for non-vaccinations and identify which intervention methods can correct these issues. This will be done by conducting a comprehensive literature review of the causes of missed vaccinations and identify strategies to deal with a lack of vaccinations. In particular, we will be suggesting effective intervention methods that will increase vaccination rates in areas affected by outbreaks such as Washington and Oregon.

Room 808    2:45-3:30    Panel 6
Aastha Pokharel
Laura N. Vandenberg (Faculty Sponsor)
Department of Environmental Health Sciences, UMass Amherst
The Effect of Analgesics on the Fetal Mouse Development in Combination with Alcohol Treatment

Gabapentin (GAB) and Lamotrigine (LTG) are two types of anticonvulsant drugs used in the treatment of seizures and epilepsy. Studies using rodent models indicate that GAB interacts
with ion channels particularly in regions of the brain, namely the hippocampus and the neocortex. Prior studies have shown that GAB is fetotoxic in rodent models, with overt signs of toxicity in the pups of the exposed dams including delayed ossification of the limbs, vertebrae and skull. LTG and GAB have both been associated with teratogenic activity. Teratogens are substances that have the ability to induce birth defects. In this project, female mice were exposed to either vehicle, LTG, or GAB throughout pregnancy. We then evaluated: 1) whether or not the analgesics acted as a protective agent, or an exacerbating agent, against the effects of alcohol on fetal development; 2) maternal behavior; 3) pup behavior; 4) development of maternal mammary tissues; and 5) development of pup mammary glands. Behavioral field-test data was recorded on the mothers at lactational day 2 (LD 2) and LD 8. Behavioral tests were conducted on the pups prior to puberty. Using the NOLDUS software, which analyzes numerous parameters (i.e. distance travelled, number of times visiting the middle of the chamber, etc.), we are quantifying the effects of LTG and GAB on anxiety behaviors, movement, and learning/memory. Completion of this project will shed light on how these drugs act, and whether they are protective against the effects of alcohol during early development.

3:45-4:30    Board 44
Jessanie Lynn Insogna
Brooke Kamalani Yuen
Penelope Pekow (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Addressing Food Insecurity in Rural Mississippi, Specifically Jefferson County

Background: Food insecurity is the inability to consistently access adequate food of nutritional value. In 2017, approximately 40 million American households were identified as food insecure, which includes twelve million children. Risk factors for food insecurity include low socioeconomic status, unemployment, rural or inner city residency. Lack of access to nutritional food can result in obesity, low energy, and diabetes in severe cases. In comparing food insecurity estimates across varying counties and congressional districts within Mississippi, Jefferson County ranks highest with a food insecurity rate of 36%. Within this community, 42% of adults have obesity and 17% of adults have diabetes. The combination of these risk factors provide explanation for the adverse health outcomes apparent throughout Jefferson County.

Methods: We will conduct a comprehensive literature review to identify programs and policies that have been shown to be effective in addressing risk factors of food insecurity, and in reducing rates of food insecurity particularly in rural populations.

Prospective Results: We will identify and develop strategies and recommendations specific to the county of Jefferson, Mississippi in order to aid in addressing the risk factors present in this community.
Improving Access to Prenatal Care among Hispanic Women in Texas

Healthcare during the prenatal period is crucial for the wellbeing of both infant and mother. Lack of access to prenatal care can lead to negative health outcomes such as maternal and infant mortality, low birth weight, and long-term disability. Personal and institutional barriers such as low health literacy, language barriers, and cultural mores all contribute to the challenges women face when pursuing care. These risk factors are especially prevalent among Hispanic women. Living in Texas was associated with low rates of first trimester prenatal care among Hispanic women, according to a 2017 study. A complementary study from the Hispanic Health Care International Journal compared Latina women to their Black and White counterparts, and concluded that these women are more likely to have late or no prenatal care. We will conduct a comprehensive literature review of programs and policies that improve access to prenatal care through use of databases such as PubMed, ScienceDirect, and Sage Journals. Using the findings, we will formulate suggestions for programs to improve access to prenatal care for Hispanic women in Texas.

Low Vaccination Rates in the West Coast Leading to Disease Outbreak

Low vaccination rates have been associated with a number of preventable disease outbreaks such as measles, polio, whooping cough, pneumococcal disease, and chickenpox. Vaccines are treatments that activate the adaptive immunity of an individual to a certain pathogen, leading to the prevention of acquiring disease. According to WHO, immunizations currently prevent two to three million deaths per year among all age groups. In recent years there has been an increase in the rates of individuals who are not vaccinated. There are many reasons that individuals may be un-vaccinated such as parental refusal, lack of access to healthcare and immigration status. The aim of this research is to better understand the reasons for non-vaccinations and identify which intervention methods can correct these issues. This will be done by conducting a comprehensive literature review of the causes of missed vaccinations and identify strategies to deal with a lack of vaccinations. In particular, we will be suggesting effective intervention methods that will increase vaccination rates in areas affected by outbreaks such as Washington and Oregon.
Lung Cancer in Appalachia Kentucky

Lung cancer is a disorder that develops in one or both lungs and is caused by the uncontrollable growth of abnormal cells within the lung walls, forming tumors within the lung that interrupt its normal functioning. The American Lung association estimated that about 155,000 Americans were expected to die from lung cancer in 2018, as lung cancer make up 25% of all cancer deaths in America. The main causes of lung cancer are smoking, second hand smoke, radon exposure, and hazardous occupational environments - such as those that have high concentrations of asbestos, uranium, and coke, a fuel with high carbon content. High unemployment rates, lack of education, and low income within a specific geographic region are associated with these known risk factors. Appalachian Kentucky has the highest rates of lung cancer in the United States. This study primarily focuses on Appalachia Kentucky, where the population has a higher probability of developing lung cancer due to the elevated risk factors in the region. We will conduct a comprehensive literature review of lung cancer as a public health problem. We will create recommendations that are deemed to be successful at reducing lung cancer risk specific to these communities. To conclude, we plan to build a set of policy and program recommendations for Appalachian Kentucky to decrease the rising rates of lung cancer.

Addressing Childhood Obesity Interventions in Mississippi

Background: One in five school aged children and young adults aged 6 to 19 years in the United States is obese. According to the National Survey of Children's Health (NSCH), the prevalence of youth obesity in 2016 was nearly twice as high in southeastern states than in their northern counterparts. Mississippi has the highest rate of obesity in the United States, where a quarter of all children between the ages of 10 and 17 years are affected by obesity. Childhood obesity is a major public health problem impacting our children’s quality of life, self-esteem, and future health outcomes. Fifty percent of children who are obese in childhood remain obese in adulthood. Adult obesity is associated with an increased risk of a number of serious health conditions including heart disease, type 2 diabetes, and cancer. Methods: A literature review will be conducted on peer-reviewed publications to identify key risk factors for childhood obesity in Mississippi. We will also identify three evidence based strategies to address risk factors for childhood obesity. Results: Preliminary results indicate that a major risk factor for childhood obesity in the South is the poor economy. The poor economy affects children's ability to afford nutritious foods, opportunities for physical activity, and social support from family and peers.
The hot climate is also a major risk factor in the South because children spend more time indoors rather than exercising outdoors. Conclusion: We will recommend three strategies to prevent childhood obesity that is achievable and evidence-based.

3:45-4:30    Board 49
Kristin Pettini
Christina Cappiello
Nicole Miller
Leah Elizabeth Mitchell
Susan Sturgeon (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst

Addressing Low Breastfeeding Rates among Low-Income African American Women

Background: The American Academy of Pediatrics recommends that infants in the United States are exclusively breastfed for their first six months of life. However, African American women have the lowest rates of breastfeeding initiation and continuation in the nation. According to the American Medical Association, approximately 81.5% and 81.9% of white non-Hispanic and Hispanic women initiated breastfeeding between 2011 and 2015. For African American women, this rate was 64.3%, and only 14% of mothers continued breastfeeding through six months postpartum. Breastfeeding is associated with favorable health outcomes for newborns such as increased protection against infection, promotion of gastrointestinal health, and decreased risk of diabetes and leukemia. Additionally, nursing mothers recover faster from childbirth and have a lower risk of type 2 diabetes, breast cancer, and ovarian cancer. Methods: We will conduct a comprehensive literature review exploring potential interventions aimed at raising the percentage of African American mothers initiating breastfeeding to 80%, which is the target percentage identified by the Healthy People 2020 initiative. Results: Preliminary research suggests that a mother’s decision to breastfeed is determined by far-reaching social factors such as media, marketing, systemic racism, or legislation. Additionally, small-scale influences such as community, interaction with health care workers, workplace factors, and personal relationships can have a profound impact on an African American mother’s feeding choices. We will present evidence-based interventions aimed to reduce the impact of breastfeeding deterrents for this population. Conclusion: Our recommendations have the potential to increase breastfeeding rates among African American women in the United States.
Addressing Rising Rates of HIV among the Adult and Adolescent Populations in Atlanta, Georgia

**Background:** Human immunodeficiency virus (HIV) is a virus that attacks the immune system, putting those infected at risk for severe illness and death. The Centers for Disease Control and Prevention (CDC) estimates that more than one million Americans aged 13 and older were living with HIV in 2015. In 2015, Georgia reported the fifth highest rate of new HIV diagnoses in the nation. Today in the Atlanta metropolitan area alone, there are approximately 35,402 people living with HIV. This area also has one of the lowest survival rates from HIV infection. The goal of our project is to identify risk factors that have led to such a high rate of infection and lower survival in this city, and to propose interventions to lower rates of HIV infection in Atlanta and to improve survival.

**Methods:** A thorough review of peer-review literature will be conducted to identify risk factors for HIV infection and HIV-related death and to identify evidence-based public health interventions for reducing rates of HIV diagnosis and mortality in Atlanta, Georgia.

**Results:** Our preliminary results indicate the major risk factors for HIV infection and related HIV death in the Atlanta metropolitan area are heterosexual and male-to-male sexual contact with an HIV infected individual, and a delayed diagnosis of HIV. We will also identify three evidence-based interventions that address these risk factors for HIV infection.

**Conclusions:** We will propose a potential strategy to address the rising rate of HIV infection and transmission in the Atlanta metropolitan area that incorporates evidence-based techniques.
acknowledged as a major environmental problem. This study reviewed major emerging contaminants and their chemical properties. These include 1,4 Dioxane, Perchlorate, RDX, Cyanobacteria, and Tetrachloroethylene (TCE). These contaminants showed health effects that include eye irritation, hypothyroidism, convulsions, and non-Hodgkin's lymphoma. EC levels in several sites in Massachusetts were tabulated and reviewed. It was observed that EC can be a major public health issue if not addressed in treatment protocols. Some mitigation options include activated carbons, application of Ozone, UV Radiation/Photosensibilizer, and Gamma radiation. There is a need to monitor, evaluate extent of levels, exposure of the public, ecosystem vulnerability, and mitigation options.

Room 908  3:45-4:30  Panel 7
Shannon Jean Silva
Laura N. Vandenberg (Faculty Sponsor)
Department of Environmental Health Sciences, UMass Amherst
Quantifying Effects of Teratogenic Compounds on Craniofacial Morphogenesis Using Geometric Morphometric Tools

Current research aims to identify compounds that act as teratogens, i.e. compounds that induce birth defects when exposures occur during embryonic or fetal development. One teratogen that has received a lot of attention is ethanol, which can induce craniofacial defects, disrupt brain development, and alter development of the visceral organs such as the heart. Although the best preventative measure for fetal alcohol syndrome is to abstain from drinking, there is also interest in blocking or reversing the effects of teratogens like ethanol.

In this investigation, I am measuring craniofacial parameters on fetuses collected from mice that were dosed with ethanol (the teratogen) and drugs that alter specific molecular pathways. These pregnant mice were exposed to the compounds at periods of vulnerability for the fetuses. We hypothesize that disruption of specific ion flux pathways can block the teratogenic effects of ethanol. Using MorphoJ, a tool to evaluate geometric morphometric parameters, my work will quantitatively characterize the effects of different teratogens on sensitive craniofacial structures.

4:45-5:30  Board 14
Meredith Raynor Mase
Justine R. Pennucci
Jasmine St. Cyr
Elizabeth Donohoe Cook (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Examining Preventative Measures for Lowering Incidence of STIs in High Risk LGBTQ+ Youth

LGBTQ+ youth in the United States are at an increased risk for contracting a sexually transmitted infection (STI). The CDC estimates that there are approximately 10 million newly contracted STIs for all youth annually. While our paper will focus on LGBTQ+ youth, the CDC reports STIs for three groups: Men who have sex with women (MSW), men who have sex with men (MSM), and women. Although the available data is often confined to these three groups,
MSM have syphilis rates 248 times higher than other males and 554 times higher than females (California Department of Health, 2018). MSM accounted for 78% of new HIV cases and 68% of new STIs, although they only represented 4% of the U.S. population in 2010. Young transgender women also have a 50 times higher risk of contracting HIV, compared to cisgender, heterosexual young adults (Wood, Salas-Humara, Dowshen, 2017). Risk factors for contracting an STI in the LGBTQ+ community include lack of access to inclusive sex education and being a member of a racial minority group. Protective factors include support and resources from their school, home, and LGBTQ+ community members. These factors were found using public data sources like the CDC and the California Department of Health, as well as databases including PubMed. We will also use these sources to further examine past intervention strategies that address STI risk factors for LGBTQ+ youth. The information gathered will be used to recommend the best measures for preventing STIs in LGBTQ+ youth.

4:45-5:30  Board 35
Hannah Goodrow
Frances Karynn Aikeins
Elizabeth Donohoe Cook (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Preventative Measures to Help Reduce the Number of Mothers Diagnosed with Postpartum Depression in Massachusetts Women Ages 30-40

Postpartum depression is a clinical condition that new mothers face after childbirth. This condition manifests itself differently in each individual; common symptoms include anxiety, a loss of interest in family activities, and substance use to hide the symptoms. The effects of postpartum depression lead to a mother experiencing difficulty bonding with her child, and the infant may experience developmental challenges as a result. According to the CDC, 1 in 9 women experience symptoms of postpartum depression, but in Massachusetts the rates are higher than the national average with 1 in 7 women experiencing this form of depression. We will focus on Massachusetts women between the ages of 30-40 as this age group has the highest risk of complications during pregnancy which is a risk factor for postpartum depression. To conduct our research, PubMed and PsychInfo will be used. Statistics show that among those diagnosed with postpartum depression, 9% of white mothers initiate mental health care compared to only 4% of Black women and 5% of Latinas. Risk factors for postpartum depression include complications during pregnancy, low hemoglobin levels, a lack of social support, and difficulty getting pregnant. Protective factors include family support and an uncomplicated first trimester. We will research interventions designed to prevent postpartum depression and make recommendations that are reliable and effective among Massachusetts mothers ages 30-40.
An estimated 15 million babies are born prematurely every year in the United States. Preterm birth is defined as a live birth before 37 completed weeks of gestation. It can cause congenital defects, and learning disabilities in children. According to the WHO, preterm birth is the leading cause of death among children under the age of 5. Regardless of education, wellness, or income, black women are still 49% more likely than white women to deliver prematurely. According to the CDC, in 2016, the rate of preterm birth among black women (14%) was about 50 percent higher than the rate of preterm birth among white women (9%). Racial disparities increase this risk of preterm delivery among black women. Women with low income, tobacco users, teenagers, and women over age 35 are also at a higher risk of prematurity. Cumulative stress is also a risk factor; it raises cortisol levels and reduce blood flow to the fetus, which stunt an infant’s development. Protective factors for reducing the number of preterm births include increased preconception and prenatal education, progesterone therapies and increased practice of birth spacing. We will conduct a review of literature using PubMed, as well as data from agencies such as the CDC to determine interventions that can reduce the outcome of preterm births for black women in the United States. In this work, we will recommend interventions to decrease the rate of preterm birth in black women and infants.

Lead poisoning is the acute poisoning due to the absorption of lead into the bloodstream, and affects children and adults across the country. Lead is 1 of 10 chemicals identified of major public health concern in the world. Risk factors include lead in paint, water pipes, and items like toys or jewelery. Exposure is dangerous for young children, who can develop cognitive dysfunction and other negative health effects, which cannot be cured with treatment. In 2016, lead exposure accounted for 540,000 deaths and 13.9 million years of life lost worldwide. Nearly ¼ of the water systems reported their lines containing lead in the United States. The city of Flint, Michigan, experienced a sudden, high level of lead poisoning in 2014 which resulted in a publicized crisis that brought to attention the lack of prevention methods in place for lead poisoning, and the lack of treatment available. This event highlighted how children in lower-income areas have a higher risk and higher prevalence of lead poisoning due to old infrastructure. Negative health impacts due to lead exposure are preventable, and there have been many laws enacted to reduce or eliminate lead content in products. Current treatment
involves removing lead from the patient’s environment, adjusting diet, and chelation therapy, which is an intravenous procedure designed to remove heavy metals from the body. Through conducting research, we will identify possible solutions to reducing the amount of lead exposure in the US and build a set of recommendations for preventing lead exposure in Flint, Michigan.

4:45-5:30 Board 48
Danae Hoeman
Victoria McAleer
Penelope Pekow (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Re-acclimation into Society Post-rehabilitation for Opioid Addiction in Residents of West Virginia from Ages 18-30

Opioid addiction in the US has a negative impact on the emotional, mental, and social aspects of an individual’s health, and also affects the population on a broader scale, with 130 people dying everyday from an opioid related overdose, and the economic burden being around 78.5 billion dollars yearly in regards to healthcare, lost productivity, addiction treatment, and criminal justice involvement. Our focus is relapse prevention in communities after patients are released from rehab. West Virginia in particular has the highest rate of opioid-related overdose deaths, and when an individual is already a recovering addict they are at a higher risk of abusing opioids again which is why we chose to focus our research on this. Opioid relapse occurs more frequently than any other substance at a rate of 70-80 percent, and in West Virginia the rate of overdose deaths is on the rise by 9.67 percent. In order to research this issue, we will be conducting a comprehensive literature review to draw conclusions on relapses with newly discharged patients and how these individuals re-acclimate to society. We will be studying what prevention strategies are most successful in order to develop a set of recommendations that will help former addicts live a healthy lifestyle and stay clean in the presence of potential temptations/triggers. We hope to help inform the public on the dangers of opioid addiction and the scope of this disease while also providing a holistic approach on the best way to stay sober for former addicts.

4:45-5:30 Board 49
Rachel Alexandra Richardson
Penelope Pekow (Faculty Sponsor)
Department of Biostatistics and Epidemiology, UMass Amherst
Strategies for Preventing and Treating Traumatic Brain Injuries in Youth Football

A traumatic brain injury (TBI) is a disruption in the normal function of the brain that can be caused by a bump, blow, or jolt to the head or a penetrating head injury. According to the CDC, 3.2 million-5.3 million people in the U.S. currently live with a TBI-related health issue. These issues can range from difficulties with memory, attention, learning, and coordination to headaches, fatigue, and sleep disturbances. Adolescents and adults who have suffered moderate to severe traumatic brain injuries were more than twice as likely than their peers of similar age, race, and gender, to die about 3.5 years after their injury. Risk factors for traumatic brain injuries include age, athletic activity, military service, and incarceration status. We will be
conducting a literature review which focuses on TBI as a public health issue. We will then look to develop some recommendations for TBI prevention and treatment that is specific to youth football programs as well as develop a plan with the intention to help individuals who participate in youth football programs across the United States.

4:45-5:30  Board 50
Annie Lynn Nguyen
Marissa Best
Nina Phuong Duyen Huynh
Richard Peltier (Faculty Sponsor)
Department of Environmental Health Sciences, UMass Amherst
Breastfeeding and Society

Despite the array of benefits of human milk, such as a variety of nutrients necessary for an infant to grow and develop, breastfeeding rates are low in the United States compared to other countries. Research has shown that women in the U.S. are undereducated regarding the specific benefits of breastfeeding. Bottle-feeding is viewed as a normal way to feed an infant. Widespread exposure of formula marketing can be held responsible for the development of this social norm. As the formula industry increased in the U.S., it has led consumers to believe that infant formula is as good as breast milk. Embarrassment is also a key factor in women’s decision to not breastfeed. Breasts are often regarded as sexual objects and using them for their nurturing function is discouraged in public places where mothers have been traditionally asked to stop feeding or to leave. Therefore, the inaccessibility of breastfeeding in public spaces makes mothers feel the need to conceal breastfeeding in public and use breast milk substitutes to avoid breaking cultural norms. This alternative method can negatively affect her child’s development. The public’s view should not hinder a mother from raising her child the best she can. Mothers should feel empowered to make informed health decisions regarding the nourishment of her child. Shifting the societal norms around breastfeeding can allow for better-informed mothers with well-nourished children. This project aims to educate the public on the benefits of breastfeeding thus reducing stigma and shifting social norms over time.

4:45-5:30  Board 85
Athena Maria Sofides
Laura N. Vandenberg (Faculty Sponsor)
Department of Environmental Health Sciences, UMass Amherst
Bisphenol-S, Endocrine Disruption, and Risk Assessment: Prenatal Exposure to Xenoestrogens and Their Effects on the Female Mouse Mammary Gland

Endocrine disrupting chemicals (EDCs), over 800 of which have been identified, are environmental compounds that mimic or alter typical hormonal activity. A compelling body of evidence suggests that the plastic chemical Bisphenol-A (BPA), one of the most produced synthetic chemicals worldwide, is an estrogenic EDC that has been associated with metabolic and behavioral disorders and certain cancers. In response to the stigma and regulation
surrounding BPA, an analog compound called Bisphenol-S (BPS), suspected to exhibit similar estrogenicity, has been widely implemented into consumer plastics. Both BPA and BPS are associated with altered mammary gland morphology and nursing behavior in mice. Ethinyl estradiol (EE2) is a pharmaceutical estrogen used in birth control. This study analyzes the effects of BPS and EE2 on the development and immune populations of the female mouse mammary gland in late adulthood. Morphological changes due to the xenoestrogenic exposures were quantified via volumetric morphometrics of the whole mount mammary gland. Histology, visualized via the hematoxylin and eosin, trichrome, and toluidine blue stains, was used to quantitatively measure collagen thickness around ducts and mast cell populations in the mammary gland. Immunohistochemistry was carried out to measure proliferation and protein expression. The aim of this work is to better understand the effects, both compounding and individual, of xenoestrogens during critical stages of development. In this project, I will also discuss the viability of contemporary risk assessment practices surrounding chemical regulation, the problem with regrettable replacements, and how we can avoid the next BP-x.
This study describes an operational socio-technical system called “World Librarians” (WL). This Knowledge Commons system provides educators, librarians, and students in remote and offline areas of Malawi, access to digital information that want and request. The WL system is based on a model involving three actors: (1) Requesters - teachers or librarians in Malawi needing content; (2) Searchers - a team at our university in the United States who has access to open access content databases; and (3) Couriers - a person, often a teacher or librarian, who get the digital content the searcher team sends via Google Drive, and “carry” these digital files back to their school or library to upload onto an offline server at their school or library. Couriers do this “carrying” usually through their smart phone’s data plan, getting the data from the shared Google Drive and uploading to their organization’s server, but in the process, often incur a significant personal cost to do this. The data transmitted are often videos and sizable files. Consequently a key issue to making the WL system work, is the establishment of some Courier data plan cost reimbursement system. After describing the WL socio-technical system as a whole, this study describes an experiment to implement a system where a digital postage stamp is “attached” to the information shipment by the searcher team, in an effort to repay the Couriers for their service.

Puerto Rican students in Massachusetts have the lowest 4 year college degree rates (12%) when compared to both overall Latinos (20%) and non-Hispanic Whites (48%). Using social ecological models (Hurtado et al, 2012) that emphasize contexts of discrimination and strengths-based, cultural wealth models of Latinx and Puerto Rican student success (Yasso, 2008, 2016), this project will interview both Latino and Puerto Rican student educational success experts and policy makers (N=5-8), and conduct interviews and a dialogue group with successful Puerto Rican college enrolled students and college graduates (N=5-8), to explore barriers and facilitators specific to Puerto Rican students at every stage of the educational pipeline from early education to college. Additionally, we will lead a dialogue group on campus at the University of Massachusetts, Boston, with Puerto Rican students currently enrolled in the Latino Leadership Opportunity Program (LLOP). By emphasizing positive resources promoting educational resilience, and identifying contexts of discrimination and other barriers such as equating bilingual status with disabilities or behavioral problems, this research will contribute to Puerto Rican student success initiatives while informing educational policy.
Science-fiction has always served as a conduit for our hopes fears and anxieties, and alien invasion stories are no exception. The inception of the alien invasion story was with H.G. Wells’ *War of the World*, which takes an imperial-age Britain and creates a power in the aliens which dwarfs Britain in the same way it dwarfed the nations it conquered. This power dynamic is what propelled invasion films to popularity in the 1950s; in the wake of the second world war, the United States became the most powerful country in the world, which made that anti-power fantasy an interesting concept for examination. The Cold War and its corresponding nuclear arms race also lent power to the stories. Beyond these two threads lies a breadth of thematic variety; the 1953 adaptation of *Worlds’* religious themes, *Invasion of the Body Snatchers*’ McCarthyism, and *The Day the Earth Stood Still*’s critique of nuclear weapons, to name a few. Alien invasion films would fall out of style in the coming decades, never returning to its former popularity, but the genre would be revisited consistently throughout the decades, each time shifting from its origin, to the modern day where many alien invasion films sympathize as much with the aliens as with the humans. In this project, I want to examine the explicit themes of alien invasion films throughout the genre’s history, how they’ve changed, and the social and political events behind those changes.

Writing a script, whether it be a pilot, short film, or feature length film, requires more than just writing a couple of scenes. A lot has to be done before the script can be started. Characters and story ideas must be developed and work shopped first. Once the characters are determined, the character descriptions can be started and, once the story is finalized, so can the treatment. Character descriptions are more than just a written physical description. Character descriptions will often go into detail on the characters’ past, hopes, fears, and even sometimes going as detailed as describing what the characters bedroom looks like; all of which helps to show who that character is and how they will act within the story. Additionally, treatments are detailed descriptions in paragraph form of what will happen in the script. Only once the treatment and the character descriptions are finished, can the script be started.

Specifically, the character descriptions that I have done for this thesis project are for the six main characters. These characters all have different backgrounds, whether it be race, family life, or social grouping, and I chose to do careful research on the groups that the characters belong
to as to not misrepresent or offend them. As for the treatment, I also did extensive research on the common writing and story tropes, that apply to my script, to be aware of them so that I can avoid or incorporate them as I feel best suits the story.
SOCIAL THOUGHT AND POLITICAL ECONOMY

Room 162  8:30-9:15  Panel 1
Teagan McStay
Deepika Marya (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst

Modern society, as it currently stands, does not value the human condition as it perpetuates a comfortable existence only for the lucky few. The rest, the impoverished and downtrodden, are victims to this system, and are repeatedly told that their own self-determination is not enough to warrant relief from their misery. With neoliberalism at the helm, the definition of success is profit. This thesis explores how neoliberalism is able to perpetuate the continuation of this divide between the rich and poor before the people boldly stand up and say “enough.” This paper will focus on the susceptibility of a third world country, Bangladesh, to the neoliberal agendas and its integration into the monopolistic global system at the benefit of the elite. It looks specifically at the impact on the country’s garment manufacturing industry and how, with the sole intent of furthering profits, factory owners and multinational corporations exploit the local workforce, subjecting them to unsafe, dehumanizing working conditions. The world witnessed the extent to which the neoliberal agendas were willing to go when the Rana Plaza Factory collapsed and killed over 1,300 Bangladeshi laborers, only warranting band-aid reforms to the corrupt system that allowed this tragedy to take place. Incorporating recent examples of anti-neoliberal resistance movements such as Occupy Wall Street and the Arab Spring, this thesis assesses other examples where neoliberalism has assaulted the globe and what is being currently done beyond reforms to overhaul the system.

Room 162  11:45-12:30  Panel 3
Deepti Kamma
Deepika Marya (Faculty Sponsor)
Commonwealth Honors College, UMass Amherst
iCons: Unsustainable: A Closer Look into the Environmental and Economic Effects of Globalization on Indian Agriculture

Food security should be a critical consideration in any society, but especially when discussing India. With agriculture contributing to 18% of the national GDP, the sustainability of the agrarian sector is critical for India’s overall development. Unfortunately, the food security condition in India is dire. Small-scale rural farmers are struggling to sustain their livelihoods. Nearly 60,000 Indian farmers have taken their lives in the past decades. The causes for the troubling rise in farmer suicides are multifaceted- but there is one prevailing factor that plays a powerful role in manifesting this calamity: globalization.

This analysis will focus on the effect of globalization, specifically through the Green Revolution, the involvement of the World Trade Organization, and the consolidation of power in multinational corporations, on the sustainability of Indian agriculture. Through the industrialization and trade liberalization fostered by intentional international interventions, the
foundation of Indian agriculture shifted from traditional practices to modernized technology that featured decreasing self-reliance and increasing dependence on international markets. From an environmental perspective, the technologies of the Green Revolution have accelerated the spread of monocultures, intensive soil degradation, and the overexertion of groundwater supplies. From an economic perspective, small-scale farmers are being forced to compete in a global marketplace while dealing with rising costs of production and decreasing yields. The current system in Indian agriculture has proven to be unsustainable. Understanding the role of globalization in Indian agriculture may provide insights into the development of a more sustainable agrarian development strategy.
SOCIAL WORK

Room 903   11:45-12:30   Panel 3
Alicia Ann Starsja
Kari Dupuis (Faculty Sponsor)
Department of Social Work, Berkshire Community College
The Power of Mentoring

Throughout our lives we are impacted by a mentor or mentors that positively influence the people we become. Mentors come throughout different phases of our lives, sometimes unexpectedly, while other times it is a planned, paired mentorship. There is a wide range of individuals that can serve as mentors; a mentor could be a family member, friend, teacher, boss, peer, community leader, or even a celebrity. Mentoring has been proven to produce powerful and positive effects through personal growth and development, social and economic opportunity, and through education as well as professionally. When embarking upon the decision of an independent study, it was clear that building a Peer Mentoring Program for the Human Service/Social Work students would be a positive addition to the program that could impact the lives of many students. This program will fall under the umbrella of the Berkshire Community College’s “Mentoring at BCC” but will be the first peer mentoring program in the Human Service division on campus. The purpose for a peer mentoring program is to integrate available support for incoming or less experienced students at Berkshire Community College in the Human Service/Social Work degree program, through the utilization of second-year students who display quality leadership skills and are highly motivated in academia. Ultimately the goal of the program will be to provide supplemental support for students as they navigate balancing their educational, personal, and professional lives.

1:30-2:15   Board 91
Erica Rachel Clark
Amy A. Ford (Faculty Sponsor)
Department of Behavioral Science Department, Greenfield Community College
Substance Misuse Treatment at Franklin County House of Correction

Opioid misuse is a national crisis that has changed the mission of the Franklin County House of Correction (FCSO) from solely punitive incarceration to a fully evolved treatment facility. A pioneering program—medically assisted treatment offering Suboxone and Vivitrol options for inmates is the first of its kind in Massachusetts. With a focus on psychoactive substances ranging from alcohol to cocaine a team of clinicians work both individually and in group therapy to support mental health while incarcerated. Upon release a dedicated reentry team provides support to the client that helps maintain and grow the skills learned during their incarceration. When working with this population a positive support system is crucial to the inmate’s long-term recovery. Franklin County House of Correction provides a milieu in which empathic communication is a priority. My field experience practicum at the FCSO is the applied environment in which my classroom theories and skills can be observed, practiced and tested. Mindfulness, Acceptance and Commitment Therapy (ACT) and Stages of Change are some of the theories I studied in The Helping Relationship and Substance Use Disorders classes. Case Management class prepared me to assist with reentry work, such as obtaining health records and creating a finalized plan for a successful reentry. This evidence based approach to
Growing Social Connection: A Case Study of a Therapeutic Farm Community

Therapeutic farm communities are vastly under researched. The studies that do exist report resoundingly positive client outcomes yet offer minimal description of the practices which produce these outcomes. Previous research has outlined these organizations to employ agricultural practices and strong social community as an intervention for struggling individuals. The purpose of this study is to provide more descriptive information by discussing the organization of a selected therapeutic farm community. Ethnographic methods were utilized as the researcher entered the therapeutic farm community as a residential volunteer intern, living and working alongside residents and staff for 51 continuous days. Qualitative data was collected on an ongoing basis, post-observation field notes were recorded at mid-day then at the end of the day to more effectively capture observations and descriptions. Data analysis was conducted as an inductive process, drawing conclusions from coded and organized field notes using postmodernism as a theoretical lens. This guided the interpretation of the collected data to exemplify the power dynamics and relationships between community members including staff and residents. The data reveals a theme of group orientation in the therapeutic farm community’s daily organization. This orientation extends opportunities of shared experience for residents’ social development through feelings of belonging and inclusion. This under-researched model, if widely implemented, could open new possibilities for existing communities or more publicly accessible programs. The result of these applications would provide alternative options to a wider range of struggling individuals.
The purpose of this research project will be to define the term “global city” and how the city of Worcester, Massachusetts fits into that definition by observing what life is like for the working class, specifically of the immigrant population. As we establish what is meant by the term global city we will analyze how policy in Worcester reflects trends from the perspective of the working class citizens. By considering concepts such as migration, public and economic policy the goal will be to determine how Worcester is doing at an institutional level in supporting the people who live within its limits as well as what could be done to make things better. Primary qualitative data will be derived from the “Voices of Worcester” research project providing citizen level observations of how the city interacts with its community specifically in regards to foreign born entrepreneurs.

The first portion of this research project will define and evaluate the idea of the Global City moving on to draw lines of comparison to show how Worcester falls into this category based off both our primary research and through evaluating secondary research in regards to the city, it's history and it's people. Transcription of the voices of our interview volunteers I will use statements to address the social problems that are faced within the city to provide an intimate view of how the characteristics of a global city impact the lives of citizens, moving on to consider suggestions for a more equitable city.

Structural ordinances set in place in the college-level classroom sometimes hinder student achievement that may affect their eventual emancipation. Using data primarily from a capstone survey with over 150 student participants under post-structural theory, this paper analyzes influences that may affect student interest in the classroom. This paper will focus on factors directly relating to the general classroom environment at Worcester State University for the sake of convenience, feasibility, and replication rather than major specific criteria.

The study found that interest at the beginning of a course correlated and faculty interaction directly with interest throughout a semester. However, course difficulty, the reason for taking the course, generalized demographics, and course material costs were not found to have correlated with indicators of class interest for students as a whole. Based on these areas, this paper
outlines brief recommendations in the classroom and academic administration to reduce student attrition for a general student population.

10:45-11:30    Board 57
Heather Marie Buchanan
Claudine E. Barnes (Faculty Sponsor)
Department of History and Political Science, Cape Cod Community College
Social Media: Is It Helping or Hurting Modern Society and Politics?

The popularity and global use of social media has made a substantial impact on our society, both negatively and positively. From social and media-sharing networks to discussion forums, they have all played an important role in how our society has developed. Social media has become a significant influence on individuals, specifically teenagers, and how they perceive reality. These online platforms help illustrate ideas and images of what kids may hope to achieve for themselves. This paper will focus on the detriments and benefits of social media and its role in modern society and politics.

10:45-11:30    Board 64
Noelle M. Hemdal
Susan McPherson (Faculty Sponsor)
Department of English, Quinsigamond Community College
Meaning of Community and Inter-community Conflict

This presentation reviews definitions of community and perspectives of modern thought on community, with particular attention paid to inter-community conflict. Analyzing patterns of past conflicts and their resolutions, this paper attempts to anticipate future trends.

Room 165    10:45-11:30    Panel 2
Jack C. Gallant
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
An Analysis of the American Values of College Students

In today’s America, the next generation of college students are the future. However, are the college students of today as in touch with their traditional American values as past generations have been? The traditional American values of Individual Freedom and the American Dream are challenged in this paper. Current literature would lead us to believe that current college students are leading very different lives than four or five generations ago, and that they have forgotten about the old American dream. The two research methods used: (1) qualitative analysis of university-level students and (2) various published articles. Data has been collected from interviews, surveys, published papers, and online news publications. These American values are still instilled in today’s youth, yet for them to be aware, they must be questioned and discussed specifically. College students see themselves as young people who have the
potential to do whatever they want in life. They might not be following the old definition of the American dream, but they are following their dream of being whoever they want to be. To be an American in college, is to say that you are following your own American dream unknowingly and on purpose.

Room 903  10:45-11:30  Panel 2
Camille Anna Nichols
Lisa Maya Knauer (Faculty Sponsor)
Department of Sociology and Anthropology, UMass Dartmouth
Apart at the Seams: Injustices against Factory Workers in Bangladesh’s Garment Manufacturing Industry

My presentation examines workplace injustice in the Bangladeshi garment industry, which has played an integral role in Bangladesh's economy for the last 30 years. Garment manufacturing in Bangladesh employs millions of workers, and accounts for than three-quarters of the country's export earnings. Women make up the vast majority of the factory workforce. However, due to social inequality, aggressive economic development, lax industrial safety policies, and substandard building code oversight, women workers have been left vulnerable to preventable abuse, injury, and death. The Rana Plaza building collapse in 2013 created awareness of these conditions on an international scale, but harmful conditions remain a constant threat to women garment workers. I have explored the intricacies of the garment manufacturing industry, and examined possible solutions to preventing future disasters and worker abuse. The first part of my research identified studies on women workers in Bangladesh, the environment they face as newcomers to the workforce, and threats to worker safety before and after the Rana Plaza building collapse. The second part of my research discussed national and international activist response to the disaster. The garment manufacturing industry has transformed societal norms for many women of Bangladesh, and has opened up new economic opportunities. However, protecting worker safety should be a priority for the industry to grow effectively. An awareness on the part of the consumer, combined with union organizing, and grassroots efforts on the part of the women on the factory floor are the catalysts to create lasting and effective changes to Bangladeshi law.

Room 909  10:45-11:30  Panel 2
Sasha Louise McEnaney
Deborah Keisch (Faculty Sponsor)
Department of Civic Engagement & Service-Learning, UMass Amherst
Social Media Ambassadorship

Safe Passage, an organization that works with survivors of domestic violence, provides a wide array of services to their clients. However, there is also a prevention and community engagement aspect that comes with such an organization, that works toward reducing or eradicating the risk of any further harm to the community. Together with staff at Safe Passage, I have developed a social media ambassadorship program which recruits volunteers to post on their own social media platforms on behalf of the organization, in order to spread awareness and engage the community to begin conversations about domestic violence, and ultimately try...
to eliminate it. This type of engagement is extremely beneficial for both volunteers and the organization, offering a low-level commitment channel for volunteers to make a difference and also stay committed to other things, in addition to assisting Safe Passage in trying to shift public discourse around these issues, and prevent the violence from occurring in the first place. In this presentation, I will describe the social media ambassadorship program, its pros and cons, and present preliminary findings about potential outcomes.

11:45-12:30 Board 26
Damaris M. Calderon
Ester Shapiro (Faculty Sponsor)
Department of Psychology, UMass Boston
Exploring Latino Leadership: Twenty-Five Years of the Latino Leadership Opportunity Program at UMass Boston

The Latino Leadership Opportunity Program started and coordinated by the Inter-University Program in Latino Research in 1992, has offered Latino students the opportunity to develop as leaders by learning to conduct policy research in partnerships with faculty and community organizations. The Mauricio Gaston Institute at UMASS Boston has housed the program, and for 25 years has graduated students who receive support for learning about cultural and community strengths as resources for leadership development. Further, students learn to use research as a tool for community leadership informing policy change. This project presents findings from a literature review on culturally meaningful approaches to Latino/leadership, and a mixed-methods qualitative study using interviews and dialogue groups to explore the experiences of program alumni, program faculty, and current enrolled LLOP students in defining Latino Leadership and identifying areas of policy research for maximum impact on Latino communities. Program alumni and key informants among faculty and staff have been interviewed by current LLOP students to explore alumni’s LLOP program experiences and impacts on their evolving careers, to identify themes in their views of Latino leadership and culturally meaningful approaches to leadership applicable in multiple settings.

11:45-12:30 Board 27
Elizavette J. Cordero
Ester Shapiro (Faculty Sponsor)
Department of Psychology, UMass Boston
Understanding Pathways for Latino Student Success at an Urban Public Institution: Organizational and Student-Centered Perspectives

This research examines academic experiences of Latino students currently enrolled at an urban public institution, to identify resources for success and how to improve points of access at both institutional/organizational levels and in support and active outreach to students. The study uses a Multi-contextual model for diverse learning environments in broad access institutions (Hurtado, 2013), which argues for attention to the organizational/institutional environment as providing resources or barriers as well as a student-centered perspective on navigating/negotiating educational, family workplace and community settings and obligations. Additionally, the research applies an intersectional perspective on culture as multi-
faceted (Villaruel and Fuentes, 2012). Finally the study uses a Critical Race perspective on Cultural Wealth (Yasso, 2016), the Psychology literature on Stereotype Threat, and culturally specific affirmative approaches to supporting educational success, wellness and leadership. The project explores Latino student strengths and contextual challenges along educational pathways during key transitions, to explore how institutional programs can incorporate culturally sensitive/high impact educational practices (ie student and family engagement, culturally sensitive career development, holistic health/mental health promotion practices, or culturally-sensitive research opportunities addressing lived experiences of inequalities, can better support student success by identifying needs and mobilizing strengths (Nunez et al, 2013; Rendon et al, 2014). The mixed methods study will report on findings from individual interviews, focus groups and stress reduction, career development and leadership workshops with diverse Latino students at different stages of their education. Additionally, interviews will be conducted with key faculty, staff, and community experts in Latino educational success policies.

11:45-12:30  Board 38
Isabel Sophie Alves de Lima
Mahala D. Stewart (Faculty Sponsor)
Department of Sociology, UMass Amherst
Shared Living Narratives: Exploring the Undergraduate Off-Campus Experience

How do family dynamics and social location such as class, gender and race influence how people live and interact in shared living spaces? Roommate struggles are common, but what are the social causes of these disagreements? What are the underlying forces that lead to successful living arrangements? Relationships and behavior within any shared space are shaped by both spoken and unspoken assumptions, expectations and agreements as well as the experiences and identities that sociologists examine. Through my research on undergraduate students living off-campus, I seek to explore the intimacy of daily physical proximity and ritual in shared living spaces to uncover the social factors that shape interpersonal relationships.

Friendship and social networks play a vital role in young adults transition to adulthood. By independently creating living communities with shared interests and values, college students create important transitional experiences together as they explore values and the relationship between community and individuality.

Often, discussions regarding the logistics of day-to-day shared living dominate the more nuanced interactions. Everyday frustrations of coffee cups left out, hair in the shower drain, and late-night noise are often resolved reactively, without acknowledging or exploring how one’s social location and those of one’s roommates affect the meanings of these interactions. Examining the complexity of these seemingly mundane interactions and social dynamics may provide insights that pave the way for productive, proactive conversations.
11:45-12:30    Board 39
Wenqi Yan
C.N. Le (Faculty Sponsor)
Department of Sociology, UMass Amherst
Asian American Parents Use Strict Parenting to Foster Academic Success

The parenting practices of Asian Americans have attracted much attention in recent years. This is due to the extraordinary educational success of Asian Americans, exemplified by a report from the 2015 Census that showed Asian Americans to have the highest rate of having a bachelor degree or higher among all racial groups in the US. Using a comprehensive review of numerous studies, this paper attempts to analyze how Asian American parents raise their children by focusing on three aspects: causes and motives shaping East Asian American’s parenting styles, prevalent parenting styles, and the impact on second generation. Current studies show that Asian immigrant generally implement stricter parenting styles, and the possible reasons could be Asian American parents’ high expectations, sense of vulnerability, and hyper-selectivity. This paper also emphasizes differences in parenting styles and expectations of success across social class and generational and immigrant status.

11:45-12:30    Board 50
Nattalya Brown
Nikesha Amado
Ester Shapiro (Faculty Sponsor)
Department of Psychology, UMass Boston
“Just Because I’m Black Doesn’t Mean I’m African American”: Constructing Racial/Ethnic/National Identities as Resources for Educational Success and Wellness

This presentation will explore the complexities of Black racial and ethnic identities that come from immigrant histories, and discuss their value in supporting the educational success and wellness of college students. The research applies an intersectional perspective on race, gender and culture as multi-faceted (Villaruel and Fuentes, 2012), as well as a Critical Race perspective on Cultural Wealth (Yasso, 2016). The presentation also draws from the work of Latinx scholars (Morales, 2018) who argue for the importance of Latinx identification with “collective Black” experience that maintains cultural heritage while refusing White Supremacy’s categories of “honorary White” or mandated African American identity. The presentation will use student narratives, dialogues, and thematic analysis to present dilemmas experienced due to limited knowledge of the wide range of world-wide migrations that contribute to Black ethnicity at UMASS Boston, and examples of student experiences in including that complexity as part of their sense of self when confronted with narrow stereotypes about their background. Our group consists of those who identify as mixed race in "non traditional" ways. There are those who identify as Cape Verdean which are islands of the coast of Africa, and those who identify as Dominican, as well as Haitian. These are US Black/ethnic identities that are often confused in the US, challenging us to create strong cultural identities "outside the boxes".
1:30-2:15    Board 92
Eleanor Mccarthy Callery
Leshawn Cornelius
Shayne Patrick Hurley
Elizabeth Whalley (Faculty Sponsor)
Department of Sociology, Framingham State University
A Storm of Violence: A Study of the Risks and Responses of Intimate Partner Violence

According to the Center for Disease Control, Intimate Partner Violence (IPV) is aggression or violence that occurs in an intimate relationship (2017). An intimate partner can refer to either former or current dating partners. This research studies the characteristics of and responses to IPV by using data from victims who reported a violent incident to the National Crime Victimization Survey (NCVS) between the years of 2000 and 2016. Using the frameworks of Critical Race Theory and Gender Conflict Theory, this study explores how a victim’s age, sex, and race affects the reporting, police response, and level of injury in IPV. It is predicted that as the demographic characteristics of the victim (age, race, sex) vary, the likelihood of experiencing IPV, reporting that victimization to the police, as well as level of injury will also differ. It is important to be aware of how both victim and institutional responses to IPV may be influenced by social forces such as racial and gender identities. This study is significant in contributing to the research surrounding IPV, which can allow communities and families to become more aware of issues within both victimization and response.

1:30-2:15    Board 93
Emily Kathryn Burnett
Casey Margaret Bradley
Vanessa Efua Broni
Zaria Davonna Osborn - Pight
Nicole Marie Pacheco
Elizabeth Whalley (Faculty Sponsor)
Department of Sociology, Framingham State University
No Means No: An Exploration of the Management of Sexual Assault Victimization

There is an overwhelming amount of evidence showing rates of sexual assault victimization nationwide. Past research suggests that every 98 seconds an American is sexually assaulted (NCVS 2010). The purpose of the study is to address how victims manage these sexual assaults in both the short and long-term, and if these post-assault characteristics vary for different types of victims or assaults. Specifically, this study analyzes how a victim’s race, an offender’s race, and awareness of an offender’s alcohol and drug consumption may influence decisions to report their assault, psychological effects, and access to resources following these assaults. The research uses the incident records of victims who reported a sexual assault to the National Crime Victimization Survey (NCVS) between the years of 2000 and 2016. Critical Race Theory, Gender Theory, Deterrence Theory, and Labeling Theory are used to frame hypotheses regarding specific characteristics of sexual assaults and victims may influence who they chose...
to report to and the long-term effects that come with being sexually assaulted. Expected findings include that women will comprise the majority of those victimized by sexual assault, race will influence a victim’s access to resources, and both race and the involvement of alcohol will have an effect on psychological effects and decisions to report. These findings aim to disrupt the normalization of sexual assault within society and differential treatment of victims. This study hopes to put the burden of sexual assault on society, rather than victims, and show that support is needed to address the ongoing problem.

1:30-2:15 Board 94
Annie Elsie Nitzsche
Jenaise A. Castellanos
Meredith Ann Kennedy
Ashleigh Nicole Whigham
Elizabeth Whalley (Faculty Sponsor)
Department of Sociology, Framingham State University
Purging the Pipeline: An Exploration of the Relationship between School Discipline and Race

African Americans constitute 17 percent of all school age youth in the United States, but they account for 37 percent of suspensions and 35 percent of all expulsions (Civil Rights Data Collection 2018). Previous research suggests that race is a factor that manifests the disproportionate use of discipline in schools with higher percentages of students of color (Heitzeg: 2009). This study examines how schools with varying populations of students of color are differently affected by the presence of racial bias and criminalization in schools. Using data from the 2015-2016 School Survey on Crime and Safety (SSOCS), a self-reported survey administered in-school to principals, this study examines how the racial makeup of the student population influences the use and frequency of varied types of discipline. Critical Race Theory and Labeling Theory are used to further explain how perceived racial demographics impact a school’s choice of disciplinary action. More specifically, this study predicts that schools with higher percentages of students of color are more likely to use punitive measures as a form of discipline, and will use them more frequently. Using these theories, this paper contributes to the field of research on how the existence of racial bias in schools affects the overuse of discipline. This is especially important given that the excessive use of school discipline increases the likelihood of students of color being introduced to the criminal justice system, revealing what may be the entrance to the School-to-Prison Pipeline phenomenon.
**Students Falling through the Crack: An Exploration of the Relationship between School, Education, and Drug Use**

The educational system is meant to further student’s future success, but could it be leading them down an ulterior path of drug use? Past research asserts that substance abuse, possession, and distribution is closely linked to school climate. More specifically, connections have been made between drug involvement and the social interactions between students, teachers, and their engagement within the classroom (Eitle & Eitle 2004). This study examines how elements of education and school experiences influence adolescent drug use and abuse. Data from the 2014 National Survey on Drug Use and Health (NSDUH) was used to conduct this research. The NSDUH is a computer questionnaire administered by RTI International. The survey contains questions about substance abuse, drug use, education, social environment, and youth experiences (NSDUH: 2014). This research utilizes Social Learning Theory, Control Theory, and Deterrence Theory to make connections between youth education and drug use. Expected findings include a relationship between negative school experiences, drug prevention curriculums, and increased short and long term drug use. Students that feel depressed, saddened, or empty may be more apt to lose interest in school, and be more susceptible to drug use (ADDPLSIN, National Survey on Drug Use and Health: 2014). Based on these predicted findings, this paper suggests modifications to the way school systems respond to student drug use and how they develop and improve drug resistance education.

**The Killers among Us: The Contributing Factors of Media Portrayal, Age, Weapons, Race, and Gender on Mass Murder**

According to the Gun Violence Archive, there were 340 mass shooting cases that were reported and verified in 2018. While mass shootings are a national issue, more information about the patterns of such offenders is needed to understand this social problem. Using the Stanford Mass Shooting of America (MSA) data set, a comprehensive database of the mass shootings that occurred from 1966 to 2016, this study uses strain, social learning, and labeling theories to analyze the different patterns within people who commit mass murder. Specifically, this study how a killer’s age, race, and gender may influence the location, weapon use, fatality, and media portrayal of the shootings. This study predicts that the majority of perpetrators who commit...
mass murder are white males between the ages of 21 through 35, and that these white male shooters will be more likely to commit mass shootings at a school than those of other races or genders. It is also anticipated that as the age of the shooter increases, the likelihood of having more guns and number of fatalities will also increase. Finally, labeling theory is used to address the expectation that mass shooters will be portrayed in the media differently based on their race. The topic of mass murder is important in hopes of reducing the frequency of such events, and this study contributes importantly to understandings of the motivation and strategies of these perpetrators.

1:30-2:15  Board 97
Cori Farrow
Ashley Afonseca
Ashley Delva
Chaiyanne D. Monteiro
Kaitlyn Selman (Faculty Sponsor)
Department of Sociology, Framingham State University
Exploring the Subtleties of White Supremacy: Racial Disparities in School Punishment

This study addresses the relationship between the racial makeup of schools’ student populations and the types of punishment practices those schools have in place. Specifically, we seek to answer the following question: does the percent of non-Hispanic white students enrolled impact the likelihood of schools having either inclusionary or exclusionary punishment practices in place? To answer this question, we perform bivariate and multivariate analyses on data from the School Survey on Crime and Safety (SSOCS), a cross-sectional survey completed by administrators at 2,092 public schools across the US. Guided by the core assumptions of Critical Race Theory, we hypothesize that racial makeup of a school will impact the types of disciplinary response policies that a school has in place. Specifically, we predict that schools with a higher percentage of white students will be more likely to have inclusionary discipline responses in place, while schools with a lower percentage of white students will be more likely to have exclusionary discipline responses in place. Existing research on the topic suggests that race is indeed a factor in school punishment, thus our research has the potential to provide further support for this suggestion, or to complicate the existing narrative. Research that locates race/ethnicity as an important variable in understanding how social institutions like the school function, gives much needed voice to the experiences of young people, particularly youth of color. Ultimately, we seek to further contributes to the ongoing work of building a future beyond whiteness and institutionalized white supremacy.
Current political distress revolving around immigrants is being pushed by President Donald Trump’s administration. With an increasing anti-immigrant agenda headlining in media, research dedicated to more fully understanding the experience of immigrants and their families is of particular importance. As such, we have conducted a study that seeks to answer the question: for children of immigrants, how does discrimination in school impact self-esteem? We analyze data from the Children of Immigrants Longitudinal study, a study based on surveys distributed to children of immigrants in three separate waves, at three different points in time in the same individuals’ lives. We conducted bivariate and multivariate analysis on the second wave of data (collected in 1995). We hypothesized that a respondent’s positive and negative self-esteem would be affected by experiences of discrimination by their peers or by teachers—with discrimination decreasing positive self-esteem and increasing negative self-esteem. As segmented assimilation theorists posit, educational experiences and personal feelings of self-worth/value are important factors in social and economic mobility. While our research does not focus on mobility, it does explore the relationship between experiences of discrimination within the school, and the self-esteem of children of immigrants. This is an important topic of study because education and self-esteem can potentially impact a person’s ability to move up (or down) the social and economic ladder, contributing further nuance to segmented assimilation theory. In total, our research seeks to shine a light on discrimination issues surrounding immigrants in our country, and on a larger scale impact future policy.
understanding the United States’ history of colonization and its roots in capitalism, it can be applied to the future of colonization as it exists in space, and the further ethical and scientific repercussions from having a privatized force of entrepreneurs and CEOs dictating our next steps for mankind. Collaborative space exploration and a reversion to a centralized international model are proposed as solutions to the challenges and problems created by privatized space discovery.

**Room 168  1:30-2:15  Panel 5**
Catherine Lynn Gullage
Zachary Miner (Faculty Sponsor)
Department of Behavioral Science Department, Fitchburg State University
Communications Technologies and Interpersonal Relationships

The purpose of this research is to understand and describe the effects of technology on the interpersonal relationships of college-aged individuals. As technology penetrates most areas within our lives it starts to essentially become a part of who we are. Individuals often go about their lives using technology without truly acknowledging the power that it holds. Therefore, this study can be used to increase our understanding of how our communication and relationships with others are impacted by commonly used forms of technology. This knowledge is significant because it can assist in assessing and reinforcing beneficial use of technologies.

The first portion of the thesis is a review of the literature pertaining to the topic of the connection between technology and interpersonal relationships. Some researchers have noted the negative consequences of technology mediated communication, while others have highlighted the beneficial aspects. Consequently, I am conducting further research to get a more first-hand and comprehensive perception of how technology affects relationships.

I am conducting qualitative research through interviews with 10 individuals who attend Fitchburg State University. Participants are asked questions about various aspects of their personal use of technology to communicate with others, as well as their social networks and relationships. I hypothesized that technology is a beneficial tool that can be utilized to make connection with others easier, but it also negatively impacts the quality of interpersonal relationships. Furthermore, I will present on the results from my semester of research.

**2:45-3:30  Board 100**
Shelby Rae Fontaine
Robin A. Robinson (Faculty Sponsor)
Department of Sociology and Anthropology, UMass Dartmouth
How Faith and Culture Impact Family Decision Making for Children with Cancer

Faith and culture can have a significant impact on the decisions patients and their families make regarding pediatric cancer care, especially when the beliefs of the family and patient do not align with those of the interdisciplinary healthcare team. These factors can lead to miscommunications with health care professionals, resulting in a conflict in caring for those with
life-threatening conditions. The proposed study aims to establish the key influences on decision making through one’s faith and culture. Qualitative interviews with families will be conducted, as well as interviews with health care professionals, such as doctors, nurses, and social workers, who work with families to establish a comparative narrative.

I plan to analyze interview data considering Steven Lukes’ three-dimensional view of power, to explore the power dynamics in these situations. Parents feel as though they know what is best for their child since they are their caregivers. On the other hand, doctors and other members of the health care team also feel as though they are the experts because they have specialize education, training, and experience caring for others. This power struggle is something that could affect the level of care a patient receives and understanding both sides of the argument could present a solution that is welcomed by all. My hopes for this study are to provide insight on how to work through the power struggles between families and health care professionals when faith and culture prove to be barriers in providing optimal care.

3:45-4:30 Board 100
Hannah Misiuk
Kyle D. Morrill
Douglas Ryan Murphy
Trevor Alan Robert
Xavier L. Guadalupe-Diaz (Faculty Sponsor)
Department of Sociology, Framingham State University
Underage Drinking: Which Factors Are to Blame?

The consequences of underage drinking affect everyone. Underage drinking may hinder both the social and psychological development of adolescents. This study examines the relationship between one’s social environment and their likelihood to engage in underage drinking, along with the many influences that can lead to it. To further explain the associations that influence underage drinking, the project tests social learning theory, social bond theory, and general strain theory. Our data came from the 2006 Monitoring the Future: A Continuing Study of American Youth. This survey of over 14,000 12th-grade students was part of a series that explored changes in important values, behaviors, and lifestyle orientations of contemporary American youth. We expect our secondary data analysis to find an association between underage drinking and factors related to adolescent’s family life, religiosity, as well as strain related to employment and academic performance. These findings will encourage society to recognize the influence that social structure and environmental factors have on adolescents in order to identify and resolve issues related to underage drinking.
Crime and Recidivism in the United States

A 2011 report from the Pew Center of the States found that national recidivism rates between 1999-2004 were 45.4% in 1999 and 43.3% in 2004. We used data from the 1995 Adults on Probation survey to explore recidivism on both criminal and technical violations while studying the effects of relationships and stigmatization on recidivism. This will include stigmatization that is from both human capital theory, labeling theory, social learning theory, and differential association theory. Human capital theory puts emphasis on an individual's accumulation of education, training, knowledge and skills. The more human capital, the more positive outcomes. Labeling theory argues that people act and behave in ways that reflects how others label them. The theory predicts that being labeled can increase the likelihood of deviant and criminal behavior. Differential association theory argues that criminal acts are from learned behavior and would predict that those who are exposed to an excess of definitions favorable against law are more likely to break it. Social learning theory argues that behavior is learned through observation and that we learn how to act from observing one another. Essentially, one learns to be a criminal. This research, if supported, could potentially help stop criminals from committing crimes after being incarcerated.

Drug Usage among Adolescents in the United States

Studies are showing that children are engaging in substance abuse as early as 10-16 years old. Data from Monitoring the Future studying U.S. teens from 8th to 12th grade found that 35% of American teens had used an illicit drug in their lifetime, as opposed to the 18% of teen European students the same age that reported drug use. We use data from the National Longitudinal Study of Adolescent Health to explore drug use among adolescents in America. We use social learning theory and attachment theory to explain the trends of increasing drug use among adolescents in America. Social learning theory suggests that individuals learn behaviors through other people via exposure, observation, and imitation. This theory would predict that teens who are exposed to drug use are likely to imitate the observed activity of drug use. Attachment theory suggests that the relationship between a child and caregiver influences whether children feel safe, secure, and protected. This would predict that the more a caregiver is involved in a child's life, making them feel a lot feel more safe, secure, and protected, the less
likely they will commit a crime. According to the theory, we expect to find that connections between a child and their parents and how connections between a teen and a role model will play a role in the behaviors they engage in.

3:45-4:30  Board 96
Susanna Nia Barthelemy
Kibriyaa Tsahay Lindsey
Amanda R. Miller
Xavier L. Guadalupe-Diaz (Faculty Sponsor)
Department of Sociology, Framingham State University
An Investigation of Social Media Usage and Its Adverse Effects on Adolescents

As a growing facet of communication, social media consumption is both expansive and of central interest to sociology. Social media is a communication tool that we use to interact and form relationships. The purpose of our study is to examine the world of social media and the adverse effects it may have on adolescents. Previous studies have shown the significance of social media use among teens as it relates to various adverse consequences such as cyberbullying. To contribute to these studies, we conducted a secondary data analysis of the Pew Teens Online data. The data set included a survey-based sample of 799 teens and their guardians. Our study examined the familial bonds of adolescents and their parents, as well as the influence of peer norms and social comparisons that teens make among each other. We expect to find that adolescents who have weakened bonds with parents, follow peer norms within groups, and compare themselves to others are more likely to experience adverse behaviors via social media. These results illustrate significant associations between relevant social factors and potential negative consequences of teen social media usage. By understanding the role social media plays in adverse behavior, parents and guardians could use this information to inform adolescents on how to properly use the internet and decrease the chances of negative experience.

3:45-4:30  Board 97
Julia Dillon
Megan E. Arnold
Rachel Hutton
Shayla Marie Terrasi
Xavier L. Guadalupe-Diaz (Faculty Sponsor)
Department of Sociology, Framingham State University
Drinking and Its Effects on Academic Performance in College Students

Our research examines how drinking habits and social influences affect academic performance. This study has practical significance because drinking is very common among college students and having further information and insight about how it can affect students’ academic performance is beneficial. The current project utilizes a secondary data analysis of the National Survey on Drug Use and Health dataset. The data includes a random sample of 67,901 US adults who took the survey. The surveys were collected through computer-assisted interviews.
and audio computer-assisted self-interviews. To test the association between social factors related to drinking and academic performance we used univariate, bivariate, and multivariate analyses to develop our results. Based on the results, we expect to find that drinking will have an impact on academic performance due to the fact that it can cause lower grades, decreased interest in courses, and higher absences. The findings demonstrate what role peers, social settings, and expectations related to drinking play in students’ academic performance.

3:45-4:30    Board 98
Eunice Bwambok
Celia Claire Liquori
Kendra Rae Shaw
Sahteeva Renee Smith
Xavier L. Guadalupe-Diaz (Faculty Sponsor)
Department of Sociology, Framingham State University
Social Factors That Contribute to Teen Drug Abuse

Adolescence is a developmentally vulnerable time. There are many different influences that impact and determine adolescent’s behavioral outcomes. This study examines what social factors are associated with drug use among teens and adolescents. While overall reported drug use among adolescents has changed over time, teens are still abusing drugs such as marijuana, alcohol, over the counter drugs, and tobacco. Social factors such as, peer influence, social environments, school, religion, family life and exposure to delinquency all seem to be some of the leading factors associated with the use of drugs among youth. The current project utilizes a secondary data analysis of Monitoring the Future which included six questionnaires, each with a different subset of topical questions, but all containing a set of “core” questions on demographics and drug use. These questionnaires were taken by 14,814 twelfth grade students across the United States. We expect to find that increased participation in delinquent behavior and activities, little to no church attendance, failure to graduate high school, and a single parent household all lead to increased use of drugs among teens. The importance of the study is to provide knowledge of potential risk factors of teen drug abuse across the United States. The findings will show some of the significant factors that are related to teen drug use.

3:45-4:30    Board 99
Emily Osborne
James Allen Collier
Leilani Santanna Edwards
Charys Lopes-Dishmey
Xavier L. Guadalupe-Diaz (Faculty Sponsor)
Department of Sociology, Framingham State University
The Effects of Social Groups, Employment, and Family on Teen Substance Use

This study examines the influence of social groups, family life, and employment on adolescent drug use (marijuana, alcohol, tobacco). We test social learning theory, social control theory, and
social bonding theory to analyze the effects of various social attachments to adolescent substance use. Previous research findings suggest a general consensus that humans learn through observation and imitation of family members, friends, co-workers, and religious affiliates. We utilized data from Monitoring the Future, a survey which randomly sampled more than 14,000 12th grade students in the US. We conducted a secondary data analysis to test associations between several risk factors and adolescent drug use. Overall, we expect that the total hours worked by teens, single-parent households, and peer influence may contribute to teen substance use. We also expect that religion and two-parent households may have a positive effect at steering students away from drugs. Studying social influences on drug use is important for future prevention tactics or programs in reducing the likelihood that high school students resort to substance use.
SPORT MANAGEMENT

11:45-12:30    Board 40
Joshua Chinedu Ogbuikwe
Emily Must (Faculty Sponsor)
Department of Sport Management, UMass Amherst
Perception of Women's Sports

How do we get more people to engage with women's sports? Nielsen reports that 66% of the population is interested in at least one women's sport. Nielsen also reports that 84% of general sports fans are interested in women's sports. Though those numbers are reassuring, but yet they also seem to be rather high compared to the consensus from the media that no is interested in viewing women's sports. This presentation will look to address whether the perception of women's sports reported by Nielsen and by the media are just myth or are reality based on surveys and interviews conducted.
11 billion tons of fossil fuels are consumed every year and with our increasing population, consumption will continue to grow meaning fossil fuels will run out. Algae biodiesel can be the answer to our energy consumption needs. Algae is a photosynthetic organism with flexibility to cultivate in open and closed pond systems, sequestering carbon from the atmosphere and turning it into energy dense biomass.

Using biodiesel from algae is less harmful to the environment than fossil fuels. It would minimize further carbon emission into the atmosphere, therefore mitigating further environmental damage. However, production of algae biodiesel as a replacement for fossil fuel is still in its primitive stages. There are currently many experimental unknowns and cost-related factors that needs to be considered. Research suggests that cars are capable of running on an algae biofuel and petroleum diesel mix with minor modifications.

In this research, we are seeking to compare different methods of production of algae biofuel. The best method would be to evaluate the amount of algae produced in relation to the time elapsed, energy input and space required. Improving the cultivation of algae species will lead to lower production cost. Algae cultivation methods are the next step in decreasing our dependence on fossil fuels.
While one in five humans is lacking fresh drinking water, agriculture uses 70% of the world’s fresh water for irrigation. Most of this water is taken from aquifers, rivers, and lakes. Currently, most farmers use overhead irrigation which consumes up to 30 gallons of water per minute. When implementing overhead irrigation, 60% of water is wasted. Drip irrigation doesn’t waste water, because it targets plant roots directly.

The question to be answered is whether drip irrigation offers advantages over conventional irrigation systems in diverse agriculture environments. Conventional irrigation refers to the sprinkler delivery system and flood irrigation, whereas conservative irrigation refers to more sustainable methods such as drip irrigation. The experiment to be tested will compare the water usages of conventional irrigation and drip irrigation by setting up multiple plots in one farmland, which differ only in the irrigation method. Therefore, by testing each agricultural methods effect on crops in a farmland and quantifying the difference in water usage between conventional irrigation and drip irrigation, we can test our hypothesis that drip irrigation uses significantly less water compared to overhead and flood irrigation while allowing for equally successful crop growth and yield.

If drip irrigation is proven to use less water than current agricultural irrigation methods, then implementing it in farms across the globe will slow the depletion of Earth’s fresh water supply. Water currently being allocated to agriculture can be repurposed in society, and this will benefit our society and ecosystems because wildlife also depends on freshwater to survive.
Climate change is threatening the future and safety of our Earth. It is imperative that more sustainable practices be implemented in every industry - especially agriculture. Agriculture is a major contributor to greenhouse gas and CO2 emissions annually. Accumulations of atmospheric greenhouse gases have doubled in the past fifty years, and is expected to increase by 30% in the year 2050. The radical increase of CO2 and greenhouse gas emissions can be reversed with widespread implementation of carbon farming. Carbon farming is a technique that halts climate change while improving modern agricultural practices. It removes gaseous carbon from the atmosphere and reintroduces it to the soil, as well as reduce gas emissions from livestock, soil, and vegetation. Carbon can be reintroduced into the ground through soil enrichment with cover crops. Cover crops are planted to improve the fertility and quality of soil while enhancing water availability. Carbon is a necessity, producing higher yields of crops and promoting the structure, biological and physical health of soil. However, carbon is harmful when too much is released in the atmosphere as carbon dioxide, trapping heat in Earth’s upper troposphere. To examine cover crops’ ability to reduce gaseous emissions and enhance soil nutrients, we will setup farms utilizing different families of cover crops, comparing the results to those that practice monoculture over three growing seasons.
Composting and CO2: Breaking Down the Impacts

As climate change continues to become more problematic worldwide, composting can be a sustainable way to create healthier soil and decrease the amount of CO2, methane, and NO2 in the atmosphere. Composting is the process of breaking down organic matter under controlled aerobic conditions. In other words, air-loving bacteria break down organic matter and create enriched soil. Composting is also a sustainable way to dispose of waste, and it has many benefits for our planet. One such benefit is that composting sequesters (draw in) carbon dioxide from the atmosphere and moves it into the soil which then promotes healthy plant growth. Composting can increase soil quality and agricultural yields while sequestering CO2 into the soil from the atmosphere. Composting also reduces emissions by diverting food waste from landfills to agricultural fields where less methane is released during breakdown. Our group asks how composting impacts the global levels of atmospheric carbon dioxide.

Hypothesis: If a layer of compost is used during crop production, then more CO2 will be sequestered into the soil from the atmosphere.

Improving Hemp Biomass and Yield through Increased Carbon Sequestration Using Arbuscular Mycorrhizae

With the increase in cannabis legalization across the country, hemp, a Cannabis sativa variety with multiple industrial uses, has become a crop of interest for many farmers. This has begun a search for methods to effectively increase crop biomass and yield, as well as providing more...
literature into hemp cultivation. Arbuscular mycorrhizal fungi (AMF) has shown promise in arabica coffee, corn, and palmarosa (Diniz et. al, Pankaj et. al). However, despite the publication of studies showing the efficacy of hemp for bioremediation of heavy metal residues (Citterio et. al), there have not yet been studies on the effects of AMF on hemp for crop improvement. Anecdotal reports of improved hemp yield in underground indoor growing operations implicate hemp as an appropriate model organism for AMF soil inoculation in an indoor research setting. We will cultivate two parallel crops of hemp from clones of the same parent plant in a standardized sterile soil substrate. The soil matrix of one crop will be inoculated with the spores of Glomus species AMF. The soil matrix of the other crop will be left uninoculated as a control. Measurements of hemp dry weight, root and stalk length, will be compared. In the event that inoculation with Glomus species has improved crop success, we would expect an increase in dry weight, yield, and taproot and shoot length at harvest. This would be beneficial as AMF decreases need for fertilizer, thus mitigating unsustainable fertilizer use.

8:30-9:15    Board 45
Molly Louise O'Donnell
Rachel Quang Dao
Vincent Frano
Nicholas M. Hayden
Mathew R. Miller
Justyne Pennacchio
Edward Weijie Ye
Elsa Petit (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Mangrove Silvoaquaculture: A Way to Mitigate Climate Change through Blue Carbon

Silvoaquaculture integrates carbon sequestering marine plants into aquaculture production and could help mitigate climate change and coastal ecosystem damage, while helping economies by reducing agricultural yield losses due to disease among sea livestock. Traditional methods of aquaculture are efficient at producing large yields of shrimp but reduce biodiversity and destroy mangroves. Shrimp farming in particular is responsible for 52% of mangrove deforestation worldwide with 2% of global mangrove forests being lost annually. Globally, mangroves store 6.5 billion tonnes of carbon (16% of the total carbon emissions from 2018) making them one of the best blue carbon sequesters among marine and terrestrial ecosystems. Silvoaquaculture allows for both ocean carbon sequestration (or blue carbon) and productive farming of sea vegetables, fish, shrimp, and shellfish. Small scale silvoaquaculture has been seen to increase biodiversity, and increase the amount of blue carbon sequestered when compared to large scale traditional aquaculture. Silvoaquaculture may reduce shrimpers’ short-term yields, but integrated mangrove-shrimp aquaculture requires low investment, decreases disease pressure, and improves the environment and biodiversification. Little is known about the viability of silvoaquaculture on a large scale but by increasing the efficiency of carbon sequestration, we propose similar economical results will be obtained while mitigating the effects of atmospheric CO2. We will analyze the productivity and losses of current aquaculture systems and compare them to those of silvoaquaculture systems on larger scales. This will involve measuring total carbon sequestered by each system along with total agricultural yields.
Permaculture and Industrial Agriculture: Water Use Efficiency

Agriculture, directly or indirectly, produces nearly half of all greenhouse gas emissions and uses 85% of all freshwater. Much of the crop yield increases obtained during the green revolution may be attributed to increases in water usage. Many of the “miracle” plant varieties used in industrial agriculture are those that are particularly responsive to irrigation water and synthetic fertilizers. Much of the increased weight in crop yields is actually due to greater water uptake caused by metabolic changes associated with synthetic fertilizers. For example, some high-yielding varieties of wheat produce 40% more grain, but require three times more water. (Hathaway 2016) Permaculture offers an alternative to the current industrial agricultural systems and the saving of water will be beneficial to all the living beings.

Currently, water use efficiency is well documented for crops in industrial agriculture but permaculture is not well researched. We will analyze water use efficiency (WUE) of squash, beans and corn in permaculture and industrial agriculture. We will compare the water use (liters) to the yield (kg) to quantify the WUE in these two systems.

We will measure success by a reduction in water consumption when compared to yield. Our prediction is that we will see higher WUE with permaculture.

Ruminating about Ruminant Flatulence

Ruminants make up a large proportion of livestock in agriculture and are responsible for 28% of methane emissions worldwide. The rumen region of ruminant’s digestive tracts contains bacteria that produce methane gas through metabolic processes. Seaweed based antimechanogenesis limits ruminant methane production, reducing agricultural livestock’s
contribution to greenhouse gas concentrations. Asparagopsis taxiformis and Gigartina sp. are two seaweed species that are known to have antimethanogenic effects, but it is not known which species is most effective in vitro.

We plan on using an artificial rumen in vitro to measure the total gas production from the digestion of a control diet of Flinder’s grass hay and two experimental groups containing varying percentages of Asparagopsis taxiformis and Gigartina sp. respectively to determine which antimethanogenic seaweed species is the most effective. More research can then be done in vivo to confirm the antimethanogenic effects of the seaweed to confirm it as a viable option. Furthermore, once we know the best seaweed species for reducing methane emissions additional research can be done to investigate its nutritional, economic, and environmental value. This collective information can better direct future aquacultural explorations of both developed and developing nations alike.

8:30-9:15 Board 48
William Jacob Gallagher
Anna Aristarkhova
Xinming Chen
Jade Kathryn Doan
Elsa Petit (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Silvopasture: A New Wave of Modern Animal Husbandry

With the rising prevalence of climate change and global warming, it is critical that effective methods of removing greenhouse gases from the atmosphere are developed. A new integrated method of farming known as Silvopasture can help lessen these effects by addressing problems with conventional grazing. Silvopasture combines livestock, forages and trees on one plot of land. Most of the greenhouse gases present in our atmosphere are carbon based, so the presence of carbon sinks like trees is essential to reducing the impact of climate change. In addition to the effects Silvopasture can have on climate change, there are many other economic and environmental benefits as well. The presence of trees can increase soil fertility by retaining water and recycling organic matter. Trees can also improve livestock conditions by providing shelter from harsh weather conditions. Farmers gain additional revenue as they now have animals, trees and multiple types of forages as additional revenue streams. By utilizing Silvopastures we can not only increase the aesthetic value of grazing fields but also improve cow health, resulting in greater yield of milk and meat. However, there is little field research comparing the effects of Silvopastures on carbon dioxide levels, especially the impact of livestock. Beginning with a plain grazing field with only cows, we will increase the ratio of trees and forage crops in different plots and compare the carbon dioxide and methane emission levels between these different pastures to try and find the best ratio to produce the lowest emissions.
8:30-9:15  Board 49
Ernest A. Carabillo
Skyler McKensie Hall
Elsa Petit (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Strategies for Canopy Management for Optimal Juice Quality

Facing unpredictable climate changes, maintaining sustainable agriculture depends on the availability of genetically diverse cultivars. The traditional European grapes (e.g. Pinot Noir) are cultivars of a single species. In contrast, emerging grape cultivars (European-American hybrids) take advantage of the tremendous genetic diversity of the native American grape species (about 30 species). In the traditional European grape varieties, shoot and fruit thinning is known to influence fruit juice quality (ripening time, sugar, acidity) and help reduce pesticide usage. Little is known regarding these effects on emerging European-American grape hybrids. Our multiyear project started in 2015, quantifies the effect of thinning practices and their cost on these emerging hybrids. In this research, we ask the following questions: (1) What is the effect of shoot and/or cluster thinning on grape quality? (2) How does it vary across grape varieties and years? (3) How does it compare between table and wine grapes? (4) How much is gained in terms of disease control and quality and does it outweigh the labor cost of thinning?

8:30-9:15  Board 50
Alexandra Zink
Elsa Petit (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Wild Grapes of the Northeast Herbarium Study

As we face increasingly uncertain climate conditions, the threat of species extinction becomes more of a reality. As temperature, precipitation, and carbon dioxide levels change, many plant species may have to adjust in ways such as shifting their spatial distribution or changing the timing of phenological events like bud break or fruiting, otherwise they may face extinction. My project uses the grape (Vitis sp.) as a model system to study these effects. The traditional European grapes (e.g. Pinot Noir, Cabernet Sauvignon) are cultivars of a single species, Vitis vinifera. We are located on the Northeast coast of the United States, one of the major centers of diversity for grapes (estimated at 30 species versus 60 species in the world), making this region an important source of Vitis germplasm for viticulture. In the face of climate and anthropogenic change, however, the climatically suitable habitat of these species is expected to greatly decrease or even disappear. For this reason, it is important to understand how the diverse Vitis species of this area respond to the ongoing changes in climate, and because grapes from North America have only recently been domesticated, around 200 years ago, the wild counterpart of the cultivated grapes are not expected to behave significantly different from the cultivated plants. My project will use herbarium specimen and data to explore the diversity and distribution of grape species in the Northeast United States as well as how the flowering time of Vitis has been affected by climate change.
4:45-5:30    Board 1
Liz StPierre
Sarah Bryn Berquist (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
The Effects of Globalization on Traditional Foods

Around the world, culinary traditions are being lost due to the globalization of the food market, which is homogenizing a formerly diverse cuisine. While it may seem like the global market would allow culinary traditions to thrive, instead, cuisines are being simplified as the industrial food system spreads further around the globe. Like the rapid loss of languages worldwide, the loss of local cuisines can be addressed with awareness and education. Food is slowly becoming homogenized as knowledge is lost, generations are passed, and the capitalist global economy thrives. Research will be done by comparing historical culinary practices to food consumed today and analyzing the effect that globalization has on food authenticity. The research will investigate non-profit organizations aimed at preserving culinary heritage and the reasons that globalized food is replacing local cuisines. One of the main reasons for homogenization of food is the spread of unregulated capitalism in which only the cheapest and most profitable items are produced and sold, thus eliminating diverse indigenous and more authentic ingredients. Capitalism also allows the proliferation of homogenized American fast-food across the globe. In addition, cultural whitewashing takes places when people open restaurants of ethnicities other than their own simply to turn a profit rather than to provide authentic cuisine. Diversity within food around the globe is something to be cherished and passed down, so preservation of culinary tradition should be prioritized. This project will increase awareness of this problem and provide education regarding both the impact of globalization and potential solutions.

4:45-5:30    Board 18
Hannah Elizabeth Bedard
Cassandra Uricchio (Faculty Sponsor)
Department of Veterinary Science, UMass Amherst
Intake Rate of Heated and Unheated Water in Horses

Winter can be one of the hardest seasons for farmers and for people in the equine industry. Below freezing temperatures create the problem of water buckets icing up and horses not wanting to drink. Equine professionals understand the importance for horses to drink the required amount of 5 to 10 gallons of water a day. The purpose of this study is to determine the intake rate of water between an unheated 5-gallon bucket and a heated 5-gallon bucket. Eight horses were given one bucket of water that is heated, along with an unheated water bucket. Data was collected from 2 horses each night for a total of 4 nights. The buckets were 5 gallons and weighed 40 pounds filled. The horses’ water intake was measured overnight, within the hours of 9pm-7am. The water was measured by weighing it before it is offered to the horse and then it was measured at the ending time of 7am. The data was statistically analyzed, and it was found that the group of 8 horses drank a greater percentage of the heated water than the unheated water. Helping horse owners find a way of getting the horse to drink more water during the winter is important to prevent impaction or dehydration colic.
4:45-5:30  Board 2
Kate Margaret Brodsky
Sarah Bryn Berquist (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Planning for Self-Sufficient Agricultural Recovery after Natural Disasters

The Food and Agriculture Organization of the United Nations states that on average, damage to agricultural infrastructure accounts for 22 percent of all losses from natural disasters. If agriculture is not rebuilt sustainably and effectively after natural disaster, the result can be economically and environmentally devastating, and potentially even result in further loss of life. This study will examine major disasters in the last 10 years such as the Port-au-Prince earthquake and the Eyjafjallajökull eruption of 2010, and the Tōhoku earthquake and tsunami of 2011, and their subsequent impact on farmers and local food systems. Through conducting case studies examining past natural disasters, this study will identify the impact of natural disasters on agricultural infrastructure in different contexts and create theoretical plans for rebuilding local food systems more sustainably and preventing future loss of resources and life.

4:45-5:30  Board 3
Jenna Carellini
Sarah Bryn Berquist (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Grow Where You’re Planted: A Story of Increasing Food Awareness

Human nutrition and agriculture both have one thing in common: food. However, in academia, the two primary activities of teaching and research, do not always work together to explore complex areas of study. Nevertheless, both can contribute to increased awareness of where one’s food comes from and enhance one’s ability to make conscious and sustainable food choices. This project examines the benefits of increasing awareness of food in children and families in the local community with respect to confidence, sense of community and personal wellbeing through educational interventions. An additional purpose of this project is to increase engagement between the areas of nutritional and agricultural studies not only at UMass, but also within research and teaching nationwide. These benefits will be examined through academic research, feedback from hands-on educational learning, and personal experience in nutrition and agricultural studies. The research for this project comes primarily from a community-based service learning project implemented at Crocker Farm Elementary in Amherst, MA and was done in conjunction with Stockbridge School of Agriculture, the Department of Nutritional Sciences, and the Commonwealth Honors College at UMass Amherst. Agricultural and nutritional based education in children and families will not only increase awareness of food and food sources, but also increase the willingness in these groups to expand their knowledge, confidence and sense of community.
4:45-5:30  Board 37
Merav Dale
John M. Gerber (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Training Teachers to Bring Their Classrooms Outside: A Manual for Early-Elementary Educators

According to a study done by the World Health Organization of Europe in 2014, people spend an average of 90% of their time indoors. However, there have been many studies done that prove outdoor learning reduces stress levels, helps students with ADHD, improves academic achievement, and even strongly supports emotional and social development of students. This project focuses on students in younger elementary schools and explores how teachers might go about bringing classrooms outdoors to optimize learning. A training manual will be compiled based upon; 1) personal experience and observations from the Amherst School system, 2) academic literature, and 3) interviews with teachers. The manual will include sample activities for students and instructions on ways to adjust curriculum based upon the learning styles of students. It will also consider state curricular standards and provide instructions on how to integrate these requirements into lessons. Lastly, the manual will provide suggestions on how teachers might respond effectively to possible negative backlash from the school or district administrators. Upon completion, the manual will serve as a model for other school systems that are attempting to integrate garden programs into their schools.

4:45-5:30  Board 38
Hannah Elizabeth Farnham
John M. Gerber (Faculty Sponsor)
Stockbridge School of Agriculture, UMass Amherst
Can Genetic Engineering Contribute to Sustainable Agricultural Production?

This research project explores the viability of genetic engineering in sustainable farming systems. Genetically modified organisms (GMOs) are living organisms whose genetic matter has been synthetically altered through genetic engineering in a laboratory. From a societal standpoint, genetic engineering is sometimes viewed as problematic because of the limited regulations on large corporations creating these modified organisms for large-scale conventional farming, and potentially unethical because of the practice of sharing genetic materials among different species. If the distribution of knowledge and power surrounding GMOs was more transparent, genetic engineering could possibly contribute to the effective management of pests and disease, food waste, land and water use, soil health, reduction of pesticides and herbicides, and other practices in sustainable food production. Looking at these questions from multiple viewpoints, this research examines whether or not GMOs can be used to effectively contribute to a more sustainable farming system that is able to feed the growing human population while addressing societal objections.
Efficient management of freshwater resources is a concern for any agricultural operation, especially in an era characterized by unpredictable weather fluctuations. Through mindful ecological design, farmers can harness the power of water flowing through the land while reducing water loss, topsoil runoff, and the need for supplemental irrigation. This project focuses on soil management and production practices that work with the natural flow of water through land, highlighting regenerative techniques that foster resilience for farms in the face of climate change. Such practices are already employed across New England but are not widely adopted. This project aims to explore and consolidate regional knowledge through farmer interviews and case studies to create a comprehensive design guide for local farmers to consult when planning production for the upcoming season and beyond. An emphasis is placed on emergent patterns of design that have potential for broad scale application. The ultimate goal is to encourage the design of farm systems that operate with minimal stress during both wet seasons and drought.

Living during a period of human-caused climate change necessitates an immediate and radical response to preserve a livable planet for future generations. Small-scale gardens serve as important educational spaces to catalyze the transition into sustainable lifestyles. Gardens are useful as spaces for education in formal and non-formal contexts, thus reaching a diverse audience. This diversity is needed to affect the wide-scale cultural change required to effectively respond to the current climate crisis. Several pedagogical theories will be explored that enhance the utility of gardens in schools and advance the cultural transition towards sustainable living.

Research will include autoethnographic reflection and interviews with school garden participants in conjunction with academic publications and case studies on formal and non-formal garden education. Data will be gathered to explore (1) key themes across personal experiences in educational garden contexts and (2) self-reported changes in lifestyle following experiences with garden-based education. Research will be used to corroborate key findings from the interviews with wider social, cultural, and educational trends. The anticipated results will indicate that garden-based education is a critical strategy for climate change adaptation. In conclusion, given the extremity of our current global environmental situation creative and innovative solutions are needed to aid the rapid transition into a sustainable lifestyle for future generations. Garden-based education has an important role to play in this transition given its wide audience and highly affective learning outcomes.
Improving honeybee health is paramount to global food security because honeybees pollinate over two thirds of the plants that contribute to the human food supply. Sustainable beekeeping in New England involves research and cooperation to implement sustainable strategies for improving honeybee health. Strategies include mite control, improvement of genetic stock, queen rearing, overwintering, and overall hive survival. This can be achieved by educating beekeepers and the public about the latest IPM (integrated pest management) methods and how to make genetic improvements to rear better queens. Queen rearing is crucial to make genetic improvements because colony genetics are stored within the queen. Improving the genetic vitality of honey bees will help with control of varroa mites, reduce overwintering losses, and will make the honeybees healthier overall. Varroa mites are honeybee pests that vector many honeybee diseases which stress honeybee colonies to the point of collapse and death. Methods used to gather research will be interviews with beekeepers who are successfully improving honeybee health using sustainable methods. Results of the interviews will be shared to help educate beekeepers throughout New England. Improving honeybee health through sustainable methods will lead to more bountiful yields, enhance environmental quality and increase food security.

The purpose of this project is to explore the potential for food forests in public spaces as community hubs, educational spaces and food access points. This research will include an in-depth case study of existing food forests in the United States, and an examination of how they affect surrounding communities particularly with respect to community vitality and food access. The project will include a design for a proposed food forest in a public space in Springfield, MA. Many of the residents of Springfield face food insecurity due to low income, and limited employment opportunities and access to education. Establishment of a publicly accessible food forest will work to meet the needs of those living in Springfield, by providing nutritious locally grown produce to community members while offering practical education and enhancing community vitality. Research will be conducted through scholarly sources as well as interviews with Springfield community members and appropriate agencies. This work will highlight the intersection between public space in community and food forest design, and demonstrate how this unique partnership can affect those who face food insecurity. Public spaces must be better utilized to serve the needs of people within surrounding communities, and for this, public food forests may offer a revolutionary option.
Urban farming and community gardens can greatly improve local economies, build community, and provide fresh, local food, especially in low-income and inner city areas. It is important to study these potential effects and learn how urban farms can be established to help in the growth of struggling local economies. In order to conduct this research, several low-income inner city communities were examined. Each of these communities have urban farms or gardens integrated into the city landscape. Overall, the implementation of farms and gardens both for food and aesthetics have been shown to spur growth and sustainability in struggling urban economies. Not only do these green spaces provide platforms for small businesses and growth of high quality jobs, but they also improve education, healthy diets, and food access for city dwellers. Furthermore, urban farms and community gardens can aid in reducing the large carbon footprint of urban life by providing a local food source and thus reducing fossil fuel used for transportation. Urban farming can be an integral part of strengthening communities by creating a center for healthy food and economic growth.

Farming is a practice that can support and heal people who have been neglected or marginalized by mainstream society. Therapeutic farming has been used to support people who are homeless, to help veterans return to a state of good mental health, and for many to create a life that exhibits human dignity. Members of society that have been cast out or excluded from opportunities may suffer from the adverse effects of the lack of basic needs and require a supportive environment that allows them to heal and integrate back into the world. To better understand how farming can be used as a means of healing, research into how working in agriculture affects the mind and body will be done. In addition, interviews will be conducted on existing farms which have the goal of healing marginalized individuals. The results of this project will illustrate how farming and a life which offers of structure and community can lead to better mental and physical health as well as bring a person back into the mainstream of society. The project will result in an outline of how a Therapeutic Farm might be managed. With Therapeutic Farming, those formerly marginalized by society will experience a restoration of personal dignity, better mental health, and find a place to live where they may contribute to their community while providing for their own basic needs.
New England agriculture depends on greenhouses to extend the growing season and expand the food supply. Conventional greenhouses rely heavily on non-renewable resources for their construction and functionality. In addition, these materials and practices produce large amounts of waste and pollutants that negatively impact the surrounding ecosystems. This is especially true of current heating, electric, and water systems. In an era where climate change is an immediate threat, it is imperative that these effects be negated by any and all means possible. This study investigates renewable, eco-friendly alternatives to the conventional materials and systems used in greenhouses without inhibiting their productivity. Interviews with greenhouse managers and experts as well as research from reliable text and online sources will be reviewed to gather relevant information and data on this topic. It is expected that this study will find that renewable, eco-friendly systems and materials can be used in the construction and development of new greenhouses that will not only mimic the functionality and yield of conventional greenhouses, but will also dramatically reduce their environmentally toxic outputs. Because of the increasing scale of the current agricultural industry, it is critical that changes be made to the existing systems to prevent further damage to the global ecosystem.

A future privately-owned farm property will host educational classes and consultations relating to regenerative agriculture, nutrition, and healing. The classes will promote food access, land stewardship, and personal sovereignty by providing education on growing a variety of food crops, managing animals, maintaining woodlots, and processing herbal medicines. Personal consultations for nutritional and holistic medicine advice will also be offered. Possessing practical survival and community-building skills is rare in the modern world. Through education and counseling, people will be equipped with knowledge that can be used to benefit the mental, physical, and spiritual health of the individual, the well-being of the family, and the greater community. Interviews with local farmers, agricultural educators, herbalists, and others will be conducted to garner a sense of real world-applications of the different directives at the core of the project’s mission. Also, case studies of past and current models that resemble certain projected aspects of the project will be examined. Finally, academic journals will be examined for relevant past research into, and literary resources on, the therapeutic potential of farm-based education. A model for a farm-based educational center and homestead property will be designed based on the findings of the proposed research initiatives. The homestead’s structured learning environment will provide therapeutic, lasting experiences to those who visit the property.
Amidst the shifts in the global environment due to climate change, humans have been forced to seek innovative ways to combat and remediate rising CO2 levels in the atmosphere. One common way of intentionally sequestering carbon is planting trees and other plants which establish themselves and pull CO2 from the atmosphere, storing it in the humus fraction of the soil. Conventional farming practices are detrimental to the accumulation of soil organic matter and its natural carbon sequestration properties. Forest gardening as an innovative agricultural practice holds the potential to nourish our land and environment while sequestering carbon and providing food for people. This practice requires minimal resources, and once a forest garden is established, can provide a favorable yield in comparison to its inputs. This study will examine the hypothesis that forest gardening is a more sustainable model of agricultural production and is more conscious of our environment than current conventional tillage systems. Findings will likely confirm the benefits of this holistic land use approach to be applied to agricultural systems across the globe. A real-life application of forest gardening will be shown to remediate climate change by lowering CO2 levels and regenerating topsoil, while simultaneously providing a diverse source of zone-pertinent sustainable food crops for people both locally and globally.

From breads to spices, and lotions to toothpaste, gluten can be found in almost everything we put into or onto our bodies! Today, nearly 18 million Americans are reportedly suffering from Celiac disease and other gluten-oriented sensitivities. Although gluten free (GF) products have become more popular, completely avoiding the culprit can be rather difficult for some. Both culinary and medicinal herbs are available as holistic approaches to aiding in both prevention and relief of these gluten triggered symptoms. For this project, research will be conducted by examining case studies and consulting with certified herbalists and holistic medicinal practitioners. Subsequent research will explore specific herbs and their properties to determine the healing benefits they can provide for Celiac patients and those with similar gluten intolerances. Individuals can use these natural remedies to alleviate pain and discomfort caused by the inevitable exposure to gluten in the modern world. Unveiling these results and creating a comprehensive guide will help improve the quality of life for individuals suffering from these conditions and their families or caregivers.
Worcester State University’s Visual & Performing Arts department and Josue Ramirez presents **Culture Shock Treatment**. A stand-up comedy performance by Worcester State University student Josue Ramirez that will focus on his upbringing as a minority in the United States and what it was like learning two languages. One major thing that we as humans use to identify ourselves is culture. Evidence of this can be seen in the many colorful flags that each nation on this planet waves. We take pride in where we come from and keep our traditions alive no matter where we go. However, due to the current political climate, there is an increasing intolerance in this country towards other cultures that are not white. Josue will be using humor to form a community and help people recognize the universality in all human experience, regardless of cultural background. This performance will be delivered using the skills he learned from the acting and theatre classes offered at Worcester State University. Skills such as body language, breathing, timing, and voice inflection will be used to deliver a funny, entertaining, and educational experience. It is his hope to turn this into an annual event at Worcester State University and bring in more comedians from different cultural backgrounds to share their experiences as well.

This research project explores the challenges of portraying Peter Pan: creating a unique portrayal of a well-known character, staying true to the source material, and playing a character that is much younger than I. I will present my research on various portrayals of Peter Pan, my work in rehearsals finding the character, and my research on historical examples of adults playing as children. I will explain how my research impacted the way I portray the character.

This research details moments of queer future-making in the devised physical theater project *Queer & Now: Sync or Swim*, a fusion of drag, lip syncing, choreography, and mythological imagery intended to create an evening of celebration and protest for the queer community.
community. This presentation begins with a discussion of two fundamental theories on contemporary understandings of queerness. The first is Jack Halberstam’s Gaga feminisms, explaining the dismantling and disintegration of our cultural understandings of gender, sexuality, family, and relationships in the 21st century as a result of major advancements in technology and interconnectedness. The second is José Esteban Muñoz’s idea of queer futures, which suggests that queerness is a futurity-bound phenomenon that is both created in and rejects the here and now. The ensemble of Queer & Now: Sync or Swim interacts with shifting cultural understandings of gender and identity through the use of drag, lip syncing, camp, and queer performance tactics in a live, public theatrical setting to provide new possibilities for a future queer world. The research was conducted through a rehearsal process, public performance, and documentation of Queer & Now: Sync or Swim. Subsequent interviews with cast, crew, and audience members were used to enrich understandings of archival footage. Queer & Now: Sync or Swim is a rich site of praxis; theories of queer world-making interact with the practice of live performance to enact these queer futures on stage. The possibilities of radical futures are instilled in the project's creators and spectators, essential to queer livelihood.

3:45-4:30 Board 16
Felipe Ferreira
Robert I. Carr (Faculty Sponsor)
Department of Communication, Fitchburg State University
Vulnerability in Theater

Putting oneself in a situation where they are vulnerable is never easy, which is why most people naturally avoid it. In theatre, the actor is very familiar with this feeling of vulnerability and, being involved in theatre myself, vulnerability is definitely a key component in really putting on an truthful performance.

The truth of ourselves is the root of our acting. ~ Sanford Meisner

This concept is well known throughout the theatre and arts community in general, however, I think it is important educate people who are unaware of the power of vulnerability in theatre, and encourage them to take a risk and become involved.

For my research, I am looking into the relationship between vulnerability in actors and how that vulnerability can affect or influence them in any way. Furthermore, I am to host a round table group interview consisting of both actors, performing artist, as well as people not involved in the performing arts. This diversity will allow for an objective look into the topic, as well as a way to compare and contrast subjective experience. This experiment may communicate the satisfaction and growth involved with putting oneself out of their comfort zone, while also functioning as a way to encourage and blossom interest in people not involved in the performing arts.
Lilies of the genus *Lilium* are selectively toxic to cats, but not other animals, leading to death within hours to days of being consumed. Results from an *in vivo* study demonstrated that aqueous extracts from all parts of the Easter lily (flower, leaves, and stem) caused feline kidney disease. Damage to the kidney epithelial cells included pyknotic nuclei, swollen mitochondria, and lipid infiltration. The lack of Easter lily toxicity to dogs, mice, rats, and rabbits have led researchers to suggest that the toxic compound(s) are metabolites produced by felines, most likely in the liver. However, an *in vitro* study using the feline kidney epithelial cell line, CCL-94, reported toxicity of Easter lily extracts. These results indicate that, either feline-produced metabolites are not the toxic agent(s), or the toxic metabolites can also be produced within the kidney cells in culture. To further investigate the selective toxicity of lily extracts, we are comparing the responses of the feline kidney cell line, CCL-94, with that of a canine kidney cell line, CRL-2936. If the cell culture models represent the *in vivo* toxicity of cats and dogs, we expect to see toxicity only in the feline cell line. This result would validate the cell culture model and leave open the question of metabolism in feline kidney cells. In contrast, toxicity in both the feline and canine cell lines would call into question the usefulness of the cell culture models for studying the mechanism of lily toxicity in felines.

Yin Yang 1 (YY1) is a ubiquitously expressed zinc-finger transcription factor that participates in the regulation of an estimated 10 percent of all mammalian genes. YY1 is a member of the Poly-comb protein group which function as both positive and negative regulators of transcription, by binding directly to DNA, and has been implicated in critical biological processes such as embryogenesis, vascularization, and cell proliferation. Additionally, the close relationship between YY1 expression and the promotion of angiogenesis via modulation of VEGF protein and the regulation of triglyceride synthesis implicates this protein in the pathophysiology of cancer and fatty-liver disease, respectively. Given the various context specific roles of YY1, understanding YY1’s role in normal development is critical in defining the molecular requirements of the cell. Previous research has demonstrated that conditional knockouts of YY1 in both the visceral endoderm (VE) of the murine yolk-sac and endoderm derived liver show remarkably similar phenotypes. Taken together with research that
demonstrates functional and overlapping transcriptional profiles between the two tissues, these results argue that the yolk-sac may prove advantageous for studying YY1 regulatory patterns as a liver proxy. The aim of my research is to discover the direct gene targets of YY1 in both the VE and hepatic endoderm and demonstrate that YY1 similarly regulates key genes in both tissues.

Room 809 3:45-4:30 Panel 7
Shakirah N. Ssebyala
D. Joseph Jerry (Faculty Sponsor)
Department of Veterinary Science, UMass Amherst
Comparison of Mammary Tumor Cell Response to Estrogens and Xenoestrogens

Despite advancements in cancer therapy and treatment, breast cancer remains the second leading cause of cancer death in women in the United States. While multiple risk factors are associated with development of breast cancer, the most common involve estrogen-related pathways. Estrogen is essential for full development of the mammary epithelium, but exposure to increased levels of endogenous estrogen has been found to increase the risk of breast cancer. Environmental chemical compounds that exhibit estrogenic activity, known as xenoestrogens, may further escalate risk. Common xenoestrogens include benzophenones, parabens and phthalates. They have been detected at higher concentrations in women than men, especially benzophenone-3 (BP3) and propyl paraben (PP). These compounds could contribute to the increased estrogen-mediated risk for breast cancer. However, xenoestrogens may have different abilities of binding the two subtypes of estrogen receptors, and therefore, may increase or reduce tumorigenesis.

**Hypothesis:** Xenoestrogens (BP3, PP) can differentially initiate signaling through estrogen receptor subtypes (ERa and ERb) and alter mammary tumor progression.

**Objective:**

1. Compare the activity of xenoestrogens (BP3, PP) to 17beta-estradiol (E2) and selective estrogen receptor agonists (E2, PPT for ERa, DPN for ERb) in different mammary tumor cell lines.

2. Develop an E2-responsive mouse mammary tumor cell line.

3. Test effects of E2, BP3 and PP on growth of mammary tumor transplants in mice.

**Results:**

We demonstrate that BP3 and PP differ in their activities with ERa and ERb using reporter assays. The effects of expression of ERa on cells in vivo and growth as tumors in vivo is currently under investigation.
As the field of epigenetics rapidly expands, more and more novel imprinted genes—genes that are expressed monoallelically in a parent of origin manner—are being discovered. New techniques used to search for imprinted genes have expanded upon the previous approximately 100 gene strong list. Furthermore, recent findings have demonstrated just how dynamic genomic imprinting can be. Certain genes’ imprinted status can change from tissue to tissue, as well as temporally, at different stages of development. Using a bioinformatic pipeline on RNA sequencing data of the mouse testes, I created a list of novel imprinted gene candidates in this tissue. From this list, a particular gene of interest epitomized the dynamics of imprinted genes: *Atp6ap1l*. It was found that not only is this gene imprinted exclusively in the testes, but additionally was only imprinted at specific regions of the gene. I plan on exploring the epigenetic regulatory factors that are controlling such imprinting expression through looking at DNA methylation patterns as well as histone modification. Through studying the regulation of non-canonical imprinted genes like *Atp6ap1l*, important insights about imprinted genes can be gained. Such insights can be applied to the bigger picture of understanding diseases that are a direct result of the dysregulation of imprinted genes.
WOMEN'S STUDIES

Room 174  11:45-12:30  Panel 3
Leeanne McHugh
Shane Jun
Shilpa ThirukkovaIur
Chris Bobel (Faculty Sponsor)
Department of Women, Gender, and Sexuality Studies, UMass Boston
From Tragedy to Activism: Exploring Public Grieving and Resistance to Closure in the Aftermath of Trauma

Inspired by Ann Cvetovich (2003) who demonstrates how communities work to publically process trauma and Deborah Gould’s (2009) articulation of the place of emotions in shaping activism, this project interrogates the lived experiences of survivors who channel trauma into action. In the aftermath of the police murder of (brown and black) people, school shootings and other avoidable tragedies, survivors and loved ones are often thrust into the role of the activist. Whether establishing foundations and NGOs that variously engage legislative reform, mounting awareness campaigns or organizing protests, they produce what Cvetovich (2003) calls “trauma cultures” that form in and around trauma. This paper draws on textual analysis of the websites, social media engagements, press appearances and public addresses associated with 15 organizations founded by trauma survivors to reveal the complexities and contradictions embedded in their actions. While they report that their work affirms the value of human life and agitates for social change, they also subtly express a deeper and more personal need to make space for a culturally –acceptable form of public grieving that resists the rush to ‘closure’. Their activism, then, resists the counterproductive discursive politics of mourning (Berns 2011) that thwarts both individual and collective reckoning with trauma and the conditions that give rise to it.

Room 808  11:45-12:30  Panel 3
Veronica M. Santos Puim
Abigail Dickson
Shoshanna Ehrlich (Faculty Sponsor)
Department of Women, Gender, and Sexuality Studies, UMass Boston
Forced Marriage in the US: Legal Limitations and the Long-Lasting Effects on Teenage Girls

Forced marriage has typically been understood as an international human rights issue associated with certain countries, cultures, and religions and has largely been considered irrelevant in the United States. However, in the past few years forced marriage has been gaining recognition as a pressing issue in the United States requiring urgent consideration. This paper will explore this emerging issue, with a specific focus on teenage girls who are particularly vulnerable to being forced into marriage due to their age and gender.

In an attempt to better understand the issue of forced marriage in this country, this paper will engage in a comparative analysis of legislation that states have enacted or are considering enacting in order curb this practice and protect teen victims. To be considered are: upward
revisions to marital age laws; the expansion of abuse prevention laws to capture forced marriage as a form of violence; reconsideration of statutory rape laws; and expanded definitions of parental abuse and neglect to address this issue. The potential strengths and weaknesses of these various interventions will also be explored.

In addition to reviewing relevant legislation, this paper will also provide a review of the emerging body of research that exists on forced marriage in the United States. In particular, it will focus on the gravity of this issue and the heavy burden that being forced into marriage places on teen girls.

In conclusion, the paper will identify gaps in the existing literature, and suggest directions for future research, and provide a set of policy recommendations.

1:30-2:15 Board 100
Serena Ivy Smith
Linda McCarthy (Faculty Sponsor)
Department of Sociology, Greenfield Community College
Prostitution: Benefits and Implications of Legalization and Criminalization

Prostitution as it stands today is dangerous and unhealthy for everyone involved. This presentation will examine five different models of legal and illegal prostitution across the world. Full criminalization includes incarceration for all parties. With partial criminalization, buying and selling sex is legal, though involving third parties is illegal. Legalization includes a legal platform of sex work in exclusively regulated brothels. The Swedish and Nordic model makes it solely legal to sell and illegal to purchase. Lastly, decriminalization is the removal of laws punitively targeting the sex industry and treats the workers as any other type of labor. This presentation will also break down the implication of illegal prostitution for the lives of the women involved. Based on current economic, criminal justice, and social science research, legalized sex work decreases sex-trafficking, rape, disease transmission, and increases workplace safety, employee income, and local tax revenue. This presentation will discuss possibilities for how sex work could be regulated, and the next steps toward full legalization in the United States.

2:45-3:30 Board 49
Summer Elise Heath
Anna Klobucka (Faculty Sponsor)
Department of Women, Gender, and Sexuality Studies, UMass Dartmouth
From Judy Chicago to Tracey Rose: Intersectionality of Race and Gender in Feminist Art

This paper will examine the intersection of race and gender as pivotal forms of identity in the context of feminist art. I will confront the classic artwork of second-wave feminism, Judy Chicago’s *The Dinner Party* (1974-79), with work by contemporary South African artist Tracey Rose from a theoretical perspective informed by Kimberlé Crenshaw’s (1991) concept of representational intersectionality. I will draw on the Black feminist critiques of Chicago’s artwork.
in order to provide the foundation for the examination of Rose’s intersectional approach in her self-representation of the sexualized Black female body. This reading expands the original framework of these critiques by building on cross-cultural and post-colonial directions in feminist thought. The pioneering contribution of Lorraine O’Grady in “Olympia’s Maid: Reclaiming Black Female Subjectivity” (1992) will lay the groundwork for the cross-cultural examination of the work by Rose against the background of colonialist ideology of representation and post-colonial reclamation of Black female subjectivity and bodily autonomy. I will look in particular at Rose’s uses of nudity in works such as Span II (1997) and Ciao Bella (2001), among others, which dialogue with the history of Western representations of racialized naked bodies. By analyzing these works, I aim to deconstruct the established understanding of white subjecthood as the center of Western art and expose the historical prejudices, which resulted in the complete erasure of black female agency.