18th Annual Student Research & Community Engagement Symposium 2015
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Research on students with disabilities enrolled in post-secondary education is, to a large extent, based on the National Longitudinal Transition Study-2 (NLTS-2). This study, which began in the year 2,000, evaluated outcomes and experiences of 11,000 secondary students enrolled in special education programs (i.e., on an Individualized Education Plan or IEP) over a 10-year period. It does not include any students who did not declare a disability until they were in college. The purpose of the present study was to explore developmental pathways of students with disabilities at the University of Massachusetts Lowell. UML students registered with Student Disability Services (SDS) were split into two equal comparison groups: those who did have a history of receiving special education services before college enrollment, and those who did not. These two groups differed in timing of registration with SDS and disability type. Students without a history of special education services were significantly more likely to wait until after their first semester to register with SDS than those with a history of receiving services. Mental health problems and physical disabilities were significantly more prevalent among those without an IEP history; learning disabilities were more prevalent in those previously on an IEP; and Attention Deficit Disorder was equally represented across both groups. These developmental pathways may be important for understanding student challenges, improving SDS's outreach, and elevating student success.

Marcouillier, C., Rosales, R.

Research on students with disabilities enrolled in post-secondary education is, to a large extent, based on the National Longitudinal Transition Study-2 (NLTS-2). This study, which began in the year 2,000, evaluated outcomes and experiences of 11,000 secondary students enrolled in special education programs (i.e., on an Individualized Education Plan or IEP) over a 10-year period. It does not include any students who did not declare a disability until they were in college. The purpose of the present study was to explore developmental pathways of students with disabilities at the University of Massachusetts Lowell. UML students registered with Student Disability Services (SDS) were split into two equal comparison groups: those who did have a history of receiving special education services before college enrollment, and those who did not. These two groups differed in timing of registration with SDS and disability type. Students without a history of special education services were significantly more likely to wait until after their first semester to register with SDS than those with a history of receiving services. Mental health problems and physical disabilities were significantly more prevalent among those without an IEP history; learning disabilities were more prevalent in those previously on an IEP; and Attention Deficit Disorder was equally represented across both groups. These developmental pathways may be important for understanding student challenges, improving SDS's outreach, and elevating student success.

Marcouillier, C., Rosales, R.

A significant number of typically developing preschoolers that come from low-income families display high levels of challenging behavior (Qi & Kaiser, 2003). It is critical for programs that serve this population to implement evidence-based strategies that promote prosocial behavior. Preschool teachers report concern in managing challenging behavior in the classroom. However, fewer than 10% of preschoolers who show early signs of problem behavior receive services (Kazdin & Kendall, 1998). This suggests that teachers may not have the resources to implement evidence-based strategies. The purpose of this community engagement project was to provide support to teachers at a local preschool in dealing with challenging behaviors by implementing positive behavior support strategies. A graduate student provided assistance in a classroom of 17 typically-developing children by conducting observations to determine the function of specific challenging behaviors (e.g., non-compliance). A behavior management plan was then written and implemented by the graduate student. Subsequently, teachers were trained to continue implementation of the plan for long-term success. Future implications of this work include teachers' understanding of the functions of challenging behavior and the importance of reinforcing appropriate behavior.
Martocchio, N., Whitlow, H., Romero, C., Meotti, M., Rosales, R.

*Autism Studies*

**VIDEO MODELING TO TEACH IMPLEMENTATION OF THE PICTURE EXCHANGE COMMUNICATION SYSTEM**
(Advisor: Rocio Rosales)

The Picture Exchange Communication System (PECS) is an augmentative communication system frequently used with individuals with autism and related disabilities. PECS is comprised of multiple phases that must be taught sequentially according to a specific protocol in order for it to become a functional means of communication for the learner. There is a need to identify training methods that are time and cost efficient, and are effective in teaching individuals to implement PECS with high levels of treatment integrity. The purpose of the present study was to evaluate the use of video modeling to teach university students to implement the first four phases of PECS. Three undergraduate students who expressed interest in working with populations who may benefit from PECS participated in the study. Participants viewed video modules that depicted the target skill with a voice over explanation of each step in the protocol. Training for Phases 1-4 was conducted sequentially until participants achieved a predetermined mastery criterion of 90% correct responding for each phase. Preliminary results indicate video modeling may be an effective method of teaching implementation of PECS to university students. Discussion will focus on limitations and implications of these results.

Thanopoulos, K., Serna, R., Boudreau, R., DaSilva, N., Gillespie, J., Livorsi, A., Pereira, T., Rogers, J., Vermot-Gaud, A.

*Autism Studies*

**ENHANCING STIMULUS EQUIVALENCE OUTCOMES**
(Advisor: Richard Serna)

Stimulus equivalence is a behavioral phenomenon that relates to teaching concepts and symbolic meaning. The conditions under which stimulus equivalence relations emerge have important methodological implications for how to better train symbolic meaning among individuals with intellectual disabilities. The present study asked whether certain training and testing protocols result in a higher yield of emergent stimulus equivalence relations. The experiment was conducted in a matching-to-sample format to evaluate how participants learn best to form a 5-member stimulus equivalence class. Four groups were trained and tested with different protocols. Group 1 received a standard equivalence protocol to train and test a 5-member stimulus equivalence class (ABXDE), where the X stimuli were familiar pictures and the remaining stimuli were nonsense forms. Group 2 received pre-training and testing on a 3-member equivalence class (CFG) before being trained and tested to form an unrelated 5-member equivalence class (ABXDE). Group 3 received conditional discrimination pre-training and testing (CF, KG) and then were trained and tested on a 5-member class (ABXDE). Group 4 received a standard equivalence protocol such as Group 1 to form a 5-member class (ABCDE), but with all nonsense forms. Group 2 showed the highest yield of emergent behavior; Group 4 showed the lowest. Groups 1 and 3 had intermediate yields. The results of the study suggest that conditional-discrimination pre-training is not sufficient to enhance equivalence-outcome yield. Rather, pre-training that includes the formation of equivalence classes has the largest effect on equivalence-class yield.

Veneziano, J., Arcus, D.

*Autism Studies*

**WHAT MAKES A GOOD INTERVIEWEE?**
(Advisor: Doreen Arcus)

One feature common in autism spectrum disorder (ASD) is that individuals with the condition tend to make less eye contact in conversation compared with non-autistic individuals (Spezio, Adolphs, Hurley,
Eye contact is considered to serve important social functions, such as regulating conversations, providing information, and impression formation (Ambady & Rosenthal, 1992; Carbone, O'Brien, Sweeney-Kerwin, & Albert, 2013; Kleinke, 1986). However, neurological studies have shown that direct eye contact may cause activation in emotion centers of the brain (Senju & Johnson, 2009; Dalton, et al., 2005), causing gaze aversion in individuals attempting to down-regulate their levels of emotional arousal. This may be the case in ASD. The goal of this study is to identify whether there is a middle ground, i.e., an approximation of direct eye contact that is socially more acceptable than total gaze aversion by comparing three levels of eye contact: direct, approximate, and completely off. Participants view nine simulated interviews of college students applying for a position in the summer community internship program. Level of eye contact is counterbalanced across stimuli and participants in this within subjects design. Participants rate each interviewee on traits such as likeability, confidence, social skills, and on the likelihood of success in obtaining the internship. Measures of gender, ethnic identity, and autistic traits are administered as potential covariates with eye contact. Results of the study may challenge the current practice in teaching eye contact to individuals with ASD and should inform more effective treatment protocols.

White, D.

*Autism Studies*

**COLLEGE STUDENTS’ ATTITUDES TOWARDS STUDENTS ON THE AUTISM SPECTRUM: A FIVE YEAR FOLLOW-UP**
(Advisors: Ashleigh Hillier & Alice Frye)

Autism spectrum disorder (ASD) refers to a class of neurological disorders that are developmental in nature and are characterized by social and communicative deficits, as well as patterns of rigid and repetitive behavior. ASD affects individuals throughout the lifespan. However, with the appropriate supports in place, many individuals with ASD are capable of academic success, including success at the university level. In recent years, the importance of acceptance from peers and integration into the university has been increasingly recognized as contributing factors to success for university students with ASD. The current study aims to evaluate UML student perceptions and attitudes towards students on the autism spectrum, as well as identify underlying factors that contribute to such attitudes. Attitudes towards and perceptions of ASD were measured among a group of UML undergraduate students in 2008; five years later, a follow up study was conducted in order to assess how attitudes toward university students with ASD may have changed. Data analysis is ongoing, however, it is expected that positive changes in student attitudes will be seen in the five-year follow up group, given increases in education about and acceptance of ASD and other disabilities. Increased insight might yield suggestions for strategies to improve peer acceptance and social integration of college students on the autistic spectrum, resulting in higher academic success and graduation rates for this population.

O'Connell, K., Amogawin, R., Probst, V.

*Criminal Justice*

**TYPOLOGIES OF TERRORIST INVOLVEMENT: THE USE OF INFORMANT-LED STING OPERATIONS IN COUNTER-TERRORISM**
(Advisor: Neil Shortland)

The Center for Terrorism and Security Studies (CTSS) conducts scientific research, education, and training to help understand and respond to the development, convergence and intricacy of domestic and foreign security challenges. One CTSS project aims to investigate typologies of terrorist involvement. Currently, terrorist involvement is perceived as binary (i.e., you are, or are not a terrorist), and there is a conspicuous absence of deeper appreciation of what involvement actually entails. In order to investigate this, an ongoing large open source data collection activity is being undertaken via the CTSS internship. CTSS interns have generated a database of United States based Jihadist terrorists by populating a 120
variable codebook that includes data points for an individual's demographics, background, involvement in terrorism, their roles within a terrorist network, arrest, court case, and sentencing. In this poster, we present data related to the use of informants in counter-terrorism operations. Specifically we focus on the arrest and conviction rates of counter-terrorism operations that use informant-led sting operations. We also focus on the attempted 2009 Bronx Bomb Plot to show the controversies surrounding the use of these tactics. Through developing data on cases of Jihadist related terrorism in the United States, this project will produce data that will facilitate the development of descriptive typologies of terrorist involvement as well as a range of participation based on behavioral qualities. The purpose of this research is to offer a structure for making more systematic discriminations between terrorist offenders that can inform future decisions about sentencing, management, and possible release of terrorist offenders.

Potts, M., Murphy, L., Nambu, C., Beckwith, A., Sexer, J.
Criminal Justice
TYPOLOGIES OF TERRORIST INVOLVEMENT: INVESTIGATING TERRORIST USES OF THE INTERNET
(Advisor: Neil Shortland)

The Center for Terrorism and Security Studies (CTSS) strives to address the complex challenges of domestic and foreign security through research, education, and training. This CTSS project seeks to develop typologies of terrorist actors in order to contribute to our understanding of the diversity of terrorist behavior and backgrounds. As part of this project, CTSS interns have collected data on 183 convicted Al Qaeda inspired terrorists in the U.S. This data is collected by using open source information including public court documents, and trusted media outlets that have researched and covered the events. Part of this research focuses on the use of the Internet by terrorists. In this poster we present data on the prevalence of terrorist activity on the Internet amongst United States based Jihadist terrorists. We also demonstrate 3 contemporary case studies to show the diversity of roles that the Internet can play in terrorist behavior. Specifically, we outline James Cromitie (an offline terrorist), Zachary Chesser (an online terrorist), and Colleen LaRose also known as "Jihad Jane" (a hybrid of offline and online terrorism). Overall, this project seeks to improve our understanding of the roles played by individuals within a terrorist cell. The knowledge gained through this project can therefore improve legal clarity in sentencing terrorist offenders as well as guide strategies for offender management post-release.

Weeks, E., Williams, L.
Criminal Justice
EMERGENT TRANSIENT ADULTS AND THE EFFECT OF PROSOCIAL BONDING ON INCARCERATION
(Advisor: Linda Williams)

Through the mixed method approach combining qualitative intensive interviews of 11 homeless, transient emergent adult males from the Boston, MA area and the addition of a quantitative data analysis of the National Youth in Transition Database of 3085 youth, it is revealed that these emerging adults are able to benefit from pro-social bonds of other adults besides their parents. The study adds to our knowledge of how the emergent adulthood developmental life period acts as a context for the offending of transient males who are in the process of transitioning to adulthood. After the adults lose their social capital as they age out of the foster care system, run away from home, or become homeless, they are less likely to commit crime when they have the social capital resources of other pro-social adults. Implications of the research include the need to focus on the group's unique educational, mentoring, and problem solving requirements while they are exploring new life options and gaining important life skills that will act as protective factors against offending.
**Byrne, A.**  
*Economics*  
**IMPLICATIONS OF THE DODD-FRANK ACT**  
(Advisor: Michael Carter)

A deeper look into the impact of the Dodd-Frank Act and the regulatory response to the "Too Big to Fail" moral hazard problem that is present within financial markets. I will be conducting research on the portions of the Dodd-Frank Act that attempt to deal with the issue of "Too Big to Fail" and the push back that came from the major money center banks. Another focus will be on the banks and their relationship to the relevant provisions within Dodd-Frank. The entirety of my study will focus on banking compliance with government regulations. The main focus will be on the Dodd-Frank Act and how this is a growth area for employment opportunities within banking management.

**Muise, D.**  
*Economics, Political Science*  
**DETERMINING THE ECONOMIC IMPACT OF IMMIGRATION ON NATIVES: DO STATE BOUNDARIES MATTER?**  
(Advisor: Gary Lyn)

In this presentation, I will directly compare contrasting tenets of the two main schools of thought in immigration economics. One side suggests that low-educated natives' wages become depressed nationwide in response to a low-educated immigrant influx anywhere in the US, while the other side suggests that immigration's wage-impact is moderated and localized by not flowing across state borders, and also by the skill dissimilarity of natives and immigrants. Here, I will recreate the skill-dissimilarity model through computer code, but will replace the "state" with experience-based employment groups. Using American decennial census data, the results of such a model can be differentiated against the localized state-dependent model's results. These differences will not only show a more accurate picture of the strength immigrants' economic impact, but will help determine the validity of constricting observation of immigrants' impact to individual American states.

**Bing, M.**  
*English*  
**FLYING ORB PRODUCTIONS: THEATER, FILM, DANCE AND MUSIC**  
(Advisor: Sue Kim)

Drawing on the magic and distinctive atmosphere of Southeast Asian folklore, Flying Orb Productions has delivered its twilight films and theater since 2005. I have been invited to work behind-the-scenes at Flying Orb Productions, located in a secret alley in downtown Lowell, for my Service-Learning Project in Asian-American Literature course. I had helped out with the Flying Orb Productions by giving them observation and feedback regarding their performances, and I was the camera assistant in filming their theater performance called Dark City. James Higgins, the founder of Flying Orb Productions, has been working with the Cambodian-American community in Lowell for over 30 years. His intention is to expose the untold stories from the dark history of Cambodia ever since the Khmer Rouge invasion in 1975-1979. Working with contemporary Cambodian-American staff members inside the production, they have shared their parents' and relatives' heartbreaking stories from the traumatic events of the Cambodian genocide. By incorporating historical events and the magical arts of Southeast Asian folklore in its cultural performances, Flying Orb Productions has been revealing the lost stories of Cambodia through short films and theater.
Cheney, V.
*English*

**CMAA SERVICE LEARNING PROJECT**
(Advisor: Sue Kim)

Within Lowell's Cambodian community, computer ownership is not as widespread as one might assume. Proportionally, Lowell has the highest percentage of Cambodian Americans in all of the United States. The 2010 Census states that Cambodian Americans make up at least 12.5% of the population in Lowell, putting them at roughly 13,000 people, though many more have since arrived and some remain uncounted. While many people own smartphones that function almost as well as personal computers, they cannot complete every task with a phone, such as the writing of resumes or accessing important forms. In addition, elderly community members may not have ever used a computer before and need assistance in learning how to use one. I became involved through the program from the Asian American Literature course and connecting to the CMAA with my professor Sue Kim. I was in charge of the initial set up of the layout of the lab within the CMAA, then the setup of the computers, installation of software required to run the lab effectively, and then finally supervising the lab and teaching students who arrived whatever it was that they wanted to learn to use the computer for.

Kiessling, M.
*English*

**SIMUL-ACTS: SCULPTING EMPATHY IN THE MEDICAL TRAINING ENVIRONMENT**
(Advisor: Dale Young)

The Emerging Scholars program at UML is sponsored by the Center for Women and Work in cooperation with the Dean's office, and pairs undergraduate students with faculty research partners for a year long collaboration. This project is co-authored by Dr. Dale J. Young of the UML Theatre Arts Program in the English Department. Standardized or simulated patients, which are actors portraying patients, have been used in the medical training environment for the past 50 years, but only recently have been used to help training nursing students. The UML Theatre Arts Program and the Nursing Program have partnered to create the simulated patient program, which uses student actors to portray simulated patients for the training of undergraduate nurses. In this program, student actors are given scenarios crafted by the nursing and theatre programs to portray a patient that a nurse might encounter, and using improvisatory technique, actors play the character in a five minute scenario with a nursing student. Then the nurses debrief with the nursing faculty and student actor, in a group discussion setting. Our project explores the unique collaboration between the nursing and theatre programs, the relationship between the actor's rehearsal process and the feedback loop, and the potential benefits for student actors from the simulated patient scenarios.

Schneider, D.
*English*

**LANGUAGE AS IDENTITY**
(Advisor: Sue Kim)

Communication is vital to identity. The languages humans understand and speak are both receptors and dispensers of information, demonstrating the ability to connect with other humans, assimilate into any given culture, and define who someone is, or who they aspire to be. As seen in much Southeast Asian literature, knowing a language acts as both a connector and a separator; the original known language connects to the past, and to others of like ethnicity, but not knowing a language can be a barrier to learning and to relationships in general. For Asian and Asian American students in the U.S., knowing English enhances the ability to operate in American culture, but most of these students also desire to retain their original language and sense of "Asian-ness." Learning English is vital for these non-native-
English speakers to achieve success in the college setting, but retaining their native language is necessary to maintain connections with their families, their heritage, and their Asian identity.

**Ramirez, K.**

*Global Studies*

**SUSTAINABILITY OF THE WIND TURBINE BLADE MANUFACTURING PROCESS: A BIO-BASED ALTERNATIVE**

(Advisor: David Turcotte)

To meet the increasing demand, not only are more blades being manufactured, but also longer blades of up to 100 meters long are being produced. The manufacturing process of wind turbine blades uses petroleum-based thermoset composites as the primary materials. The anticipated influx in disposal and manufacturing leads to environmental concerns as there is no practical way to recycle these blades. The main objective of this research is to assess the economic, health and environmental impacts of replacing petroleum-based epoxy resin with Epoxidized Linseed Oil (ELO) in the manufacturing process of the blades. This new bio-based epoxy system is thought to have similar toughness, stiffness, durability and costs compared with the conventional, petroleum-based system. Our approach for evaluation consists on a Life Cycle Cost Analysis to determine the least costly manufacturing process over the life cycle of blades. It also included a Toxic Use Reduction Analysis to assess the impact of changes toward less toxic chemicals. Preliminary findings suggest the bio-based system seems to be at least as competitive, economically, as the conventional petroleum-based system. It is also much safer and imposes less health and environmental impacts compared with the conventional. Preliminary findings also suggest that workforce education and training will not change significantly, with a possible positive impact of job creation in a new recycling industry. Overall, findings indicate that a bio-based system is a promising and more sustainable alternative to the current petroleum-based manufacturing process.

**Shea, M.**

*History*

**SAVING VENICE: A HISTORY OF SAVE VENICE, INC., 1966-2016**

(Advisor: Christopher Carlsmith)

A non-profit organization founded in 1971 in Boston by a group of scholars, Save Venice, Inc. was created to preserve art and architecture in Venice following the November 1966 floods in Italy. Since 1971, Save Venice has become the largest private organization working on historic preservation in Venice, raising over 20 million dollars to restore more than 400 works of art and architecture in Venice. Despite Save Venice's significant contributions to fundraising, educational awareness, and technical advances in restoration practices, there exists no comprehensive institutional history of the organization. The goal of our project is to provide a history that explores its origins, mission, achievements, failures, and members. To do so, archival documents in Boston, New York, and Wellesley College are being utilized, as well as documents donated by senior Save Venice members. Oral histories of Save Venice members will also be crucial to documenting the growth and challenges of this organization. Preliminary research suggests that the early years of the organization were dominated by the charismatic figures of John and Betty McAndrew of Wellesley College. Following John McAndrew's death in 1978, the organization languished, and then recovered under the leadership of Bob and Bea Guthrie in the 1990s. Two public and highly acrimonious disagreements among the membership of Save Venice Inc. tarnished its reputation in the late 1990s; since then it has recovered its focus and continued its fundraising and conservation advocacy.
Khuon, C.  
*Peace & Conflict Studies*  
**SOUTHEAST ASIAN AMERICANS IN COLLEGE AND CAREER READINESS**  
(Advisor: Sue Kim)

My poster summarizes my work as research assistant for the study, Southeast Asian American College & Career Readiness (SEACCR), led by Dr. Phitsamay Uy, from the Graduate School of Education, and Dr. Sue J. Kim, from the English Department, with much support from the Cultural Center for Asian American Studies. In the course of this study, I have learned many things about my community that has never made an impression on me before. First, there are very unique traits that distinguish the importance of cultural understanding for specifically the Southeast Asian American community. Unlike the average immigrant story Southeast Asian Americans sought their journey to America out of sheer necessity in order to escape circumstances of war and genocide. People like my mother and father came to America for survival, rather than to follow the ordinary "American dream." Throughout their journey the community has established an identity geographically, culturally etc., but that has not allowed them to overcome common afflictions that are not to be typically associated with Asian Americans. For example, the SEAA population have variety of issues in dealing with sociological, pathological and psychological trauma. Their trauma plays an important role in the foundation for the community because of the effects it has in raising the next generations. This study has given me perspective on who my parents, friends and community are and their adjustment into their American identities. I thank this project for alleviating the disconnection to society I grew up knowing, but never understanding.

Da Silva Souza, F., Whitten-Woodring, J.  
*Political Science*  
**SHOULD WE BE ALL A TWITTER? #YBYA: THE EFFECT OF NEW MEDIA AND MEDIA FREEDOM ON HUMAN RIGHTS**  
(Advisor: Jenifer Whitten-Woodring)

The perceived ability of news media to hold government accountable has led human rights NGOs to advocate for media freedom. The United States and other western democracies continue to encourage the development of media freedom in non-democratic and developing countries. Yet, little is known about the effectiveness of media freedom in non-democracies. Some research indicates that in the absence of other democratic institutions, media freedom is actually associated with violations of human rights; however, this research evaluated data for the years 1981 through 1995, before new media became widely available (Whitten-Woodring 2009). Thus, this study focuses on the years 2000 to 2012, during which new media, especially the internet, smart phones and social networking platforms emerged and became mainstream in many parts of the world. Do new media make it easier to hold government accountable and bring about improvements in human rights? To answer this question we analyze the effects of media freedom as well as internet and social media penetration across countries and over time and then explore the implications of these findings with a case illustration of the disappearance of 43 Mexican students. The results suggest that with the emergence of new media, both internet penetration and media freedom have independent and positive effects on human rights, regardless of the presence or absence of democratic institutions.

Gates, N., Dutta, U.  
*Political Science, History*  
**FAIR TRADE: A FRAMEWORK FOR BRIDGING JUST DEVELOPMENT AND LOCAL ACTION**  
(Advisor: Urmitapa Dutta)

Fair trade is an approach to trading partnerships geared towards facilitating more egalitarian terms of trade for producer communities, especially those in the global South. As such, fair trade is based on
dialogue, accountability, and respect. In addition to better economic remuneration, the fair trade movement has historically supported democratic decision-making, capacity-building, and, more recently, sustainable development within producer communities. Our project explores how a non-profit organization committed to a social justice and just development agenda engages with the concept of fair trade. Specifically, we ask: How do members of the organization understand the concept of fair trade vis-à-vis their work? What kinds of arguments do members make around fair trade - its promotion and critique? This research poster will present new and critical understanding of the relationship between fair trade and social action, particularly at the local level. Our findings will help us identify the barriers that impede the translation of fair trade ideals into action. We will also present an emerging framework that connects fair trade and local social action.

Geoffrey, P.
Political Science
WHERE DID THE WORK GO AND WHAT CAN WE DO ABOUT IT?
(Advisor: Robert Forrant)

With frequency, the claim is made that universities and other entities of higher learning are essential components to the revitalization and economic stabilization of urban areas. Indeed, there is substantial information to support such claims. Institutions of higher education, both universities and community colleges alike, attract high volumes of students and staff members into urban areas, and thereby have the inherent impact of stimulating local economies. In tracking this sort of impact, universities commonly produce "economic impact reports," but those reports fail to paint the complete picture of the transformative effects that higher education can have on a community. For the purposes of this research project, the extent of the economic and social impacts that such institutions have on urban areas has been examined, with a particular focus on the community of Springfield, Massachusetts. Beginning with consideration of the chartering documents and legislation which enabled the creation of various public institutions in the Commonwealth of Massachusetts, this project provides a comprehensive study of both the intention of institutions of higher education and the role they have played in communities that have experienced significant job loss. Our research has found that institutions of higher education do much more than merely attract people who spend money in communities. They foster involvement in communities, generate unique initiatives, and reeducation the workforce, among a host of other positive impacts.

Burgett, J.
Psychology
WORKING PARENTS IN THE UNITED STATES AND SCANDINAVIA AND THE ADVANCEMENT OF CHILDCARE POLICIES
(Advisor: Andrew Hostetler)

In this project I research parental employment and childcare policies in the United States and elsewhere, and explore why there has not been a greater push for family-friendly policies in the U.S.. Specifically, I explore how different cultures view work and family life and the different policies that have been enacted to support the integration of work and child care. The United States is strongly individualistic, and most Americans endorse the ideal of working, raising a family, and "having it all". Increasingly, American parents are involved in every aspect of their children's lives while still having to work, as most families need two incomes, and maintain their own lives. Parental over-involvement, the "having it all" lifestyle, and other unique manifestations of American individualism are a big part of the reason why there is not a childcare movement in the United States. Although policies that work in one country might not work in the United States, the success of childcare and parental leave policies in Scandinavian counties, in particular, holds important lessons that could be applied here.
Casavant, J., Shahin, S.

Psychology
PERCEPTION OF TATTOOED AND NON-TATTOOED MODELS
(Advisor: Mary Duell)

In a research study that we conducted in Fall of 2014, college students evaluated images of either a male or a female model with or without tattoos. Our findings indicated that the presence of tattoos did not result in more negative ratings regardless of gender of the model in the image. In the current study, we were interested in the possible effect of ethnicity on evaluation of tattooed and non-tattooed models. One hundred twenty college students were asked to evaluate images of either an African American female or Caucasian female model with or without tattoos. We expect the results to show that the female models with tattoos will be viewed more negatively than those without tattoos, and that the African American female with tattoos will be viewed the most negatively of all. The data from this study are currently being analyzed and preliminary findings will be presented.

Colak, B., Green, J., Prickett, S., Cox, K.

Psychology
“YOU KINDA GET THAT SMALL FEELING THAT SOMETHING'S GONNA HAPPEN:” YOUTH PERSPECTIVES ON COMMUNITY SAFETY IN LOWELL
(Advisor: Urmitapa Dutta)

Youth violence continues to be a major public health problem across the globe. Conventional definitions of violence are typically limited to physical violence, which fail to account for the structural violence that marks the lives of many urban youth. Our project tried to address this gap by employing participatory action research (PAR) approaches. We document youth perspectives on violence in Lowell and plan to use that knowledge to inform local violence prevention efforts. In this poster, we draw upon the PAR project to examine how young people understand safety in their local communities. The specific questions are: What are the safe and unsafe spaces as perceived by youth? How do youth evaluate safety and risk? What do these evaluations tell us about the forms and contexts of violence experienced by youth of color in Lowell? The data for this poster comes from a focus group sessions carried out with a group of seven 18-year old youth from who attend an afterschool program in Lowell. Our findings will be divided into two major areas. First, we will list safe and unsafe community spaces as designated by youth. Second, we will highlight themes that emerge from youth evaluations of safety. We conclude by discussing the implications of these findings for ecologically-informed interventions in the local community along with future directions.

De Lima, H., Weinstein, Y.

Psychology
THE EFFECT OF PROBE FRAMING ON MIND-WANDERING REPORTS
(Advisor: Yana Weinstein)

Mind-wandering is the experience of an individual loosing mental focus of what they are trying to pay attention to. The field of psychology has yet to develop a unified methodology for collecting subjective mind-wandering reports. We compared two methods of probing participants for mind-wandering during a reading task. Participants were tested in groups of 10-20 in a simulated classroom setting. Participants read a printed transcript of a TED talk and reported mind-wandering with a clicker device typically used for polling in university classrooms. During the 20-minute reading task, 10 probes were randomly displayed on a projector, and a ding alerted participants to each probe. Participants were either asked to respond to a statement that affirmed their mind-wandering ("At the time of the ding my mind was on something other than the text", YES/NO; n = 45) or attention to the text ("At the time of the ding my mind was on the text", YES/NO; n = 34). Those probed to affirm mind-wandering reported significantly
more mind-wandering (41%) compared to those probed to affirm attention (27% mind-wandering). While mind-wandering increased over reading time in both conditions, there was a clearer trend in the affirming mind-wandering condition. Our results suggest that the wording of mind-wandering probes may affect mind-wandering reports.

**Doucet, M., McCabe, A., Arcus, D.**  
*Psychology*  
**aversive childhood events and college experiences**  
(Advisor: Allyssa McCabe)

The purpose of this study was to examine whether experiencing trauma affects participants' responses to describing a high point and low point narrative of personal experience. This study should help identify ways that university students cope with non-academic aspects of their lives that have the potential to impact their academic performance. Participants completed two questionnaires, one about Aversive Childhood Experiences and another about traumatic events, as well as answering two open-ended questions about a high point and low point experience they had while attending UMass Lowell. The study showed participants expressing their thoughts and emotions openly for what they believed was a high point and low point experience at UML. Some discussed difficult, traumatizing early experiences, but many addressed the struggles a student faces living on campus, commuting, or being a parent. As a result, this study was partially successful. Implications are discussed.

**Gilbert, K., Weinstein, Y.**  
*Psychology*  
**Piano music memorization**  
(Advisor: Yana Weinstein)

Recently there has been a lot of interest in cognitive psychology about study strategies and which techniques maximize memory recall. Retrieval practice during study has been shown to be effective for long-term memory. Musicians, particularly pianists, are required to memorize a lot of information, so in this study we use the memorization of music to compare different study strategies on their effectiveness for later memory. Participants in our study are presented with three different melodies and learn each one with a different study strategy while we record them. The first study strategy is practicing the melody ten times with the music in front of them, after which participants are given a final test without access to the music 10 minutes later. The second study strategy is practicing with and without the music interchangeably for a total of ten trials, followed by the final test. The last study strategy is practicing with the music five times in a row, followed by practicing without the music 5 times in a row, and then taking the final test. The results of this study will be scored by a music student for accuracy to compare the effectiveness of the three study strategies.

**Lai, A., Charette, M., Shroll, T., Tauras, M.**  
*Psychology*  
**support our students at umass lowell (sos)**  
(Advisor: Khanh Dinh)

College student food insecurity is a serious and often overlooked national epidemic. Only a handful of universities have assessed food insecurity on their campuses and have found rates as high as 59% (Patton-López, López-Cevallos, Cancel-Tirado, & Vazquez, 2014). Food insecurity has been linked to negative health consequences as well as poor academic performance at post-secondary schools. The federal programs designed to prevent food insecurity do not address the needs of college students. Once supported by the National School Lunch Program, high school graduates who pursue higher education face strict eligibility requirements by the Supplemental Nutrition Assistance Program, limiting available
assistance. A 41-item survey administered to UMass Lowell students in August 2014 indicated that of the 1,335 participants that completed the survey, 24% of them were food insecure. The survey also included an assessment of the awareness of food insecurity and the stigma associated with seeking help. Over the course of the 2014-2015 academic year, SOS, a comprehensive and preventative program designed to address the problems associated with food insecurity was implemented at UMass Lowell. The same survey will be distributed in April 2015 to assess whether any changes have occurred in the presence of this program. SOS serves as a pilot program that can be modeled on other campuses across the country. This program has built a strong ecosystem of support across the UMass Lowell community that facilitates awareness of food insecurity, the provision of assistance without stigma, and empowerment of students to overcome the hunger barrier to collegiate success.

McGuire, J., Hajjar, E., O’Neil, J.
Psychology
ATTITUDES TOWARDS SEXUAL VIOLENCE
(Advisor: Mary Duell)

Sexual violence on college campuses is a growing problem. Little research has been done regarding the connection between empathy and attitudes towards sexual violence. The present study aims to investigate the link between empathy levels and attitudes towards sexual violence using a date rape vignette. This research will be conducted using an online survey tool. A link to the study will be sent to UMass Lowell undergraduate students. The study materials will include a short vignette about a date rape involving a female college student and will include a series of questions evaluating participants’ attitudes towards sexual violence described in the vignette. An empathy scale and a rape myth questionnaire will also be administered. The study is currently pending IRB approval, and data collection will begin as soon as approval is obtained. The results of the study could possibly provide insights regarding the design of programs aimed at reducing sexual violence on college campus.

O’Neil, J., Lohmeier, J., Thompson, S.
Psychology
COOL SCIENCE: BRINGING TOGETHER ART & SCIENCE
(Advisors: Jill Lohmeier & Shanna Thompson)

Research has shown that climate change is a growing issue in today's society, yet many people are unaware or uneducated on the topic (Leiserowitz et al., 2014). Research has also indicated that students are much more engaged in art classes than they are in science classes (Legewie & Joscha, 2014; Shernoff et al., 2003). The Cool Science competition works to address both of these issues by asking K-12 students in Massachusetts to research the local effects of climate change and create a poster highlighting the effects. Six posters are chosen to be displayed on Lowell's public buses in order to educate the public about climate change. Students become more engaged in science through learning by discovery and researching climate change in order to create their artwork, and also through discussing climate change with their classmates. Bus riders are also more engaged in science by learning about climate change through students’ artwork and talking about the artwork with others. This presentation will include data from a survey for teachers who participated in the Cool Science project. The data are being analyzed to provide further insight into the teaching styles and student collaboration that accompanies the Cool Science competition. We hypothesized that Cool Science teachers encouraged more student discussion and learner-centered approaches while working on the Cool Science project than they do during typical lessons. By bringing together students, teachers, and the general public, Cool Science increases awareness and education of climate change science.
Narrative skills are essential life skills which represent one of the richest sources of personal information. Narrative ability is also one of the most valid and reliable ways to measure communicative competence both in normal populations and in clinical groups. Previous work has shown that individuals with autism spectrum disorders (ASD) tend to produce impoverished narratives deficient in causal explanation, background contextualization, details and personal evaluation. The present study was a pilot investigation to assess whether narrative skills were improved among young adults with ASD whose parents had received appropriate training to improve the narrative skills of their children as compared to parents who had not received this training. During a 12 month period ten parents elicited personal narratives from their children (7 males, 2 females aged between 15 and 25 years) on a monthly basis which they recorded. Parents were randomly assigned to the treatment or control groups so that half the parents received the training on specific strategies to improve narratives among their children and half did not. The training provided information on how to develop and optimize narrative skills including how to best prompt the child to enable them to build an effective narrative. At the end of 12 months the narratives were transcribed and then coded by three coders. Scoring for the narratives was compared between the control and treatment groups. Results showed that narrative skills had significantly improved among those whose parents had been trained due to an effective change in parental elicitation styles enabled by the training and guidance provided. These findings suggest that narrative skills can be improved using these strategies, thereby enabling those with autism spectrum disorders to communicate effectively with others.

Trainor, A.

Psychology

ADULTS ADOPTED AS CHILDREN: INDIVIDUAL DIFFERENCES AND COMMON THEMES
(Advisor: Doreen Arcus)

Multiple sources of identity play a role in development, especially during adolescence and emergent adulthood (Alvarado, Rho, and Lambert, 2014; Erikson, 1968). Racial and ethnic identity has largely been studied in the context of families in which such identity is shared, but individuals who are adopted may face special challenges as they try to integrate both the culture of their adoptive family and their birth culture, especially individuals who are adopted across race and ethnicity. To what extent do these persons experience microaggressive comments or interactions that may challenge or threaten their self-image or quest for integration of their cultural and racial identities? To date the literature had not addressed these important questions directly. The current study does so by examining qualitative data gathered through semi-structured interviews on the lived experience of young adults who were adopted as children. These data have revealed both individual differences and common themes, and suggest that internationally and transracially adopted persons may have different experiences and challenges compared with young adults raised by parents of the same racial and ethnic background. Results will be presented and next steps-construction of a quantitative instrument to examine these trends more systematically in a larger group-will be discussed.
Zylkuski, N.  
*Psychology*  
**STUDENTS WITH DISABILITIES AND THE SCHOOL-TO-PRISON PIPELINE: EXPLORING THE ROLE OF BIAS**  
(Advisor: Doreen Arcus)

Students with disabilities are over-represented in the population of students who are excluded via suspension or expulsion (Advancement Project, 2000). This is especially true for minor infractions that may provide more room for judgment on the part of administrators and educators (Arcus, 2013). Being excluded from school is a risk factor for dropping out (Aud, Fox, & KewalRamani, 2010; Reschly & Christensen, 2006) and involvement with juvenile justice (Snyder & Snickmund, 2006). As such, it is important to understand the reasons for the disproportionate numbers of students with disabilities who are suspended. The current study is designed to examine implicit bias against students with disabilities in the context of a simulated disciplinary review board. Ninety undergraduate students are asked to review cases of conduct code violations and rate the severity of the infraction and the length of suspension that should be applied. Cases are based on actual events described in focus groups of high school educators, and student disability status is subtly varied by descriptors pre-tested for association with disability ("a student in the learning center") or typicality ("a student in history class") and counterbalanced across cases and participants. Within subject differences will be summarized and next steps-replication with educators, administrators, and school safety officers—will be discussed.

Overton, T.  
*Sociology*  
**COPING WITH DANGER AND FEAR: ORGANIZED CIVILIAN RESPONSES TO DRUG VIOLENCE**  
(Advisor: Angelica Duran-Martinez)

In Mexican states, citizens have been exposed to drug violence in varying degrees. The individual responses to this violence are equally varied. The inclination of many citizens, however, is to become more politically active in reaction to violence and victimization. The goal of this research is to analyze the relationship between violence and the evolution of Civil Society Organizations (CSOs) at the state level. These organizations are non-governmental groups which aim to make various socio-political changes. We focus on analyzing organizations with the following goals: social assistance, the promotion of participation, and human rights. These CSO goals are connected to victimization in Mexico because they directly relate to the interests of citizens affected by this violence. We use regression analysis to assess the relation between homicide and the creation of CSOs. This is done to explore the impact of violence on civilian mobilization. We control the validity of our analysis by including statistics on population, GDP growth, and other variables that could potentially explain CSO creation. This data provides insight to the hypothesis that exposure to victimization inspires not only direct victims but also bystanders exposed to highly visible violence to respond proactively. Such responses could alleviate much of this violence, if enough CSOs participate quickly enough.

Stemple, C.  
*Sociology*  
**INVESTIGATING CHOICE OF MAJOR AND KNOWLEDGE OF SOCIOLOGY AMONG UML STUDENTS**  
(Advisor: Mignon Duffy)

Understanding why students choose the major that they do is an important piece of knowledge that can be used to attract more students to a given department and to better focus the teachings of department faculty. This project seeks to gain a better understanding of why students choose the majors that they do and to use this information to compare and contrast sociology majors with majors from other
departments. We also seek to gauge the knowledge and experience that other UML students have of the field of sociology. Finally, we seek to understand how students choose their major in today's connected and fast paced world. We achieved this goal by designing, fielding, and analyzing a survey that was sent out to sociology majors and other students in the liberal arts and humanities. Using the results of our survey we plan to compare and contrast the responses of other majors to those of sociology majors to see what sets sociology majors apart from others. The poster will present our preliminary findings.

**College of Health Sciences**

**Baniasadi, N., Arevalo Garcia, S., Falcon, L., Tucker, K.**

*Biomedical Engineering & Biotechnology*

**LOW MAGNESIUM INTAKE IS ASSOCIATED WITH INCREASED DEPRESSIVE SYMPTOMATOLOGY IN BOSTON AREA PUERTO RICANS**

(Advisor: Katherine Tucker)

The purpose of this study was to assess the relationship between magnesium (Mg) intake and depressive symptomatology in Boston Puerto Ricans, aged 45 to 75 y. 1130 participants with complete baseline data were included. A designed FFQ was used to assess dietary intake at baseline and 2 y follow-up. Depressive symptomatology was assessed with the Center for Epidemiologic Studies Depression Scale (CES-D). Energy adjusted Mg intake was classified into tertiles, with 377 participants per group at baseline, and 122 in each group at 2 y. Logistic regression was used to relate Mg intake with prevalent and incident depressive symptomatology at baseline and 2 y, respectively. Linear regression was also used for continuous CES-D scores. Potential confounders included age, sex, education, marital status, overall health, physical activity, BMI, and use of vitamin B6. At baseline, likelihood of depression was 31% lower in the highest, vs. lowest Mg intake group (OR: 0.69, CI: 0.50-0.93), with significant linear trend (P trend= 0.017). However, this was attenuated after adjustment for confounders. At 2 y, incident depressive symptomatology was 51% lower in the highest, vs. lowest Mg intake group (OR: 0.49, CI: 0.28-0.87), and this remained significant after full adjustment (OR: 0.42, CI: 0.21-0.84). CES-D score at 2 y, adjusted for baseline, was negatively correlated with total Mg intake in linear models (β: -0.01, P=0.044). Improving magnesium intake may reduce the disparities in depressive symptomatology seen in mainland based Puerto Rican adults.

**Khan, N., Kasperkovitz, P., Mansour, M., Tam, J., Seward, M., Puranam, S., Reedy, J., Feliu, M., Vyas, J.**

*Biomedical Engineering & Biotechnology*

**DECTIN-1 CONTROLS TLR9 TRAFFICKING TO PHAGOSOMES CONTAINING β-1,3 GLUCAN**

(Advisors: Jatin Vyas & Stuart Levitz)

Dectin-1 and TLR9 play distinct roles in the recognition and induction of innate immune responses to Aspergillus fumigatus and Candida albicans. Dectin-1 is a receptor for the major fungal cell wall carbohydrate β-1,3 glucan and induces inflammatory cytokines through Card9 and controls phagosomal maturation through Syk activation. In contrast, TLR9 modulates the inflammatory cytokine response. In this study, we demonstrate that β-1,3 glucan beads are sufficient to induce dynamic redistribution of TLR9 to phagosomes and results in accumulation of the cleaved form of TLR9. Trafficking of TLR9 to A. fumigatus and C. albicans phagosomes required Dectin-1 recognition. Similar to CpG beads, inhibition of phagosomal acidification blocks TLR9 accumulation on phagosomes containing β-1,3 glucan. Dectin-1 mediated Syk activation was required to license TLR9 trafficking to β-1,3 glucan-containing phagosomes,
A. fumigatus and C. albicans phagosomes. Collectively, our study demonstrates that recognition of β-1,3 glucan by Dectin-1 triggers TLR9 trafficking to β-1,3 glucan-containing phagosomes and may be critical in coordinating innate antifungal defense.

Nicoloro, J., Luo, J., Drenas, W., Sun, Y., Goodyear, N.
Biomedical Engineering & Biotechnology
THE ROLE OF N-HALAMINE BASED ANTIMICROBIAL FABRIC IN SIMULATED REAL WORLD CONDITIONS
(Advisor: Nancy Goodyear)

The role that fabric and other soft surfaces play in the spread of pathogenic microorganisms is a topic of growing concern. Antimicrobial fabrics propose an innovative and cost effective approach to combat nosocomial infections, and control the transfer of pathogens between clinical settings and the community. Many antimicrobial fabrics are intended for use in clothing worn in a clinical setting. These fabrics may have direct contact with skin as well as soils including blood and body fluids. The current methods used to assess performance of antimicrobial materials do not address the potential impact of organic soils, nor do they consider the skin environment, including sweat and normal skin flora. Our goal was to assess the efficacy of N-Halamine based antimicrobial fabric against several bacteria in the presence of PBS, artificial sweat, and 5% serum. We inoculated swatches of 1-ply N-Halamine based antimicrobial fabric selected skin organisms and pathogens in PBS, artificial sweat, and 5% serum for a contact time of 15 minutes. To date, S.aureus, E.coli, mixture of E.coli and S.aureus, and S.epidermidis have been tested. Each test run contained a positive control, negative control, and two test swatches. Our findings demonstrate that antimicrobial fabric remains effective at reducing bacteria at an average of ≥4.00 log reduction when in the presence of aforementioned organisms and soils. Additional organisms, organism mixtures, and different soils must be evaluated in order to fully characterize the performance of the antimicrobial fabric with our more comprehensive testing method.

DiAngelo, R.
Clinical Laboratory & Nutritional Sciences
BACTERICIDAL EFFECTS OF ESSENTIAL OILS ON STAPHYLOCOCCUS AUREUS AND ESCHERIA COLI
(Advisor: Nancy Goodyear)

Plant essential oils like tea tree oil are used in cleaning and personal care products for their purported ability to kill bacteria without the use of caustic chemicals such as bleach. Essential oils are highly complex mixtures that vary in composition depending on the geographic plant source and the extraction process. We are investigating the disinfection effectiveness of 4 oils from different sources on two common pathogens, Escherichia coli and Staphylococcus aureus. The oils to be tested include lime, lavender and thyme oils from Aura Cacia (AC) and Wyndmere Naturals (WN), and tea tree oil (TTO) from AC, WN, Nature's Bounty (NB) and Desert Essence (DE). The bacteria are applied to a stainless steel surface, dried, and exposed to one essential oil for 30 seconds. The effect of the oil is neutralized in a broth, which is serially diluted and plated on agar in duplicate. Positive (no essential oil) and negative (no bacteria) controls are run alongside three replicates of each bacteria-oil combination. To date, 7 of the 10 oils have been tested; AC lime, WN lavender, and WN thyme are currently undergoing testing. For E. coli, all oils achieved a minimum 5-log reduction (100%) except for AC lavender. S. aureus is significantly more difficult to kill with only AC thyme achieving a 5 log reduction (100%). All other oils tested achieved no more than a 2 log reduction (99%). Additional testing is needed to evaluate the effectiveness of undiluted plant essential oils as well as diluted in various products.
Li, X., Lam, D., He, G.
Clinical Laboratory & Nutritional Sciences
IMPACTS OF MULTIDRUG EFFLUX PUMPS ON THE ANTIMICROBIAL EFFECTIVENESS OF PSEUDOMONAS AERUGINOSA
(Advisor: Guixin He)

Pseudomonas aeruginosa is a gram-negative opportunistic pathogen that has been found to have increased resistance to multiple antimicrobials. The major resistance mechanisms in P. aeruginosa are the multidrug efflux pumps. The purpose of this study was to evaluate the effects of multidrug Efflux Pumps on the antimicrobial effectiveness. The efflux pumps that we evaluated are MexCD-OprJ and MexB. The wild type P. aeruginosa K767 was used to compare with two other strains K1523 (K767 ΔMexB) and K1521 (K767 ΔMexCD-OprJ). The antibiotics were used in this study include gentamycin, tobramycin, erythromycin, tetracycline, and oxacillin. The antimicrobial effectiveness tests were carried out by using Clinical and Laboratory Standards Institute (CLSI) standard method. The antimicrobial effectivenesses of tetracycline, tobramycin, and gentamicin were significantly increased on the strain K1521 (K767 ΔMexCD-OprJ); the antimicrobial effectivenesses of oxacillin and erythromycin were also significantly increased on the strain K1523 (K767 ΔMexB).

Mohamed, H.
Clinical Laboratory & Nutritional Sciences
CONTAMINATION AND SANITIZATION OF BULK REFILLABLE LIQUID SOAP DISPENSERS
(Advisor: Nancy Goodyear)

Hand soap and water are recognizable ways of reducing the risk of bacterial transmission, however, bulk refillable soap dispensers have demonstrated contamination in several studies. About 25% of these dispensers in the US are thought to be significantly contaminated, mostly with opportunistic organisms such as: Klebsiella pneumoniae, Pseudomonas aeruginosa and Serratia marcescens. The mechanism of contamination of the dispensers is unclear. Understanding the source of contamination will lead to more effective approaches to prevent transmission of infection. Two possible sources are the hands of users and the hands of janitorial staff refilling the dispensers. In order to understand the behavior of bacteria that enter the dispenser when it is filled, we will test 6 soap dispensers by filling them with preservative-free soap contaminated with ~2 x 10^7 CFU/ml K. pneumoniae, sampling the soap periodically, and then re-contaminating them when bacteria are no longer recoverable. To date we have tested two wall dispensers, the refillable Bobrick B-4112 and the cartridge-based Sloan SJS-1000. Bacteria were recovered form both dispensers on days 1 and 2, and from the Bobrick dispenser on day 6. We were unable to recover bacteria from either dispenser on days 8 and 17. Both dispensers were re-contaminated on day 21. Bacteria were recoverable from both dispensers up to 47 days following the second contamination. We hypothesize that the second contamination allowed biofilms to form in the dispensers, allowing the bacteria to survive significantly longer. Testing is underway on two counter-mounted cartridge systems, Bobrick 826-18 and Sloan ESD 200/250.

Hulbert, K., Rusch, K., Bacon, M.
Environmental Health
MERRIMACK RIVER WATERSHED COUNCIL RIVER CLEAN UP SERVICE LEARNING PROJECT
(Advisor: Leland Ackerson)

Our goals with working with the Merrimack River Watershed Council were to gain valuable experiences and skills in the environmental health field by working for a non-profit organization, organize our own event, and develop program plans along with materials and resources for the event. We worked with the executive director of the Merrimack River Watershed Council, Caroly Shumway. She gave us the idea of organizing a river clean up, and we were in charge of the whole program. We had to find a safe, suitable
location along the Merrimack where volunteers could pick up trash. We had to find volunteers, and we contacted the advisor of the environmental club at Lowell High School. We had to create program plans, and educational materials for the volunteers. On the actual event day, we engaged the volunteers in cleaning the river, and explained the importance in keeping the river, and environment clean. Throughout our project, we also gained experience in contacting different community leaders including people from: Merrimack River Watershed Council, Department of Conservation and Recreation, City of Lowell, Lowell High School, and Coastsweep.

Melvin, A., Crawford, S., Tenaglia, K., Wilcox, H., Marshall, J.
Environmental Health
TOXIC USE REDUCTION INSTITUTE (TURI) DISINFECTION STEAM RESEARCH
(Advisor: Leland Ackerson)

We tested steam products on behalf of TURI for a research paper being conducted by Dr. Goodyear and Kathleen Tenaglia. We used S. aureus and E. coli on stainless steel coupons to simulate cleaning surfaces. The steam products were tested on their quality of disinfection of the coupons and their temperatures. We also looked at the temperature flux of the products. This is an ongoing research for Kathleen Tenaglia's thesis and Dr. Goodyear's research on disinfection with steam products. Future plans for the project are going to be continuing tests of the flux in temperatures of the machines and how that affects disinfection on different surfaces. We never got the chance to meet the community we served, but the hope the research we helped conduct will further assist in safer disinfection alternatives in the community.

Nickerson, J., Nowoswiat, C., Eversman, N., Smith, R., Smith, B., Souza, M., Dunbar, A., Yaxter, B.
Exercise Physiology
“7 MINUTES TO HEALTH” AND EXERCISE CAPACITY – FACT OR FICTION?
(Advisor: Cynthia Ferrara)

PURPOSE: An increasingly common mode of daily exercise is the use of exercise apps via smartphone or portable tablets. Recent media and magazine articles suggest that regular exercise using the "7 Minutes to Health" app may increase exercise capacity, specifically maximal oxygen consumption (VO2max). The purpose of this study was to determine if an increase in VO2max could be achieved using 7MH for 4 weeks as part of a regular exercise program. METHODS: Ten participants (6 men and 4 women, 18 - 32 years old) were recruited to participate in the study. Participants were healthy and had no limitations to exercise. Initial measurements to assess VO2max were performed using a treadmill test. Participants were then encouraged to use the 7MH exercise app at least 3-5 days/week as part of a regular exercise program. After 4 weeks, a second treadmill test was performed. Paired t-tests were used to determine if there was an increase in VO2max. RESULTS: After 4 weeks, there was a trend for an increase in VO2max (38.4+12.6 vs. 39.9+12.4 ml of oxygen/kg body weight/min, p=0.09), with seven out of ten subjects achieving an increase in exercise capacity. CONCLUSION: These results suggest that a 4 week exercise program using the 7MH app may result in a small increase in exercise capacity. Additional research is needed to determine how this app can be used as an effective part of a regular exercise program.

Aggouras, J., Case, C., Duchemin, R., Sullivan, K.
Nursing
HEALTHY CHILDREN OF NASHUA OUTREACH PROGRAM
(Advisor: Alison Basmajian)

Purpose: Our project focuses on an outreach program to the youth of Nashua, New Hampshire. The purpose of this program is to educate the youth about healthy eating and exercise habits that will contribute to overall long-term health. Background: As a community, 30% of Nashua's population suffers from obesity. The youth of Nashua has a 16% obesity rate comparable to a 15.6% obesity rate in the state
of New Hampshire. We found that this statistic was significant enough to formulate a nutrition and exercise education program. Method: This program was targeted at children from the ages of eight to 12 at The Boys & Girls Club of Greater Nashua. We presented a poster that described healthy eating habits and lifestyles along with having the children participate in constructing a healthy meal. Results: At the end of our presentation, the children successfully answered our questions about healthy food choices and exercise. They were also able to identify the foods and habits that can be harmful to their health. This validated our teaching was effective and our expected outcomes were met. Discussion: Our outreach program proved to be successful and The Boys & Girls Club were so great to encourage ongoing positive teaching to the children.

Akibu, A., Anuta, O., Arets, W., Mutyaba, L.
Nursing
SAFE SEX EDUCATION FOR AT RISK FEMALES IN HAVERHILL ALTERNATIVE SCHOOL, MA
(Advisor: Alison Basmajian)

Purpose: This education project promoted safer sex practices and healthy sexual relationship decisions for at risk female students at the Haverhill Public Alternative School (HALT). The "Massachusetts Community Health Information Profile" statistics for the city of Haverhill showed a much higher incidence of sexually transmitted diseases (STD's) and unplanned pregnancies among women in the age group of fifteen to nineteen year old as compared to the whole State of Massachusetts. Background: Surprisingly, we also found that the Alternative School, for students with developmental diagnoses and behavioral challenges, has not had any formal sex education despite the efforts of the school nurse for ten years. This project was a milestone in the history of the school on sex education. Our teaching focused on safer sex practices and prevention of unplanned pregnancies among teenage girls in this underserved and at risk population. Methods: Teaching design was derived from the Alberta Health Services education program from Canada with theoretical framework that incorporates the Resilience, Social Learning, and Comprehensive School Health models. Our Teaching model was on primary prevention strategies that focus on the students with developmental diagnoses and Health Promotion Model (HPM) which formed the theoretical basis for our educational project. The teaching session was conducted in 45 minutes with the 'Girls Group' at St James Alternative School in Haverhill Massachusetts. We used the following instructional methods during our educational section: sex education video from Rutgers University ("Sex Myths" produced by teens for teens), cardboard presentation, handouts, role play, small group discussions, and questions and answers sessions. Results: Teenage girls are most likely to have unsafe sex practices, and sexually transmitted diseases (STDs). The majority of our participants reported delinquency in assertive communication skills putting them at risk for unprotected sex and unplanned pregnancies. Discussion: High prevalence of STDs among teenagers in Haverhill community indicates that our target population is at risk for unsafe sex practices and teenage pregnancies. Since, this is the first sex education in the school, subsequent teachings should be done to include the teenage boys who are also at risk for unsafe sex and STDs.

Bernard, V., Bolivar, C., Marcinkevich, J., Thibodeau, B.
Nursing
JUST BEAT IT: HEART DISEASE PREVENTION & EDUCATION AT THE METHUEN SENIOR CENTER
(Advisor: Alison Basmajian)

The purpose of this presentation was to increase awareness about Methuen seniors’ cardiac disease. According to the city of Methuen mortality rates, cardiac disease is the leading cause of death in this community. The Massachusetts Department of Public Health reports that Methuen citizens aged 75 and higher commonly die and are hospitalized from cardiovascular disease. Our targeted population was senior citizens aged 55 to 85 years old who regularly attend the Methuen senior center. In one hour and 30
minutes, we were able to teach topics related to the heart and its functions, the causes, symptoms, modifiable and non-modifiable risk factors for heart disease, and the importance of medication compliance. We followed an elaborate teaching design that comprised of an oral presentation, a jeopardy game and operation of two blood pressure reading booths. Our recommendation is the expansion of education, possibly an education series, to include cardiac medications and treatment compliance. This recommendation is based on audience feedback and questions received from the participants.

Bowen, S., Denietolis, J., Donovan, N., Mayo, S., Phaneuf, C.  
*Nursing*  
COMMUNITY OUTREACH PROJECT AT HAVERTILL BOYS AND GIRLS CLUB  
(Advisor: Alison Basmajian)

Purpose: The purpose of this outreach project was to build positive coping skills for an adolescent population. Background: The City of Haverhill has a suicide rate higher than that of the state of Massachusetts. The suicide rate in Haverhill is 8.8% compared to 7.9% in Massachusetts as a whole. Positive coping skills are essential to dealing with stress and remaining healthy both physically and emotionally. Methods: The Haverhill Boys and Girls Club offers a safe environment for school aged children and teens of lower socioeconomic status. The presentation was provided to a teen group known as the "Torch Club". This is a community outreach project to educate children ages nine to twelve on the major stressors in their life, how to cope with them, and to identify the difference between positive and negative coping skills. The education methods included an interactive discussion and identification of positive and negative coping methods with the teens. Strategies to build positive coping skills were taught, including the use of journaling. Each participant received a journal for their personal use. A poster presentation was used to present the information along with a colorful handout with additional resources to take home. Results: This presentation was successful as evidenced by engaged participation by the teens, and positive verbal feedback provided by the participants and Torch Club directors. Discussion: The Boys and Girls Club program directors stated that the program was successful and stated the need for ongoing education regarding this important topic. This presentation is one that can be implemented on an ongoing basis.

Casimir, A., Finney, E., O'Connell, C., Bonneau, V., VanKuilenberg, N.  
*Nursing*  
NUTRITION EDUCATION FOR MIDDLE CHILDHOOD STUDENTS IN TYNGSBOROUGH  
(Advisor: Margaret Laccetti)

The purpose of this project was to provide primary prevention nutrition information including the following topics: food groups, nutrients attained, nutrients and the role in the body, and required daily servings. Background: Massachusetts is the 25th most obese state in the country. The 2011 Massachusetts State Obesity report found that of 178 male/female students 27.5% were either overweight or obese. Tyngsborough Middle School enrollment of students by their ethnic makeup was analyzed to determine appropriate topics. Discussion topics were also based on an interview with the school's nurse. It was brought to our attention that the students could not discern the healthy versus not so healthy food choices available at the school's cafeteria. This project was an opportunity to reach out to middle school students to make an impact on their eating habits before bad habits set in. Early intervention may prevent these habits from being established or change these habits before health related problems occur and/or medical intervention is necessary. Agency: The activity was implemented at Tyngsborough Middle School. The sixth grade students participated in this outreach program. Project and Implementation date: The project was designed in accordance to the target population's stage of development. The project included an informational session and two evaluation activities in the form of a "matching" and trivia quiz. Project implementation took place April 1, 2015. This project taught our group the importance of community
health nursing interventions and that primary prevention is key to maintaining optimal health at the individual and community level.

Chery, B., Kamau, T., Awuh, B., Velez, K., Macharia, J.
Nursing
PROMOTING A DRUG-FREE LIFE FOR TEENS IN LOWELL
(Advisor: Alison Basmajian)

Purpose: The purpose of this presentation was to educate Lowell teenagers on substance abuse, and how it can profoundly affect their life. Substance abuse can cause serious health consequences; impacting academic performance as well as relationships with friends and family. Background: In 2011 there were a total of 2,163 substance abuse admissions between the ages of 15 and 19 in the city of Lowell (Mass Chip). Our target population were teens of ages 13 to 19; this group is at highest risk for trying drugs and alcohol for the first time and becoming addicted. Methods: An educative session on drug prevention program was held at the Boys and Girls Club in Lowell. Materials used included a developed power point presentation that included drug abuse education, and a You-tube video, that conveyed the truth about drugs through the words of those who have "been there." The video had memorable graphics, raw imagery and the consequences of substance abuse. The materials used for presentation were visually stimulating, appealing and age appropriate. The content was limited to one hour to capture and retain interest. The teens had an opportunity to meet representatives of the Lowell's anti drug resources during the implementation of the project. The Lowell Public Health presented with posters, brochures, and pamphlets with indepth information on the prevention of drug use. Also, the Lowell House Inc. supported the team by attending our presentation and providing a hand on drug prevention kit, which enabled the teens to visualize the reality of what the drugs will look like. Conclusion: Desired target population was reached at the Boys and Girls Club of Lowell, with 37 teenagers in attendance. Teens were able to identify Truth verses Myth about substance abuse, ways to overcome peer pressure, and identify locally available community resources. Engaging the teens in their environment resulted in a great educational experience.

Choun, T., Chhean, H., Khin, E., Almonacid, D.
Nursing
EXPLORING HEALTHY HABITS AMONG PRESCHOOL AGED CHILDREN IN DRACUT, MA: A COMMUNITY OUTREACH PROJECT
(Advisor: Alison Basmajian)

Purpose: The purpose of this community outreach project was to address the issue of childhood obesity in Dracut, MA by educating preschool aged children and their parents on proper nutrition and exercise. Background: According to the Centers for Disease Control (CDC), it is estimated that approximately seventeen percent of United States children, ranging from the age of two years old to nineteen years old, are overweight. Dracut nearly doubles the national average with the average of thirty seven percent of children being obese or overweight. Methods: Our group took into consideration the developmental age of our particular target population. We used pictures, songs, and dances to educate children who were four to five years old. Our program included a nutrition board game with healthy and unhealthy food choices, a physical activity board game with examples of physical and non-physical activities, an exercise book, and a follow-along song. We ended with a coloring activity for the children while the parents were given additional brochures and evaluations. Results: Fifteen children attended the presentation at the Dracut public library with their parents. Children were able to identify the proper foods or physical activities about ninety five percent of the time. Conclusion: We accomplished our goal as the majority of the children were able to verbalize and identify at least three healthy foods and activities. The presentation received a positive response from all the participants and the request was made to continue this education on an ongoing basis.
Creamer, S., Houle, E., Kalenoski, M., Magill, A., O’Brien, A.  
Nursing  
CHILDHOOD NUTRITION EDUCATION IN METHUEN, MASSACHUSETTS  
(Advisor: Margaret Laccetti)

A chronic problem that is on the rise in America is childhood obesity. According to the Center for Disease Control and Prevention, obesity rates in children from ages six to eleven years old has more than doubled (7-18%) in the past 30 years. Similarly, the obesity rate in young adults from age 12-19 has quadrupled (5-21%) (2014). After conducting a focused community assessment of Methuen, Massachusetts, it was evident childhood obesity is a problem in this community. The priority nursing diagnosis addressed in this project was ineffective health maintenance related to childhood obesity. To address this issue, an informational presentation on nutrition at the Methuen YMCA was presented. This population is engaged in the developmental stage of inferiority vs. industry. Children in this stage are more willing to learn and make their own choices, such as choosing healthy foods and exercise habits. Information was shared through use of verbal discussion and interactive activities appropriate for the children's developmental level. The effectiveness of this presentation was evaluated by using coloring pages and repeat-back of information that the second graders learned throughout the presentation. All materials were designed to make it possible for the YMCA to duplicate this presentation.

Dascoli, L., Baez, S., Linane, C., Ouellette, J.  
Nursing  
CHILDHOOD OBESITY IN LAWRENCE, MASSACHUSETTS: A COMMUNITY OUTREACH PROJECT  
(Advisor: Margaret Laccetti)

This community health project was designed to reach out to the community of Lawrence, Massachusetts and use primary prevention to fight the epidemic of childhood obesity. Lawrence is the poorest city in Massachusetts, and also has the highest obesity rate in the state. This community health project targets children, ages 7 to 8, who attend the Lawrence Boys and Girls Club. It was designed to provide information for children and families on making healthier snack and drink choices. This project was implemented on March 24, 2015 and was considered to be a success. First, information was shared about ways to substitute healthier snacks and drinks, and how healthy foods can still taste good. Then we demonstrated the amount of sugar which is contained in common sodas and juices. The children then revealed what they had learned by answering questions in a Jeopardy style trivia game. At the end of the implementation, the children were given health snacks and water along with a pamphlet for their parents. This pamphlet contained information on how to sneak veggies into food and healthy snack ideas; these were available in both English and Spanish. An activity was also sent home for the parents in hope that it would bond the child and parents in a dialogue about healthy food choices. The children can apply this information to their diet choices in the future, to avoid developing obesity.

Elia, E.  
Nursing  
BRING DIVERSITY TO NURSING RESEARCH CO-OP  
(Advisor: Laura Hajjar)

Diversity is a crucial aspect in strengthening the nursing workforce. An intergrated community allows nurses to not only learn from one another, but also delve into cultures they would not be otherwise exposed to. Diverse nurses help to implicate health outcomes for minority populations. By introducing middle school and high school students to nursing programs, nursing schools are able to recruit diverse students. I am currently involved in the research Co-Op Bring Diversity to Nursing (BDN). As a nursing student, I am extremely interested in the effects of promoting nursing to pre-collegiate students. The
nursing community has made vast advancements in health sciences. BDN is able to bring forth those advancements to potential, future nurses. As apart of the team, I incorporated health promotion into the nursing clubs at Lawrence and Lowell middle and high schools. Nutrition in American is ever changing; the recent advancement from the food pyramid to MyPlate gave the BDN staff and I the opportunity to educate students on how crucial their nutrition is while revamping our curriculum. After the fall cohort completed their programs, I collected data and evaluations on how students reacted to such recruitment activities. Students were thrilled to receive and incorporate such lessons into their daily lives and demanded more. Most importantly, these diverse students noted that they would consider a career in the nursing field.

Fedorchuk, J., Conger, B., Farelli, M., Nusky, K., Ortiz, M.

Nursing

SERVICE LEARNING PROJECT: STRESS MANAGEMENT FOR HIGH SCHOOL STUDENTS AT CONCORD-CARLISLE HIGH SCHOOL
(Advisor: Margaret Laccetti)

After a year of work, reviewing public information about Concord, Massachusetts, other data, and talking with residents, we have determined the residents of Concord may experience greater levels of stress as compared to other towns. We chose to share knowledge of stress and stress management to high school students, so they may be better prepared to make healthy choices to manage stress. The goal of this service learning project was to provide information about stress management for 14 to 18 year old students in the town of Concord. We included healthy techniques for stress management such as adequate sleep, good nutrition, exercise, and time management. Our role was to present a booth at a health fair held at Concord-Carlisle High School on March 5th, 2015. Two posters highlighted healthy ways to manage stress. The first discussed managing stress through healthy sleep patterns, exercise, good nutrition, and time management. The second was an interactive game quizzing students on information regarding stress and stress management, with an opportunity to win a prize for participation. Finally, we developed two time management handouts to help students organize their daily routine as well as homework and tasks to be completed. This project has increased our knowledge of stress and stress management and has taught us skills to work with professionals and organizations in the planning and implementation of this community project.

Finn, K., Seamans, K., Rios, R., Forsyth, K.

Nursing

DON’T SKIP A BEAT: CARDIOVASCULAR DISEASE EDUCATION
(Advisor: Alison Basmajian)

Purpose: The aim of this project was to provide education to seniors regarding Cardiovascular Disease. Our target population was the seniors at Palm Center Powerback Rehabilitation in Chelmsford, MA. Background: Massachusetts Community Health Information Profile (MassCHIP) statistics reviled Cardiovascular Disease to be a serious issue for the community of Chelmsford, being the leading cause of death in 2010. Over a span of three years, Chelmsford had 42 deaths related to Cardiovascular Disease in ages 55-74 and 201 in ages 75 plus (MassCHIP, 2010). Design: Project was implemented at Palm Center Powerback Rehabilitation. Ten participants were provided information utilizing a poster board and an oral presentation. The presentation on cardiovascular disease included handouts, visual aids, and opportunities for participants to ask questions and engage in dialogue. Specific education included risk factors, diet, reading labels, smoking cessation, and exercise. Goal: The goal of this project was to have participants demonstrate an increase of knowledge by verbalizing an understanding of covered cardiovascular material by the end of the presentation. Recommendations: As the participants were so receptive to the education; we recommend regularly scheduled educational sessions regarding cardiovascular disease.
Hayward, D., Trombly, M., Kamara, H., Waithaka, Z., Whyte-Gruning, M.

Nursing
PROMOTING HEALTHY EATING AND DENTAL HYGIENE FOR LAWRENCE CHILDREN
(Advisor: Alison Basmajian)

Purpose: This community health education project provided information to children about healthy snack and drink choices and proper dental hygiene. The goal was to address the health problem of obesity in the Massachusetts city that holds the highest childhood obesity rate. Background: Among school-aged children, Lawrence has an obesity rate of 17.8% compared to the state average of 14.5%. Our health promotion goals were to positively impact the health related diseases that have been linked to obesity such as DM II, hypertension, cardiovascular disease and stroke, joint disease and psychosocial disorders. An astounding 22% of children in Lawrence’s public schools are obese (Vogler 2010). The community also has high unemployment, high poverty and limited access to fresh, high nutritional, lower calorie foods such as fruits, vegetables, and lean meats. In contrast, the availability of cheaper, higher calorie foods such as fast food and convenience store food is convenient to all the neighborhoods of Lawrence.

Design/Methods: We chose a primary teaching intervention held at the Lawrence Boys and Girls club for children aged 7-15. Six senior AND to BSN students lead 96 students in groups of 7 through 3 interactive teaching stations. Teaching included illustrations of sugar amounts in popular drink choices when compared to water, a dental hygiene station, and a healthy snack choice station. Evaluation: Using the teach back method, presenters where able to affirm knowledge attained by the participants.

Recommendations: To continue the interactive teaching process with Lawrence children. Interactive education was so successful and well received, that it should be continued on a regular basis.

Jean, A., Piela, R., Rondeau, K., Fawcett, M., Barker, N.

Nursing
STRESS RELIEF IN NEWBURYPORT, MASSACHUSETTS: A COMMUNITY PROJECT
(Advisor: Alison Basmajian)

Purpose: The purpose of this project is to help young adolescents manage stress. Background: This project is involved with the assessment and health improvement of the city of Newburyport, Massachusetts. Through comments made by the school nurse about the high stress level, and research done by the students themselves about a high suicide rate, it seemed appropriate to work on stress relief and relaxation in the eighth grade class in this city. Methods: The presentation will take place in the eighth grade health classes at the Rupert A. Nock Middle School in Newburyport. The students will receive facts from the American Psychological Association, as well as hear personal experiences from senior nursing students about unique ways to manage stress. The students will watch a Prezi video on stress, learn deep breathing exercises, map out a calendar month to learn organization skills and share personal experiences to learn good ways to cope. The group will also participate in an activity that inspires them to think positively about others and have others think positively of them through affirmations. This activity will involve coloring and modeling clay and then sharing pieces of it with their classmates while saying something nice to them and having them say something nice in return. Discussion: Through this project, the young students can take the skills learned with them to high school and through the rest of their life. This presentation and important topic may be recommended to be included as part of the middle school health curriculum.

Kaliba, F., Kigotho, M., Wang, P.T.

Nursing
PRESCHOOL NUTRITION EDUCATION IN WINCHESTER, MA
(Advisor: Alison Basmajian)

Purpose: The purpose of our project was to address the problem of altered health maintenance related to cardiac illness as evidenced by high incidence of Winchester's cardiovascular disease in comparison to
the state. Based on this problem, we completed a health promotion project on nutrition to pre-
kindergarten children in Winchester. Background: The reason we decided to give a nutrition presentation
is because teaching the habit of eating healthy at an early age can put children at a lesser risk of
developing complications later in life. Method: A nutrition presentation we implemented at a Winchester,
MA preschool -The Kids Connection consisted of twenty-four students between four to five years old.
The methods of teaching used included the poster board with printed pictures, board games, teach back
method and coloring. The interactive presentation covered the five different food groups, benefits of
eating healthy and risks of eating unhealthy foods. The presentation included engaging activities to
facilitate the children's understanding of specific types of healthy and unhealthy foods. Results: The
results identified that students had gained more knowledge about nutrition from the presentation and
activities implemented. More than half of the class was able to identify the healthy and unhealthy foods,
identify at least three of the five food groups, three reasons to eat healthy and two risks of eating
unhealthy. Discussion: Based on the positive response of the young students and teachers it is
recommended that ongoing nutrition education be conducted at the preschool age level.

Lacina, L., Boisvert, K., Ciofolo, K., Clifford, N.
Nursing
EATING HEALTHY IN HUDSON: INTRODUCING CHILDREN TO HEALTHY FOOD CHOICES
(Advisor: Alison Basmajian)

Purpose: The purpose of this project was to empower children with information to make healthy food
choices. Healthy Eating at a young age can decrease the risk of obesity later in life. According to a 2013 health needs assessment conducted by the MetroWest Health Foundation, 44.9% of
the fourth grade population in Hudson was considered obese. The target population for this education was
school aged children in grades two through four in the Hudson Public School system. The project was
implemented during one educational session at the Chaps, Inc. afterschool program, which is held at the
Farley Elementary School. Students in grades two through four were divided into subgroups, based on
grade level. Two learning stations were established with the first station focusing on My Plate and the
Food Pyramid. The second station allowed children to make healthy food choices using a laptop computer
and a PowerPoint presentation. Rationales for healthy choices were provided in the PowerPoint
presentation. The children were brought together as a group to solidify learning with a group True/False
game. All children were provided healthy snack bags, which included an apple, carrots, a small bottle of
water and educational activities. Children were encouraged to share activities and learned information
with family members. Recommendations would include continues healthy education to the children of
Hudson.

Laura, S., Gouveia, M., Bueno, J., Stevens, R., Giron, K.
Nursing
COMMUNITY OUTREACH PROJECT: HEALTHY CHOICES IN BURLINGTON
(Advisor: Margaret Laccetti)

Due to rising obesity rates in Massachusetts, the abundance of unhealthy food choices and the high
socioeconomic status in the Burlington, Massachusetts, this community outreach project was designed
and implemented to offer information regarding healthy food choices to prevent obesity. The target
population was a group of seventh grade students in health class at Marshall Simonds Middle School.
Most families in Burlington have the financial ability to make healthy food choices and this group of
nursing students planned activities based on the developmental level of seventh graders, which included
nutritional information for parents, as well. According to Erikson, seventh graders are in the identity
versus role confusion stage. At this time, children begin to develop a sense of self and are also beginning
to make important choices. This theory gives educators a better understanding of how critical
independence is for this age group. Activities presented in this project prepared the children to
independently make healthy choices by giving them the tools necessary to do so. By using information about portion control, calorie counting, and raising awareness of sugar content in popular drinks, the seventh graders were engaged in active discussions about health and health choices. Upon completion because the children were able to demonstrate use of this information in decision making about health and stated they would apply this information to their daily lives.

Madden, S., Champagne, P., Champey, S., Sliney, J.

*Nursing*

**WALTHAM: TICK TALK! EDUCATING WALTHAM'S SUSCEPTIBLE YOUTH ABOUT LYME DISEASE**
(Advisor: Alison Basmajian)

The purpose of this project is to provide education about tick-borne illnesses. The target population was children aged six to eleven. The presentation took place at the Boys and Girls club in Waltham, MA. The nursing diagnosis was risk for knowledge deficit related to tick borne illness as evidenced by heath statistics. According to the CDC, in the year 2013, the state of Massachusetts was found to have 3,816 confirmed cases of Lyme disease, the second most confirmed cases in the United States (http://www.cdc.gov/lyme/stats/chartstables/reported cases state/locality.html). There were 720 confirmed cases per 100,000 people of Lyme disease in 2013 according to the Mass Department of public health (DPH) in Middlesex County, as well as 267 probable cases per 100,000, the highest in the state of Massachusetts (http://www.mass.gov/eohhs/docs/dph/cdc/lyme/lyme-disease-surveillance-2013.pdf).

According to DPH, the incidence rates of confirmed and probable Lyme disease cases in Massachusetts by age group showed that people from ages five to fourteen, and again people from their forties to late seventies were the highest number of confirmed cases of Lyme disease. The project design utilized interactive learning through our “walk through the grass” activity and visual learning aids; colorful posters of ticks, pamphlets, and take home crossword puzzles. The goal of the education was to inform the target group how to avoid being bitten by a tick, how to remove ticks, how to avoid tick borne illnesses, and treatment of the bite site. At the end of the educational session, the students verbalized their understanding of the education provided about prevention and treatment of tick borne illnesses and were able to verbalize two specific methods of tick bite prevention by the end of the educational session.

The program we implemented at the Boys and Girls club of Waltham in their after school program was successful. We received positive feedback from the Boys and Girls Club staff, children, and their parents. Recommendations for improvement would include running the program at the beginning of the tick season rather than at the end of the season. Future educational needs would include offering tick prevention classes or programs yearly, as Lyme disease is an ongoing issue within the community of Waltham.

Majeski, E., Marshall, O.

*Nursing*

**CO-OP PARTICIPATION AT ELDER SERVICES OF THE MERRIMACK VALLEY, INC**
(Advisor: Lisa Abdallah)

Elder Services of the Merrimack Valley (ESMV), Inc. was established in 1974, seeking to serve adults at high risk of hospital readmissions through coordination of care and to ease the transition back from hospital to home. Through the UMass Lowell Co-op Scholars program, we were given the opportunity to work as transitional coaches (TC) for the Community Care Transitions Program (CCTP) at ESMV, giving us an introduction into the field of geriatric care. Our role as TCs was to complete a home visit with the elder, as well as three follow up calls 7, 14 and 21 days following the initial home visit. Each interaction would emphasize the 'Four Pillars' of CCTP, ensuring that the elder properly understood all medications, was communicating with their primary care physician (PCP), monitoring their signs and symptoms, and documenting their findings in a personal health record. TC's also completed a series of approximately 15
questions from the Care at Hand (CAH) application, which uses a series of questions specialized to a
general diagnosis to monitor symptoms and track progress. Over the course of our 10 week involvement
with ESMV’s CCTP program, we developed our assessment skills, learned how to communicate with
patients, and became more familiar with chronic diseases often seen in with the elder population. This
opportunity opened doors for us as full time TCs at ESMV, in addition to introducing us to the geriatric
field and providing valuable experience as a foray into the nursing world. Key Words: chronic, care
coordination, geriatric

Peabody, S., Agwu, J., Ngo, A., Semiglia, D.

Nursing

BEAT THE BUG: INFLUENZA AND PNEUMONIA EDUCATION IN OLDER ADULTS
(Advisor: Alison Basmajian)

The purpose of this community education project was to provide influenza and pneumonia education to
the older adults of Dracut, Massachusetts. In an effort to reduce the high rate of influenza and pneumonia
complications, the target population was encouraged to receive their vaccinations early in the flu season.
Background: According to the 2010 US Census, senior citizens make up a fifth of Dracut’s population.
Between 2006 and 2009, flu and pneumonia caused 164 illnesses and 19 deaths (Mass CHIP, 2014). Over
a third of Massachusetts’ seniors were diagnosed with influenza in the 2010-2011 flu season
(Massachusetts Health and Human Services, 2014). Older adults are at an increased risk of complications
from influenza and pneumonia, which can cause illness and death. The target population was seniors
attending the Dracut Council on Aging. Methods: The project was designed to focus on primary
prevention of influenza and pneumonia and timed to coincide with the town’s annual flu clinic.
Information was disseminated in a 20-minute poster presentation, which included demonstrations of
proper hand hygiene and cough etiquette. Results: Participants identified knowledge of influenza and
pneumonia prevention, risk factors, and interest in receiving the flu vaccine. Discussion: Influenza and
pneumonia education was provided to the older adults of Dracut in a congregate setting. Teaching senior
residents of Dracut is a valuable method of reducing disease and promoting wellness.

Peckham, M., Horan, M., McKeon, C., McDermott, P.

Nursing

EDUCATION TO PREVENT SEXUAL VIOLENCE IN LOWELL
(Advisor: Alison Basmajian)

The purpose of this project is to educate the UMass Lowell student population regarding sexual violence.
UMass Lowell is a huge contributor to the city of Lowell, bringing in students from all over the state and
country. It is common for students to reside on campus because they live too far away to commute from
home, causing them to be unaware of the potential of sexual assault. A major problem in Lowell is the
high incidence of sexual violent acts that occur. According to the University of Massachusetts, Lowell
(2012), the Annual Security Report for 2011 reports five on campus forcible sex offenses and five
forcible sex offenses in residential facilities. Because students are unaware of prevention strategies they
may be at risk to become a victim of sexual violence. Our Community Health Nursing group
implemented education specifically for UMass Lowell students on how to prevent sexual violence. We
were affiliated with O’Leary Library on South Campus where we displayed a poster with information
regarding ways to prevent sexual violence and how to be safe on/off campus. We also provided pamphlets
regarding ways to prevent sexual violence and what to do if it becomes a problem. Our project was
successful as we engaged roughly 50 students. Students reported that the information was helpful and
increased their knowledge of sexual violence prevention with specific strategies. Using this method we
were able to increase awareness regarding sexual violence, which will provide students a safer learning
and living environment at UMass Lowell.
Rafferty, J., McMahon, D., Iorio, M., Augustus, S.  
*Nursing*  
INCREASING AWARENESS OF UNDERAGE ALCOHOL CONSUMPTION IN THE COMMUNITY OF TEWKSURY, MA  
(Advisor: Alison Basmajian)  

Purpose: The purpose of this community education project is to address the issue of alcohol abuse in the adolescent and school-aged population of Tewksbury, Massachusetts. Background: In the fall of 2014, we began a thorough assessment of the town of Tewksbury. Community data, group observations, and interviews with townspeople gave us insight into the health status of this community. Based on interviews, surveys, and statistics, we were able to discern that adolescents and school aged children were experimenting with alcohol. Methods: Community education will be accomplished by participating in a health fair reaching out to the entire Tewksbury community. Using information provided by the Centers for Disease Control (CDC), education will include the negative effects of alcohol use by the younger population including organ damage, impaired judgment and engaging in high risk behaviors. Prevention methods will also be included to assist parents in addressing this important issue with their children. Emphasis will be placed on non-judgmental and open communication within families. Healthy coping strategies will also be introduced to students to further discourage alcohol consumption. Results: Participation in a community event using proven educational resources and materials is an effective education strategy. We anticipate participants to be receptive to the educational materials and resources provided, and to respond positively to our interventions. Discussion: Ongoing education of this important health concern should be considered as part of health curriculums within this community.

Sicard, K., Hynes, K., Pickett, M., Baier, D., Angelosanto, C.  
*Nursing*  
CARDIOVASCULAR HEALTH IN WILMINGTON, MASSACHUSETTS  
(Advisor: Margaret Laccetti)  

The goal of this community outreach program in Wilmington, Massachusetts was to provide information about a heart healthy lifestyle to promote cardiovascular health in the senior population. Wilmington, Massachusetts age-adjusted rate for cardiovascular disease deaths is 10% higher than the rate of Massachusetts, making this an important project to implement. We implemented our project at the Buzzell Senior Center. First, we facilitated a discussion with information regarding heart healthy exercises, diet, and lifestyle modifications. The seniors asked many questions regarding nutrition and ways to know if they are making a healthy eating choices. We played a trivia game to test the seniors' knowledge of what we just discussed regarding nutrition, exercise and other facts. We provided a trail mix station with Gluten-free Chex Cereal, craisins, raisins, and dark chocolate chips. We also, had a blood pressure station which gave the seniors the opportunity to get their blood pressure checked. We hope that, after our presentation, the seniors will be more conscientious in regards to a heart healthy lifestyle.

Spoto, S., Dowling, J.  
*Nursing*  
WHAT'S IT ALL ABOUT? INTRODUCING NURSING AS A CAREER CHOICE TO ELEMENTARY SCHOOL CHILDREN  
(Advisor: Jacqueline Dowling)  

Background: Little research about introducing nursing as a career to elementary-aged children is published. Teaching children about the work nurses perform helps strengthen their perception about the profession. Objectives: The purpose of this project is to gather information about the knowledge that elementary school-aged children have about nursing before and after reading a children’s story about the
various roles and responsibilities of nurses. Additionally, this project encourages children to pursue a career in nursing. Significance: Introducing nursing as a career at the elementary level gives children insight into a rewarding career, which needs more nurses to ease the current U.S shortage. It is predicted that the shortage will grow by 260,000 RNs by 2025-2026, the years these children will graduate from college. Methods: First and second grade classrooms were visited in the Merrimack Valley where the book Nurses was read. Before and after reading the story, children were asked what they know about nurses and responses were recorded. The demographics of each school and the children’s responses were analyzed. Results: 983 children across 14 schools participated in this project. Before reading, most children had a general understanding of the responsibilities of a nurse. After the reading, the children’s responses became more specific but also broader in view. Conclusion: Based on the before and after responses, the short story readings were successful in increasing children’s knowledge about what nurses do, where they work, and how to become a nurse, as well as introducing them to the nursing profession.

Surette, R., Gabriele, K., Jones, B., McManus, C., Lafranchi, C.
Nursing
LESS STRESS MORE SUCCESS
(Advisor: Margaret Laccetti)

The purpose of this project was to provide information about stress and stress management to high school students. After conducting research about the town of Chelmsford, and collaborating with the Department of Public Health, it was found that stress and anxiety were identified as things that high school students struggle with. High school students were identified as the target population for intervention. Erikson describes this age group as trying to discover themselves while also making important life decisions. In order to address the issue of stress in this population Five UMASS Lowell Nursing students participated in a health fair at Chelmsford High School. A poster presentation and pamphlets shared information with students on stress and how to manage it. We were able to attract the students to our presentation via a snack making station and a brief trivia game. We were able to interact with and share information with multiple students. After participating, students were able to identify stressors in their lives, healthy and unhealthy ways to manage stress and how they could exchange one unhealthy coping mechanism for a healthier alternative. This project would be an excellent choice for future groups to engage in. Through this project, we learned about the function and role of a Public Health Nurse. We also discovered how valuable a public health fair can be in reaching out to a specific population to share information with them on healthy behaviors.

Am, L., Lancaster, E.
Public Health
SOCIAL MEDIA DEVELOPMENT & EXECUTION PLAN FOR UMASS LOWELL’S WELLNESS CENTER
(Advisor: Leland Ackerson)

The main goal of our service learning project was to develop a social media plan for both UMass Lowell's health department and peer health education group: The Healthy H.A.W.K.S. We first researched the social media uses of similar colleges and universities in the United States to grasp what we wanted UML's website to be like. Our end-product goal was to create a newly improved, efficient and visually appealing mock website/ proposal guide for those who are authorized to update and design the actual UMass Lowell health services website. We learned a great deal of different social media uses as well as the major current college health topics. We also gained insight on how to appeal to target audiences, while still making content reliable and accurate.
Harding, C., Shay, E., Hardy, M.
Public Health
GIRLS INC: GUIDING GIRLS TO LIVE HAPPY, HEALTHY LIVES
(Advisor: Leland Ackerson)

Our service learning experience with Girls Inc. consisted of us developing and implementing lesson plans for the Healthy You program. Each week we created age specific lesson plans focused around exercise, stress management, and nutrition for girls between the ages of 5-12. Our service goals were to provide the girls with the knowledge and power to carry on the healthy behaviors in their everyday lives as they continue on with their adolescent years. Another goal was to create educational and hands-on lesson plans that would impact and motivate the girls to demonstrate healthy behaviors by properly handling stress, eating healthy, and being physically active. Our main goal that we wanted to achieve was to improve the overall wellness of the community by inspiring all the girls to live healthy lives while being strong, smart, and bold. We were very in touch with our target population by providing our service to many girls throughout the Greater Lowell area. The learning outcomes we had from working at Girls Inc. mainly included program planning skills from developing and implementing new lesson plans every week. We also learned how to assess the needs of our target population and tailor activities to those specific needs. Our researching and organizational skills were strengthened when designing lesson plans based off similar programs that have already been done. Lastly, our cultural competency skills became further developed by working closely with a diverse target population.

Adejumo, K., Rungu, R., Rivera, I.
Work Environment
LOWELL RISK ASSESSMENT AND EVALUATION PROGRAM
(Advisor: David Turcotte)

Reviews have shown that the older a housing unit, the more likely the risk of harm from environmental home health and safety exposures. According to the 2013 Massachusetts (MA) Childhood Lead Poisoning Prevention Program (CLPPP), Lowell is one of 20 communities in MA designated as a High Risk Community. In recent years, Lowell is experiencing a rising of children with blood lead levels >10mcg/dl (MA CLPPP, 2013). The Federal law first prohibited the use of lead-based paint in residential property in 1978. All housing units built before 1979 are assumed to have lead-based paint hazards from deteriorating interiors and exteriors. Also, based on the 2010 US Census, 59.29% of Lowell residents receive low and moderate income. The Assumption is that the low income population is more likely to occupy older substandard housing units, which commonly have cheap lead-based paints, than people with greater economic means. Therefore, the Lowell Risk Assessment and Evaluation Program (LREAP), in partnership with the City of Lowell Lead Abatement Program (LLAP), aims to conduct a semi-quantitative risk assessment of all potential healthy homes hazards inside and outside the housing units, provide interventions to mitigate / remove such hazards, and evaluate the effectiveness of the program relative to environmental health and safety improvements, knowledge gain and economic cost savings.
Brownmiller, S.
Biological Sciences
HIGH THROUGHPUT CHEMICAL SCREENING OF ZEBRAFISH: NOVEL COMPOUNDS FOR THE TREATMENT OF SCHIZOPHRENIA
(Advisor: Carol Myers)
The purpose of this chemical screen was to attempt to find novel compounds for schizophrenia treatment. This screen was performed on zebrafish larvae seven days post fertilization. Fish were loaded into 96 well plates and subjected to chemical treatment. PCP was utilized to induce schizophrenia-like symptoms in the fish in accordance with the glutamate hypothesis of schizophrenia. The fish's behavior was monitored in response to a cycling strobe light. Untreated fish had a natural freeze response during the periods of strobe lighting, which in turn was lost when PCP was administered. Additional chemicals were administered in order to try and revert the fish to their normal behavior. The fish's motion patterns were recorded and transferred to a motion index to visualize which chemicals were able to rescue the fish's natural freeze response. Almost 10,000 unique chemicals were screened, and potential hits from the screen underwent further testing and identification.

Bradley, C.
Biological Sciences
ANALYSIS OF FRESHMEN BIOLOGY UNDERGRADUATES' METACOGNITIVE AWARENESS IN RELATION TO SEMESTER GRADES
(Advisor: Naomi Wernick)
Metacognition refers to a student's ability to understand which strategies are most beneficial in their everyday learning (Flavell, 1979). This study assesses the possible correlation between biology undergraduates' metacognitive awareness and their success in introductory biology, using final grades as a measure of success. Metacognitive awareness will be determined using the Metacognitive Awareness Inventory (Schraw & Dennison, 1994), which provides statements related to a student's knowledge about cognition and regulation of cognition. Knowledge about cognition focuses around a student's declarative, procedural, and conditional knowledge. Whereas regulation of cognition focuses around five different competencies that include planning, information management strategies, comprehension monitoring, debugging strategies, and evaluating (Schraw & Dennison, 1994). Preliminary data suggests that A-B and C-D students differ in their knowledge of certain aspects in regulation of cognition. Specifically, students receiving grades in the A-B range (n=12) struggle with strategies pertaining to planning, information management, monitoring, and evaluation. While, students receiving grades in the C-D range (n=5) had difficulty with evaluation. Within the knowledge about cognition component A-B students struggled with strategies related to declarative and procedural knowledge and C-D students did not demonstrate any difficulty. At the beginning and end of the 2015 fall semester this inventory will be sent to all biology undergraduates in introductory biology. Data will be analyzed to determine if students' metacognitive strategies change over the course of the semester and what possible impact this has on semester grades.
Giadone, R., Pelletier, M., Malu, K., Gaines, P.

Biological Sciences

STUDYING THE EFFECTS OF ABERRANT LAMIN A/C AND SUN2 EXPRESSION ON THE DEVELOPMENT AND FUNCTIONALITY OF MOUSE NEUTROPHILS
(Advisor: Peter Gaines)

The linker of nucleoskeleton and cytoskeleton (LINC) complex is comprised of proteins spanning the inner and outer nuclear envelope (NE). The LINC complex provides anchorage and a means of physical communication between the cytoskeleton, the nuclear lamina beneath of the NE, and chromatin. Mutations in constituents of the LINC complex lead to a wide variety of disease phenotypes – from Emery-Dreyfuss muscular dystrophy to Hutchinson-Guilford Progeria Syndrome. Our laboratory has discovered that multiple components of the LINC complex, including SUN2 and Lamin A and C, are differentially expressed during the maturation of blood neutrophils, critical mediators of innate immunity. Interestingly, expression of Lamin A and C, initially expressed in immature cells, rapidly declines while expression of the NE-spanning protein SUN2 dramatically increases. Additionally, increased SUN2 expression coincides with that of the lamin B receptor, another NE protein critical to neutrophil differentiation. To investigate possible roles for A-type lamins and Sun2 in neutrophil maturation and differentiation, we stably overexpressed each protein in two mouse myeloid cell lines, early progenitor Erythroid-Myeloid-Lymphoid (EML) cells and more mature MPRO (murine promyelocyte) cells. Cells were analyzed for nuclear morphologic changes during differentiation, and functional capacities as mature cells. We show that overexpression of either A-type lamin causes a severe loss in nuclear segmentation typically seen in normal mature neutrophils. In contrast, cells overexpressing Sun2 showed no aberrant nuclear maturation. To date, we have found that overexpression of Sun2 has little effect on neutrophil functional capacities, whereas overexpression of either A-type lamin disrupts several functions. These studies demonstrate that loss of A-type lamin expression is required for normal neutrophil differentiation, but roles for increased Sun2 expression in developed phagocytes remain unclear. Current studies focus on knocking down Sun2 gene expression to identify whether loss of this or other LINC complex proteins impact overall neutrophil development.

Gulcius LaGoy, S.

Biological Sciences

EFFECTS OF AN ENRICHED, SOCIAL ENVIRONMENT ON RECOVERY FROM TRAUMATIC BRAIN INJURY
(Advisor: Carol Myers)

Traumatic brain injury (TBI) is a mentally and physically debilitating disorder that is caused by strong impact to the head. TBI is a prevalent disorder resulting from incidences like car accidents, sports, and military combat. No decisive treatment option has been developed, due to the complexity of TBI and its secondary effects. This study examines a non-medicinal healing technique for TBI, involving exposure to different environmental and social conditions. Closed-head injury (CHI), a form of TBI, was inflicted on mice in order to examine the detrimental effects of injury on memory and cognition. Once given CHI, subjects were placed in either an isolated, standard environment (STD) or a social, enriched environment (EE). Improvement or decline in memory and cognition were observed for four weeks after injury through performance in two behavioral tests: standard Y-maze and Novel Object Recognition (NOR). Results showed that placement in EE led to increased recovery from brain injury in comparison to placement in STD. This study was compared with similar studies in a meta-analysis. Overall, it is consistently shown that exposure to an enriched environment with social interaction leads to optimal recovery from brain injury. Studies like these may have great impact on how rehabilitation regimens for those with brain injury and brain illness will be designed.
Matte, T., Wernick, N.

Biological Sciences
FIRST YEAR BIOLOGY: DEVELOPMENT AND ASSESSMENT OF A FRESHMAN SEMINAR AND ANALYSIS OF STUDENT CONFIDENCE
(Advisor: Naomi Wernick)

Improving retention rates in science, technology, engineering, and mathematics (STEM) fields has become a nation-wide priority at undergraduate institutions. To aid in STEM retention efforts, all incoming biology students at University of Massachusetts Lowell are required to take Freshman Seminar in Biology, a college preparatory course geared for biology students. Recently, significant efforts have been taken to improve the course in order to facilitate the transition from high school to higher education. Specifically, the focus was to adequately prepare students for the rigorous biology major. Based on previously published freshman seminars as well as Vision and Change (AAAS), seven main goals for the course were devised: career planning, self-esteem building, goal setting, learning strategies, self-management, interpersonal relationship development, as well as biology-specific skills. To gauge the effectiveness of this course, a pre- and post-survey were developed, with questions measuring competence in the main goals devised. Results from the 2012 post-survey indicate that students (n=59) felt freshman seminar increased their ability to set realistic goals (78%), academic motivation (64%), understanding of biology's role in society (83%), and ability to work in groups (63%). After adjustments were made for the following year, a number of goals were improved upon in the seminar. Furthermore, preliminary results indicate that overconfident students perform undesirably in their freshman introductory biology course; further investigation is underway.

Nadile, E.

Biological Sciences
INVESTIGATING STUDENT MOTIVATION STYLE IN AN INTRODUCTORY BIOLOGY COURSE
(Advisor: Naomi Wernick)

This study examined the academic motivation, or self-determination, of students transitioning from high school to college. Self-determination theory concerns the extent to which behaviors controlled by motivation are autonomous (intrinsically based) or controlled (extrinsically based). By investigating the motivations behind student participation in their own learning, instructors and students can further understand the ways in which they are motivated. Both intrinsic and extrinsic motivational factors were assessed using the Learning Self-Regulation Questionnaire (LSRQ) adopted from Black and Deci (2000). Students were asked to evaluate those factors that underlie their efforts to succeed in an introductory biology course. Pre and post-surveys were administered at the start and completion of the course, and student grades were also collected. We hypothesized that students who received an A or B in high school biology would be more extrinsically motivated by the reinforcing nature of grades, and external sources of praise or pressure. We also hypothesized that C, D, and F students may be more intrinsically driven, by focusing on material of interest instead of current topics being assessed. Preliminary results suggest that for all students, the highest response averages were mainly associated with intrinsic motivation, and the lowest response averages were associated with extrinsic motivation. Future research will investigate if students' grades previously received in high school will impact the way in which they are motivated in their college introductory course.
Negron, Alicia
Biological Sciences
THE HEALTH OF THE MERRIMACK RIVER: PROJECT-BASED INSTRUCTION IN HIGH SCHOOL BIOLOGY
(Advisor: Eliza Bobek)

Project-based instruction is becoming increasingly popular in classrooms because it is a comprehensive approach in which students engage in investigations of authentic, real-world problems. This study was an investigation of the value of project-based learning through the creation and implementation of a project-based unit for ninth grade biology students at Greater Lowell Technical High School. The classroom used for this study was an inclusion classroom in which more than half of the students had learning disabilities or were English Language Learners. In this unit, students examined how water flows through a watershed and studied how the processes of the water cycle affect pollution in the Merrimack River. The first two lessons of the unit focused on exploring the water cycle and topographic mapping using interactive web tools. The third lesson was a field trip to the Tsongas Industrial History Center in Lowell, MA, where students conducted a laboratory experiment in which they tested how groundwater flows and the effects of pollution. In the final lesson the students tested local water for turbidity, dissolved oxygen content, nitrates, and more to make conclusions about the health of the Merrimack River. The results gathered at the end of the unit indicate that project-based instruction can be an effective method of teaching high school students key science concepts put forth by the Next Generation Science Standards.

Nguyen, S., Dewilde, A., Fish, B., Moulder, J., Medhora, M., Tries, M., Braunhut, S.
Biological Sciences
MITIGATING AGENT EFFECTIVE AFTER LOW LINEAR ENERGY TRANSFER (LET) RADIATION (GAMMA, X-RAY) INVESTIGATED USING A RAT MODEL OF NEUTRON-GAMMA RADIATION-INDUCED LUNG PNEUMONITIS
(Advisor: Susan Braunhut)

Post detonation of an improvised nuclear device (IND) or reactor leak, significant neutron-gamma radiation exposure can occur (1). Survivors of these exposures experience a well-described series of organ pathologies including bone marrow depletion, gastrointestinal (GI) syndrome, lung pneumonitis and/or kidney failure, any of which can be lethal (2,3). Research is essential due to the rising potential threat of an IND attack (3). Neutron is 3-10 times more damaging than gamma, proving a higher relative biological effect (RBE) (4,5,6). Since the Cold War little development of medical countermeasures with efficacy has occurred for neutron-gamma exposures (2,3). Our research studies the biological effect of mixed neutron gamma irradiation and the effectiveness of mitigators in preventing radiation-induced lung pneumonitis. Adult female Sprague Dawley and Dahl/SS rats received total body irradiation with varying doses of mixed neutron and gamma radiation (1.75-12 Gray equivalent assuming an RBE of 1.75). The rats received an autologous bone marrow transplant after irradiation to avoid bone marrow depletion. Post irradiation the rats were housed in sterile housing for two weeks. Supportive care (Baytril and subcutaneous fluids) was administered to avert GI syndrome deaths in the first week. Animals were separated into an unmitigated and mitigated group, which received Lisinopril (40mg/L) seven days post irradiation. Lisinopril has proven efficacy with gamma and x-ray irradiation. Weight loss was monitored post irradiation and upon death or euthanasia, necropsies were performed. The results obtained from the neutron-gamma irradiation model, and preliminary data of mitigation agent efficacy will be presented.
The Kemp's ridley (Lepidochelys kempii Garman, 1880) is the smallest and most endangered species of sea turtle. One of the threats to these animals is the phenomenon known as cold-stunning. In sea turtles, cold-stunning results from a hypothermia-like state. This condition regularly occurs in juvenile ridley turtles along the northern coast of Cape Cod, where they are found each winter stranded on beaches. When turtles are located they are transported to the New England Aquarium for rehabilitation, however mortality rates are high. This annual event provides a unique opportunity to investigate the infracommunity of metazoan parasites found within the deceased turtles. Molecular identification of the parasites was attempted using PCR amplification of the COI gene. High amplification yields were achieved via a nematode-specific primer cocktail. Sequencing results were used to construct phylogenetic trees to aid in specimen identification and to determine the taxonomic relationships among the parasites present. Of the specimens investigated, most belonged to the nematode genus Anisakis. This roundworm parasite is common in fish and marine mammals, but sea turtles may be accidental or novel hosts. Our analyses provide insight into the biodiversity of the parasite communities found within the Kemp's ridley. These results further the understanding of Kemp's ridley sea turtle ecology and will aid in treatment decisions for the juvenile cold-stunned turtles undergoing rehabilitation.

The MinION is the first commercially available nanopore DNA sequencing device released for preliminary testing by Oxford Nanopore Technologies in 2014. Unlike other sequencing methods based on detecting DNA synthesis, the MinION measures the translocation of a DNA strand through a pore on a membrane. An electric potential is applied across the membrane, and the change in current as the DNA interrupts the flow of ions through that pore is measured and associated with a specific set of bases. The MinION has the potential for extremely long individual reads while also being small, portable, and designed to operate through a USB port. A single run of a sequencing library constructed from control lambda phage DNA resulted in 6514 sequences with a largest single read of 22 kilobases. Alignment of those sequences to a reference lambda genome with LAST resulted in 229X coverage. A combination of 3 total runs of 2 libraries made from a 41.5 kb fosmid containing Latrodectus hesperus genomic DNA yielded 1488 sequences with a largest single read of 73.6 kb. De novo assembly using the Celera Assembler of those reads yielded a putative 30.3 kb sequence that was aligned using Blastn with 70% of the known fosmid sequence with 85% identity.

Our team's goal was to redesign the clothing donation system of the Lowell Transitional Living Center (LTLC), a homeless shelter in downtown Lowell, and create a sustainable procedure for clothing distribution into the future. The LTLC had suffered years staffing shortages, causing the shelter's
basement to be piled with of trash bags of disorganized clothes. To accomplish our goal, we took
measurements of the basement and worked with staff to design a floorplan to clothing-sorting. We then
each spent about 40 hours discarding old/soiled clothes, discarding actual trash that had become mixed-in,
and folding, sorting, and labelling the remaining clothes. After this work, we were able to fulfill six
months-worth of unfilled clothing requests in under 4 hours. We're now in the process of ensuring our
clothing organization, retrieval, and distribution systems remain maintained by the staff and volunteers in
years to come.

Ainsworth, G., Mahini, H., Alaimo, H., Jamil, N., Garelnabi, M.

Chemistry
ROLE OF DIETARY OXIDIZED LIPIDS INTAKE ON PLASMA LIPIDS
(Advisor: Mahdi Garelnabi)

Hyperlipidemia affects significant number of people and is shown to result in atherosclerosis; oxidized
lipids have been hypothesized as a factor. Oxidized lipids, specifically, Oxidized Linoleic Acid (OxLA)
have been shown to be therapeutic against both hypertriglyceridemia and atherosclerosis, in mice. They
modulate plasma lipoproteins including lowering plasma triglycerides and raising good HDL-cholesterol
(HDL-C.) In this study, we are looking to discern the mechanism by which the modulation happens.
Experimental Design: For 10 weeks, C57Bl6 mice (n=40) were monitored for food availability, weight
and health checks, before being sacrificed. Groups of 10 mice were separated by diet and fed either
normal chow or diets formulated with varying amounts of fatty acids, Linoleic Acid (LA) or OxLA: Plain
Control (P) was fed standard chow; Control (C) chow contained 18mg/day/mouse of LA; the Low OxLA
(A) chow contained 9mg/mouse/day of OxLA; the High OxLA (B) chow contained 18mg/mouse/day of
OxLA. Once sacrificed, plasma, adipose and livers were collected and analyzed for lipid concentrations
and expression of genes related to lipoprotein metabolism. Results and Conclusion: The plasma showed
significant modulation of apolipoproteins associated with lipid metabolism. ApoC3 was decreased in a
significant dose- dependent manner for OxLA-fed mice (High P<0.01 and Low P<0.05; High Vs Low
P<0.05) compared to the LA. ApoA5 increased, though not significantly, in all formulated diets, with the
highest amount of plasma ApoA5 in the High OxLA group. There was a decrease in the levels of plasma
triglycerides for the High OxLA mice, though it was not significant. Significant dose- dependent
decrease in plasma Hepatic Lipase occurred for the OxLA-fed mice (High P<0.05 and Low P<0.05)
compared to the plain control mice. Triglycerides, LDL (P<0.007,) and total cholesterol (P<0.007) were
the only lipids that showed decreases for the High OxLA-fed mice compared to the LA group. This study
demonstrates that an ApoC3/Hepatic Lipase-dependent mechanism is likely what is causing modulation
in lipoprotein metabolism and cholesterol levels.

Stephens, J.

Chemistry
STE. JEANNE D’ARC ELEMENTARY SCHOOL SERVICE-LEARNING PROJECT: LES JEUNES
ÉTUDIANTS DE L’ÉCOLE STE. JEANNE D’ARC
(Advisor: Danielle Boutwell)

As part of my Advanced French Conversation and Composition class, I participated in a Service-Learning
project at Ste. Jeanne D’Arc Elementary School. For nine weeks I served at the private French Catholic
school, which is located in Lowell, MA. Through this project I was able to work with students in
kindergarten, fourth, fifth, and sixth grades. Working under Mme. Steenland, the school’s French
language teacher, I helped to instruct new concepts and vocabulary and aid students with comprehension
and pronunciation. For the kindergarten children, games, songs, and interactive smart board activities
were used to introduce and reinforce new material, while the older children used worksheets and listening
comprehension exercises. Working with the children at Ste. Jeanne D’Arc has allowed me to practice and
expand on my vocabulary and grammar learned as a French student at UMASS Lowell. I have enjoyed
the opportunity to work in a classroom environment and am amazed by the eagerness to learn and proficiency of these children learning French at such a young age. This Service-Learning experience has made me wish I had this type of opportunity in my elementary school, and I will continue to volunteer to help maintain this valuable language learning.

Ford, C., Swanger, K.
Environmental Sciences
THE EFFECTS OF SOLAR INDUCED THERMAL FATIGUE AND STRESS ON COSMOGENIC NUCLIDE PRODUCTION IN HIGH-ALPINE CIRQUES, OLYMPUS RANGE, ANTARCTICA
(Advisor: Kate Swanger)

We investigated the effect of surface weathering processes on cosmogenic nuclide chronologies in the high-elevation McMurdo Dry Valleys of Antarctica. A suite of stratigraphically correlated drifts and moraines record Pleistocene fluctuations of cold-based alpine glaciers within the adjacent ~2-km wide cirque valleys in the Olympus Range. Chronologic control comes from helium isotope measurements from pyroxenes in dolerites from four moraines in Diboye Cirque. This sequence provides a preliminary He³ chronology ranging from ~200 kyr to ~2.4 Myr ago; ages increase away from the modern glacier, but all moraines exhibit age scatter. The goal of this study is to isolate the influence of 1) nuclide inheritance, 2) complex burial histories, and 3) thermal stress erosional processes. Weathering studies were focused on erosion and surface rind development on dolerites and sandstones. We measured temperature fluctuations in boulders at 2-cm depth increments during periods of full sun, shade, and episodic cloud cover to quantify the influence of solar radiation on weathering. In order to investigate the role of local topography, we used ArcGIS to model solar incidence and intensity during the austral summer months of November and December. Results show that intermittent cloud cover can cause temperature fluctuations of >40°C and that dolerite surface temperatures can change by >2°C/min, causing repeated stress on the rock. We expect relative age scatter caused by thermal fatigue to be more pronounced on younger drifts as fresh rock cores are exposed and less pronounced in older drifts as total nuclide inventories increase and average clast sizes decrease.

Renaud, C. Farese, M., Gamache, R.
Environmental Sciences
CONSTRUCTION OF DEUTERATED WATER ISOTOPOLOGUE LINE LIST TO AID MARS ORBITER MISSIONS
(Advisor: Robert Gamache)

There is a need for measurements of HDO broadened by CO2 to interpret Mars data from the Mars Reconnaissance Orbiter onboard the Mars Climate Sounder and future data from the Trace Gas Orbiter of the ESA ExoMars mission. In these measurements the presence of doubly deuterated water, D2O, must be accounted for to reduce the spectra. The present study will enhance the theoretical databases of line shape parameters for the H2O-CO2 and HDO-CO2 systems, calculate D2O-CO2 line shape parameters and create line lists for these molecules in the 1100-4100 cm⁻¹ range. The quantum transitions for H216O, H218O, H217O, HD16O, HD18O, and HD17O are from the 2012 HITRAN database [JQSRT 130, (2013) 4] and those for D216O are from the ab initio line list of Shirin et al. [JQSRT 109 (2008) 549]. The database was constructed using the best available measured parameters, augmented with theoretical calculations. The half-width, γ, its temperature dependence, n, and the line shift, δ, are for CO2 as the colliding partner and for self collisions. The resulting database was constructed using the best available measured parameters and augmented with theoretical calculations. The line list is for the seven isotopologues of water in the 1100 to 4100 wavenumber range and contains 299,821 transitions. This project is a collaboration between UMass Lowell, the College of William and Mary, NASA Langley Research Center, and the Jet Propulsion Laboratory to aid the upcoming ExoMars Trace Gas Orbiter mission. The final database, incorporating HDO measurements, will be provided to the ExoMars team.
Baturin, A., Bellerose, S.

*Mathematics*

**ANALYZING SLOPE TO DETERMINE IF PRODUCTION IS SUCCESSFUL**
(Advisors: Eliza Bobek & Michelle Scribner-MacLean)

UTeach is a teacher preparation program that focuses on inquiry-based learning. UTeach interns created a unit plan by using Backwards Design, which is a method of curriculum design in which the teacher first creates a goal, and then instructional activities are created to support that goal. The goal of the unit was to answer the question, "How can we analyze slope to determine if a business' production is successful?" This unit was created for an inclusion Algebra I class at Greater Lowell Technical High School in Tyngsboro, MA. The unit consisted of two introductory lessons, a field trip to the Tsongas Industrial History Center, and a group project in which students analyzed data and presented a business plan. The students were able to gain content knowledge and achieve academic objectives through real-world experience creating meaningful learning.

Burke, C.

*Mathematics*

**LA VIE EN FRANÇAIS--FRANCO-AMERICAN LIFE ACROSS NEW ENGLAND, THEN AND NOW**
(Advisor: Carole Salmon)

This poster showcases the sociolinguistic project that I worked on for my research co-op experience under the mentorship of Dr. Carole Salmon, associate professor of French Studies in the Department of World Languages and Cultures. I transcribed interviews in English from the bilingual Salmon-Dubois 2011 Franco-American Corpus and to learn more about the history of this community across the six States of New England. This corpus covers seven decades of speech in both French and English in apparent time. While transcribing, I took notice of the importance of the gender roles, and how they tied in with both family life and education in these communities throughout several generations. In my poster, I explore the relationship between these three social factors and their impact on our interviewees' lives. This study compares the theoretical and stereotypical representations of the Franco-American identity as described in the literature on the subject with the specificity of our speakers who do not always fit that model. This program allowed me to gain a yearlong research experience for the first time in my undergraduate career. It was a wonderful experience that I am so proud to have been a part of. On a personal level, I have drawn countless parallels between the families I have learned about and my own, which has helped me to understand and recognize how the immigrations of my grandparents and great-grandparents have shaped me into who I am and who I identify with as a people today.

Flynn, J., Bustin, K.

*Mathematics*

**HOW DO BUSINESS FACTORS INFLUENCE THE PROFIT IN A POSITIVE OR NEGATIVE WAY?**
(Advisors: Michelle Scribner-MacLean & Melinda Willis)

The poster I am submitting in the Student Symposium shows what I did for my Project-Based Instruction course. The learning done through Project-Based Instruction is hands-on; high school students learn through the exploration of different concepts that will help them solve real-world problems. We created three lessons on linear equations using data that were collected at the Tsongas Industrial History Center in the "Workers on the Line" interactive exhibit. The students were able to use the equipment in the exhibit and role play what it was like to work in a production line during the industrial revolution. My teaching partner and I gave the students different scenarios paired with different time frames in which the students had to make as many paper towels as they could following the quality guidelines that they set for themselves. Using these data, we wanted the students to be able to create a linear equation for each trial
and analyze each line in order to determine which trials produced the most paper towels. The project connected real-world issues that businesses face such as how to optimize a production method to create the most amount of sellable products.

**Pham, A., Katsaros, G.**
*Mathematics*

**HOW CAN MATHEMATICS HELP DEMONSTRATE TO BANK/INVESTORS THAT THEY ARE WORTH THEIR INVESTMENT**
(Advisor: Michelle Scribner-MacLean)

As part of a Project-Based Instruction course, a high school mathematics unit was designed to show students that mathematics surrounds them in their daily lives. The main goal was to create a unit that would refine students’ data collection skills and focus on sharpening their analytical, critical, and conceptual ideas. We created, structured, and implemented 4 lessons around a field trip to the Tsongas Industrial History Center. Students worked in groups to simulate multiple areas of business, from owning and managing of a food restaurant to working on an assembly line. These lessons required students to think about businesses through a mathematical point of view. Creating the first lesson to reinforce early algebraic concepts helped assess student knowledge. The next lesson had students analyzing and predicting future trends of a business. This lesson applied a multitude of algebraic concepts learned in the prior lesson. The following lesson revolved around a field trip to the Tsongas Industrial Center History Center. This hands-on lesson had students working on an assembly line creating towel. Using data the students collected, they analyzed and predicted future trends. The final lesson was a follow up where students presented their project data. In their presentation students answered questions such as “How can analyzing data help us understand and anticipate outcomes?” The unit were a success, through their presentations students were able to demonstrate their knowledge of the unit.

**Oram, K., Cook, T., Lewis, N.**
*Physics*

**EVALUATION OF AN INSTRUMENT DESIGN FOR CHARACTERIZING EXOPLANET ATMOSPHERES THROUGH TRANSIT SPECTROSCOPY: AN INSTRUMENT COMPLEMENTARY TO THE NEW MEXICO TECH EXTRASOLAR SPECTROGRAPHIC SURVEY INSTRUMENT**
(Advisor: Timothy Cook)

The focus on exoplanets in astronomy has grown immensely in recent years. Advancements in technology have allowed for increasing numbers of exoplanets to be observed. So far, space-based instruments such as Kepler or the Hubble Space Telescope have led the way in detecting and observing exoplanets. However, getting observing time on instruments like these is difficult, and building a new space-based instrument is extremely costly. Ground-based instruments present a cost-effective solution for meeting the increasing demand for exoplanet studies. We present a potential design for a spectrograph complementary to the New Mexico Tech Extrasolar Spectrographic Survey Instrument (NESSI). NESSI is a ground-based instrument that measures the transmission spectra of transiting exoplanets in the wavelength range of 1.0-2.4 μm. The scientific purpose of NESSI is to characterize the atmospheres of transiting exoplanets. However, in order to complete the characterization of planetary atmospheres, an instrument needs to be developed to measure transit spectra for the wavelength range 0.35-1.0 μm. By extending the range of the instrument into the blue end, more data can be gathered to use in determining the atmospheric scattering processes as well as important absorption features of molecular species. The challenge in designing this instrument is to maximize sensitivity in the blue end of the spectrum without saturating the red end. The design evaluated in this report is of a spectrograph made from a grism and CCD detector. The instrument is evaluated for its ability to achieve the wavelength range and sensitivity necessary to meet the scientific goals.
Park, J., Sudur, F.
Polymer Science
COVALENT FUNCTIONALIZED GRAPHENE NANOCOMPOSITES AND THEIR APPLICATION
(Advisors: Nese Orbey & Mingdi Yan)

The superior properties of graphene, such as high carrier mobility, high electrical and thermal conductivity as well as stability, make it an excellent candidate for the fabrication of nanocomposites. The nanocomposites offer synergetic enhancement of material properties that may not be possible from each individual component. To this end, graphene nanocomposites have the potential to meet increasing demands for thermal management materials used in heat sinks in aerospace and military applications and in electronic industry as functional materials for electromagnetic interference shielding, antistatic dissipation (against lighting strike), capacitors, sensors and actuators. The most current graphene nanocomposite are based on graphene oxide (GO) because of their easy processability for functionalization. However, GO have permanent structural damage induced by harsh oxidation process that cannot be restored after reduction. As a result, conductivity and carrier mobility of reduced GO at room temperature decreases by 3 and 2 orders of magnitude, respectively. In this research, we have developed a new method for covalent functionalization of graphene with polymeric materials that eliminates the above mentioned disadvantages. Samples are characterized by SEM, TEM, FT-IR, Raman spectroscopy, XPS, EDS, and XRD. The electrochemical properties and their application in nanocomposites will also be studied. Preliminary results obtained to date will be presented.

Francis College of Engineering

De Jesús Vega, M.
Chemical Engineering, Plastics Engineering
IMPACT OF MICROFLUIDIC DEVICE MATERIAL ON CELL SEPARATION
(Advisors: Nese Orbey & Carol Barry)

Microfluidic devices are capable of performing a complete blood analysis in which the first step is the separation of white blood cells (WBCs) from red blood cells (RBCs). Due to the difference in the size of the WBCs and RBCs this cell separation can be performed by size exclusion using cross-flow filtration in the microfluidic device. The characteristics of the materials used in fabrication of the microfluidic device, however, may affect the separation of the WBCs and RBCs. This work was an investigation of the effects of the polymer material (polydimethylsiloxane, polystyrene, polymethylmethacrylate, and polycarbonate) used to manufacture the microfiltration device on its performance. Device characteristics, including polarity, surface roughness, porosity, feature dimensions, and cell separations efficiency were compared for the different materials. The efficiency of separating WBCs while discarding RBCs was evaluated using video microscopy of colored microspheres.

Reimonn, T.
Chemical Engineering
GENOME-SCALE DYNAMIC FLUX BALANCE ANALYSIS OF HYBRIDOMA CELL CULTURES
(Advisor: Seongkyu Yoon)

Dynamic flux balance analysis (DFBA) is a powerful technique to characterize intracellular reaction fluxes during microbial fermentation processes. DFBA consists of optimizing the biomass production rate subject to the constraints of linear stoichiometry system and extracellular media uptake/excretion rates. The benefit of DFBA is that it can calculate intracellular reaction fluxes as they change during
fermentation processes. A series of informed amino acid supplementation experiments were performed by
the FDA and the data made public for further analysis. In order to understand the effects of media
changes in the Mus musculus cell line, a dynamic flux balance analysis was performed on the 12
fermentation experiments using a genome-scale mouse metabolic model during the growth phase. The
calculated reaction fluxes were examined using principal component analysis (PCA) and partial least
squares regression (PLS). The results indicate that amino acid supplementation has little effect on the
metabolic state of the cell culture during growth, and increases product yield by preventing depletion of
critical nutrients towards the end of the culture. Additionally, the DFBA shows that metabolic state varies
more at the beginning of the culture but less by the middle of the growth phase.

Shah, P.
Chemical Engineering
QUANTITATIVE DETERMINATION AND ANALYSIS OF PYROLYSIS PRODUCTS FROM A TWO-
ZONE PHENOL-FORMALDEHYDE RESIN AND CARBON PREFORM REACTION
(Advisor: Hsi-Wu Wong)

Pyrolysis of phenol-formaldehyde (PF) resins is one of the most common processes to produce carbon or
carbon/carbon composites. On the other hand, carbon impregnated PF resins are also commonly used as
ablative and friction materials for aerospace applications. In both scenarios, detailed kinetic understanding
of the chemical interactions at high temperature between the pyrolysis products and carbon structure
resulted from pyrolysis is essential. In this work, pyrolysis of a resole PF resin and carbon preform was
performed in a two-zone custom-made batch reactor, with the lower zone holding the PF samples and the
upper zone holding carbon preform samples. The reaction is carried out in a two-zone heating furnace.
The temperature difference between the two heating zones was set to be constant (upper zone kept at
higher temperature) based on temperature distribution and the thermal equilibrium data. Samples in both
zones were exposed to different temperatures and pyrolysis reaction was performed using a step-wise
heating procedure for both heating zones. The mass loss of the samples was determined after every step,
and the production of the gas-phase and liquid-phase species was quantified and analyzed using gas
chromatography and mass spectrometry techniques.

Sudur, F., Orbey, N.
Chemical Engineering
HYDROGEN PEROXIDE STABILITY IN SILICA HYDROGELS
(Advisor: Nese Orbey)

Hydrogen peroxide (H2O2) is an environmentally friendly oxidant with applications ranging from
sterilization to catalysis, however its stability is limited due to its propensity to disproportionate
exothermally into oxygen and water. Providing better stability would enable new applications that are
currently not practical due to the instability of H2O2. Silica xerogels has a high potential of increasing the
stability of H2O2. In the present work, silica hydrogels are synthesized to entrap H2O2 upon
polymerization and drying of ion exchanged sodium silicate solution. Stabilization of H2O2 in hydrogels
is due to strong hydrogen bonding between H2O2 and the silica network as well as entrapment inside the
pores. In this study, the gel formation stage before hydrogel synthesis and the factors affecting gelation
are studied. Optimum conditions for hydrogel formation and H2O2 stability are determined by varying
the sodium content and initial H2O2 concentration. The resulting hydrogels retain variable, but significant
fractions of H2O2 when stored at room temperature. Specifically, retention values of 89% were obtained
for initial H2O2 concentrations of 10wt%. Hydrogels are characterized by measuring their surface area,
pore size and pore size distribution using Brauner-Emmet-Teller (BET) analysis and using scanning
electron microscopy (SEM).
As electronic devices are getting smaller, lighter, and smarter, new assembling and packaging techniques are needed to integrate and accommodate all electronic components in a single device. Nano-soldering is an enabling technology to integrate smaller components in next generation electronics assembly and manufacturing processes. This project focuses on developing a green lead-free and halogen-free nanosolder paste by using Sn/Ag/Cu (SAC) nanoparticles to replace the conventional solder paste, which is composed of toxic and hazardous materials, including micron sized tin-lead solder balls and halogen-based flux material. The lead-free solder nanoparticles may have decreased melting temperature, which can potentially lower the electronic manufacturing temperatures and make the soldering process more energy efficient.

Beginning in 2013, the University of Massachusetts Lowell American Society of Civil Engineers (ASCE) student chapter has been working with the Town of Lexington's Department of Public Works (DPW) Engineering division. The partnership has consisted of approximately 30 UMass Lowell students collecting and analyzing water samples from Shawsheen River watershed outfalls. The students are divided into field sampling teams, known as Stream Teams, and a data analysis team. Field sampling teams record various conditions at the time of sampling, perform field tests, and collect water samples for laboratory testing. Laboratory testing is used to determine the presence and/or quantities of Escherichia coli (E.coli), surfactants, and ammonia. With the recent addition of a YSI meter and Chlorimeter, field interns can now perform Dissolved Oxygen (DO), specific conductivity, and chlorine tests at the outfalls. Elevated concentrations of these parameters are used as indicators to determine the source of contamination into the stormwater system. As of March 2015, new field teams are consistently collecting samples. The data analysis team will begin working closely with the Lexington Engineers to find patterns in the data to identify potential pollution sources. Through this collaboration, the Town of Lexington is able to satisfy EPA regulations and provide real world experience to the students. It is hoped this program can serve as a model for other municipalities seeking to meet the EPA unfunded stormwater mandate.

Noble metals, in particularly gold and silver, have been broadly employed in optical metamaterials. This is in large part because in these metals, the free electrons necessary to support resonances are high enough concentrations to resonate at near-infrared, visible, and ultraviolet frequencies. Unfortunately, the same resonances that give these exotic optical properties introduce high losses, and limit overall performance of devices. In recent years, several attempts have been made to reduce these unwanted high losses. Researchers have been proposed a variety of material sets as alternative plasmonic materials as well as different studies have been also conducted to suppress the optical losses in different materials, including negative index materials. Nevertheless, these approaches are very challenging and appear to be far to resolve the optical losses problem. A novel method has been introduced to reduce the optical losses in
noble metals as well as in semiconductors. The technique is known as the parametric two-wave coherent coupling. The mechanism is based on classical thermodynamic. The theoretical and analytical study of the mechanism has already been published, and the experimental proof of the mechanism in the Mid-IR has been reported as well. In the current work, the parametric two-wave coherent coupling technique consists of a support wave which is provided by a Nd-YAG laser at 1.064 μm, and the probe wave at 0.532 μm which is generated from the non-linear optical crystal KTP. By adjusting the phase shift between the probe and support waves, and their amplitudes, the optical losses can be significantly suppressed.

Bhatta, A., Thompson, C., Chandra, K.
*Electrical & Computer Engineering*

**IMAGE SOURCE MODEL FOR SMALL ROOM ACOUSTICS**
(Advisors: Charles Thompson & Kavitha Chandra)

In this investigation the impulse response obtained using exact solution comprising of the ILT (Inverse Laplace transform) of the direction cosine of the incident angle is undertaken. The results are compared to those obtained by Allen and Berkley (JASA, v.65, p. 943-950, 1979). In addition frequency dependent wall impedance effects are considered. Numerical efficiency and accuracy of the image solution are evaluated.

Miniter, J.C., Mehta, V.
*Electrical & Computer Engineering*

**DETECTING CYBER CONTENT IN ONLINE FORUMS**
(Advisor: Kavitha Chandra)

A text based classifications scheme of user driven content is developed from topics inferred by Latent Dirchlet Allocation (LDA). A large volume of user generated forum posts from various sub-Reddits are classified a priori as either cyber or non-cyber. A portion of this labeled data is used to train a Random Forest classifier, using the topics inferred by LDA as feature vectors. The performance of the resulting classifier is then evaluated using two test datasets: the remaining portion of the labeled sub-Reddit data, as well as an entirely independent dataset consisting of Stack Exchange posts. The resulting classifier can be used as a coarse grained filter to greatly reduce the volume of data a human analyst would have to consider.

Misiunas, N., Chandra, K., Thompson, C.
*Electrical & Computer Engineering*

**BAYESIAN NETWORK MODELING FOR PREDICTING DEGREE COMPLETION RATES**
(Advisor: Kavitha Chandra)

This research investigates the application of a Bayesian Network to predict causal relationships in a dataset that captures several demographic and academic features of a group of students from a four year public university. This educational dataset is characterized by both quantitative and qualitative variables, some of which exhibit a strong pair-wise dependence. To identify this dependence a factorial analysis of the mixed data is conducted which draws from both principle component analysis and multiple correspondence analysis to allow consideration of both variable types. The exploratory stage enables some of the dependent variables to be aggregated before being presented to learn the structure of a Bayesian Network. A Bayesian Network is then learnt using bootstrapped arc strength averaging to create a final stable model. This model can then be evaluated by supplying it with evidence, drawn from the dataset, to determine its effectiveness at predicting key outcomes such as rate of degree completion. These results are validated through comparison with cross validation and the results of FAMD.
Mogulla, S.
*Electrical & Computer Engineering*
**COMPUTING INTERNET TRAFFIC STATISTICS USING GPU'S**
(Advisor: Kavitha Chandra)

Resource management of cloud services requires real-time estimation of the traffic load arriving on multiple channels. In this research the estimation of the parameters of a non-linear time series model of traffic flows is undertaken using GPU's. The parallel computation of the parameters is applied to estimate a state vector that represents the system load over time.

Mudasiru, O., Chandra, K., Thompson, C.
*Electrical & Computer Engineering*
**MODELING THE SPREAD OF INFECTIOUS DISEASE DURING AN EPIDEMIC**
(Advisors: Kavitha Chandra & Charles Thompson)

An epidemic which is a sudden outbreak of a disease, has various uncertainties usually leading to a high mortality rate and a sudden increase in the need for health care facilities. In this paper the classical deterministic SIR (susceptible-infected-removed) model of the epidemic is extended with stochastic components that model the mobility and interaction of the susceptible and infectious population. The probability distribution of the reproduction number is obtained and the impact of its variance on the rate of infection is examined with respect to the mobility of the parameters.

Zhou, H.
*Electrical & Computer Engineering*
**INVESTIGATION OF ACOUSTIC SCATTERING USING FAST-MULTIPOLE PADÉ APPROXIMANTS METHODS**
(Advisors: Kavitha Chandra & Charles Thompson)

The scattering of acoustic wave from three-dimensional compressible fluid is considered. Particular attention is paid to cases where the scatterers have moderate magnitude in compressibility constrast and nondimensional wave number. The scattered the field is cast in terms of asymptotic series which valid in the limit of small compressibility contrast. It has been shown that pointwise application Padé Approximants in the scattered volume to be used to expand the range of validity of the results. However pointwise divergence in the scattered volume can result as the magnitude of compressibility contrast is increased. We will use low-frequency Fast-multipole method to evaluate the coefficients of Born series.

Mohseni, H., Parkin, R.
*Energy Engineering*
**SMART ALBEDO & SNOW REMOVAL**
(Advisor: Robert Parkin)

In this paper I will explain how the new Smart Albedo & Snow Removal Device can increase efficiency of Solar Panels by automatically removing snow from the surface of a solar panel. The removal of snow from the surface of the solar panel will limit shading caused by the snow and increase energy efficiency. Also, by using this device one will get more electricity through the reflection of the Smart Albedo. This device is designed for both warm places with heavy dust and cold places with heavy snow. Also wind can help this device to operate more often to clean the surface of the panel. To go further, one can add an electronic device to mechanical system of Smart Albedo & Snow Removal to run this system at wishing time.
Beauregard, E., Fein, J., Hall, N.
Mechanical Engineering
RESEARCH INVOLVING THE ENGINEERING OS SPORTS
(Advisors: James Sherwood & Patrick Drane)

The Baseball Research Center strives to be a center of excellence in the Science and Engineering in Sport for both experimental and analytical methods with a particular emphasis in baseball. Over the past year, the Center has conducted research on (1) the impact analysis of foams used in sports helmets, (2) the analysis of the construction of baseballs, and (3) the breakage of wood baseball bats. The foam impact studies investigated a baseball impact of Twintex covered foam and showed the specific velocity thresholds for certain foams for varying levels of play. The study of the baseball performance and construction has been performed for Major League Baseball over past years to investigate the consistency of the ball relative to past seasons. The bat durability studies have been ongoing for the past seventy years to understand the strength, breakage and response of the bats to dynamic loading in laboratory controlled experiments. This poster concentrates on some of the work that has been performed by Research Co-op scholars over the past year in these various research efforts.

Bielmeier, C., Sherwood, J.
Mechanical Engineering
STUDY OF FABRIC MICRO-MECHANICS BEHAVIOR DUE TO MICRO-IMPACTORS
(Advisor: James Sherwood)

The development of stab resistant, flexible fabrics is vital for protecting personnel from knives, spikes, needles, and insect bites. Large-scale impactors, such as knives and spikes, have been and continue to be widely studied and regulated. However, micro-scale impactors, such as needles and insect proboscises, have been researched only on a limited basis. Quasi-static testing, conducted on the Universal Testing Machine (UTM) and Dynamic Mechanical Analysis (DMA), studied penetration of sewing needle and simulated insect impactors on tows and sections of fabric. Also, meso- and micro-finite element models were developed to aid in the understanding of tow-to-tow and fiber-to-fiber interaction during penetration. Overall, this work will develop a standardized test to develop insect proof fabric that is not reliant on chemicals.

Burke, A., Olsen, B., Poillucci, R., Tarar, H.
Mechanical Engineering
ADDITIVE MANUFACTURE OF MULTIFUNCTIONAL COMPOSITE STRUCTURES
(Advisor: Christopher Hansen)

Multi-functional composite materials, in which additional functions exist beyond the primary structural function, offer broad scope for system-level performance enhancements. Key functions targeted for composite structures include thermal management, self-healing, and structural health monitoring capabilities. Aerospace and other advanced composites applications, which will benefit from these capabilities, are increasingly being manufactured via Automated Fiber Placement (AFP) but the lack of available material systems suitable for AFP hinders the manufacture of these multifunctional features. In this work, we present efforts to create prepreg materials suitable for AFP processing and to characterize the resulting structures' multifunctional performance. Specifically, the material systems explored include prepregs containing sacrificial filaments and carbon nanotubes (CNTs). These materials are targeted for microvascular-based thermal management and self-healing, as well as structural health monitoring of composites, respectively. The structures are fabricated at Aurora Flight Science’s facility with an Electroimpact AFP machine. Sacrificial thermoplastic filaments, which degrade in a post-cure cycle to embed hollow synthetic microvascular networks within a composite structure, are extruded in
continuous lengths suitable for direct spooling onto unidirectional carbon fiber prepregs or as an input for fused deposition modeling (FDM) for subsequent additive manufacturing onto the prepeg surfaces. AFP-related parameters, such as feeding and roller pressures, are correlated with filament quality and ultimate thermal management and healing functionality. Finally, vertically-aligned carbon nanotubes are transferred onto AFP-ready prepeg for damage sensing and resistive heating applications. The quality of interfacial bonding and maintenance of vertical CNT orientation during AFP lay-up is investigated.

Dangora, L., Sherwood, J.
Mechanical Engineering
FORMING OF FIBER-REINFORCED COMPOSITES FOR THE MANUFACTURE OF SMALL ARMS PROTECTIVE HELMETS
(Advisor: James Sherwood)

The forming of a flat sheet into a three dimensional helmet has traditionally been accomplished by cut and dart techniques. For such methods, slits are introduced into the plies to accommodate overlapping regions which facilitate the molding of three dimensional shapes. This procedure, while effective at reducing waste and mitigating wrinkling, introduces adverse product features such as high seam density, short fiber lengths, and undesirable fiber orientations. Therefore, an alternative method is desired to manufacture small arms protective helmets. One possible solution is to fabricate near net shape preforms which can subsequently be compression molded and consolidated into the final helmet geometry. These preforms can be fabricated by the deep-drawing or thermoforming of full plies, which has the potential to decrease seam density, maintain long fiber lengths, and control desired fiber orientations. The objective of the current research is to simulate manufacture of the near net shape helmet preform and, in future efforts, to model the subsequent compression molding of the final part. Using a discrete mesoscopic finite element (FE) model, information regarding thickness changes, fiber orientations, stresses, and strains can be mapped and monitored throughout the deep draw process. With these analysis outputs, the simulation tool is able to identify potential defects (e.g., in plane waves, out of plane wrinkles, fiber tearing) that arise during the manufacture and compromise helmet ballistic performance. FEA results can therefore be used to influence process parameters and design constraints (e.g., tool velocity, forming temperature, binder pressure, material selection, fiber orientation, ply geometry, binder size).

Dev, S., Hamilton, J., Hansen, C., Schmidt, D.
Mechanical Engineering
INVESTIGATING BARRIER PROPERTIES OF ROBUST DOUBLE SHELL WALLED MICROCAPSULES USED IN SELF HEALING COMPOSITE MATERIALS
(Advisors: Christopher Hansen & Daniel Schmidt)

Microcapsules that possess good barrier properties, long shelf life and excellent bonding to the composite matrix are critical in advancing self-healing technology. Research has seen the development of double shell walled polyurea/poly (urea-resorcinol-formaldehyde) (PU/PURF) microcapsules that possess improved thermal stability in comparison to single walled PURF microcapsules. In this study, we investigate modified chemistries to improve the barrier properties of these double walled microcapsules. Previous work has seen the use of Desmodur L75 which is an aromatic polyisocyanate with a functionality of 3. In this research, the inner polyurea shell wall is made in-situ using varying aromatic polyisocyanates with a similarly high functionality to determine if the barrier properties of the shell wall can be improved. Single layer PURF and Double layer PU/PURF films are manufactured to mimic the shell wall morphology seen in single and double walled microcapsules respectively. Permeability cup testing (ASTM D 1653) is conducted on these films as a novel way to investigate the improvement in barrier properties of double walled microcapsules. This is done by individually recording mass loss of a select group of amines, epoxies and organic solvents from the perm-cup sealed with the single and dual
layered films. These results are then compared to each other and then also correlated with Thermo-Gravimetric Analysis (TGA) conducted on double walled capsules with the same chemistries.

Gowda, R.
Mechanical Engineering
INVESTIGATING THE IMPACT OF FLUID-STRUCTURE INTERACTIONS ON LEADING EDGE VORTEX EVOLUTION USING CYBER-PHYSICAL FLUID DYNAMICS
(Advisor: David Willis)

Dynamic Stall, a transient vortex phenomenon on high angle of attack lifting surfaces, can be observed on: wind turbine blades, insect/bird/bat wings, fish fins, helicopter blades, etc.. When dynamic stall occurs, the shear layer resulting from flow separation at the leading edge of the lifting surface rolls-up to form a leading-edge vortex (LEV). The vortex low pressure generates additional lift and temporarily delays stall. As vorticity continues to shed from the leading edge, the circulation of the LEV continues to increase and eventually the LEV will separate from the wing potentially resulting in an abrupt loss of lift and increase in pitching moment. This rapid variation of forces can cause vibrations, and high loads that can result in reduced fatigue life and structural failure. Cyber Physical Fluid Dynamics (CPFD) is a combination of a physical experiment (the physical side) and a computer control system (the cyber side) to achieve complete, parametric control over the forces experienced by a submerged object. The end result is an experiment where the body in question moves instantaneously in response to both the fluid forces acting on it, as well as software – defined “virtual” forces including springs, dampers, etc. A series of increasing complexity, cyber-physical fluid dynamics experiments are performed in the UML water tank to understand: (1) How is the dynamic stall vortex formed and how does it evolve on translating versus rotating lifting surfaces? And (2) How can passive (or minimally active controlled) fluid structure interactions be used to alter dynamic stall vortex evolution.

Kirkwood, R.
Mechanical Engineering
SUSTAINED CAD INTEGRATION: RESOLVING DEFICIENCIES RELATED TO DATA IMPORT
(Advisor: James Sherwood)

Engineering projects of any serious scale require sustained integration between applications creating solid model data and applications using that data. Homogeneous proprietary systems are able to support this capability within very strict usage rules. Heterogeneous (export/import) systems have no such success. Engineers are generally able to export/import with reasonably good success, but integration with subsequent imported versions is lost. Proposals for improved heterogeneous CAD integration typically begin with new requirements for how the data writes from the source systems. These requirements generally manifest themselves as new standards or proposed extensions to existing standards. With CAD models/formats fairly stable for the last 20 years, perhaps new standards are not the solution. This research explores solutions that can be applied working only with the as-imported data.

Martell, J., Schiano, A., Kleschinsky, W.
Mechanical Engineering
A SIMPLE COMPUTER NUMERICAL CONTROLLED BUILDING BLOCK (CNCBB) FOR ACADEMIC SETTINGS
(Advisors: David Willis & Stephen Johnston)

Modern manufacturing relies on computer numerically controlled (CNC) machines to add and/or subtract material. These machines are used to manufacture a wide array of prototypes, parts/components, molds, forms, etc. Over the past decade, the proliferation of inexpensive/open source electronics control hardware and open source software has resulted in a variety of hobbyist CNC kits/products (CNC micro-
mills, three-dimensional printers, laser cutters, etc.). These inexpensive CNC kits present an opportunity to easily deploy hands-on academic experiences in the classroom. The assembled CNCs are more than capable of introducing students to CNC concepts via an accessible and 'trial-and-error' platform. Since the kits are inexpensive, students can directly use them (rather than a trained machinist) and benefit directly from hands-on experience. Unfortunately, the available hobbyist kits possess many individual parts and often take several hours to days to assemble. This senior capstone research and design project addresses the multi-unit academic deployment of CNCs by introducing a single motor-block, linear motion solution (mechanical and control hardware design). The CNC building block (CNCBB) design, integrated with off-the-shelf guide shafts, threaded rod and fasteners enables the prototype/assembly of several CNC configurations within minutes to an hour. The single block is being prototyped and eventually mass production via injection molding is proposed. One complete candidate CNC assembly will be presented as an example, with other possible configurations highlighted. The final poster will present the design philosophy, design process and project outcomes.

Noursadeghi, E., Raptis, I.
Mechanical Engineering
DISTRIBUTED FAULT DETECTION OF NONLINEAR LARGE-SCALE DYNAMIC SYSTEMS
(Advisor: Ioannis Raptis)

This work deals with the problem of designing a distributed fault detection algorithm for nonlinear large-scale systems. In the proposed algorithm, instead of a central detection node, several interconnected local detectors (LD) are employed. Each LD has a limited observation of the system's state and communicates with its neighbors to exchange processed information. The output of the detection nodes is the collective probability of failure associated with the system's fault mode. Simulation results illustrate the efficiency of the proposed approach and prove that the stronger communication amongst the LDs will lead to more reliable and faster results.

Obando, S., Avitabile, P.
Mechanical Engineering
USE OF EXPANSION OF HIGHLY REDUCED ORDER MODELS FOR THE ACCURATE PREDICTION OF FULL FIELD DYNAMIC CHARACTERISTICS IN THE FORCED RESPONSE OF LINEAR AND NONLINEAR SYSTEMS AND COMPONENTS
(Advisor: Peter Avitabile)

A comprehensive framework for the use of reduction/expansion methodologies of components and system models is proposed for the prediction of full field dynamic characteristics of models in both linear and nonlinear forced response for both displacement and strain. Commercial finite element models of high resolution are simplified to a reduced space in which different configuration of forces, boundary conditions and connecting/coupling elements can be tested efficiently and without loss in the fidelity of the model. With the calculated component/system model response at a reduced set of points, expansion can be employed to return to the full space of the model and predict the response at all DOF. Furthermore, the system component response can be expanded to predict the dynamics of complete systems with complicated subcomponent or cascaded configurations as well as accurately calculate full field stress-strain. The methodology is developed for linear systems and for more complex multi-component models in which nonlinear response occurs due to the presence of highly nonlinear coupling elements such as hard contacts, isolation mounts, gap springs, bilinear springs, etc. These cascaded systems require the embedding of dynamic information in the reduced order model as to accurately preserve the high level of resolution and detail of the full model. Using this efficient technique, this work aim is to show a complete set of analytical tools that allow for the simplification and accurate dynamic characterization of large complex FEMs as an alternative to current approaches for the solution of nonlinear computationally expensive detailed models of structural systems.
Olson, B., Sherwood, J., Willis, D., Bergeron, K.  
*Mechanical Engineering*  
**DEVELOPING A FUNDAMENTAL UNDERSTANDING OF PARACHUTE SUSPENSION LINE BRAID ARCHITECTURE WHILE UNDER DYNAMIC LOADING CONDITIONS**  
(Advisor: James Sherwood)

This research is motivated by the phenomenon where the suspension lines of a parachute vibrate and change shape during descent. The vibrations add to the system’s drag, which reduces performance, and create unwanted noise. The shape change can result in lift forces that push the jumper or cargo off target. A textile characterization program will be conducted to investigate the physical changes of the cord during loading and a model will be developed to assist in understanding the mechanical behavior of the suspension line. The goals are to characterize the physical phenomenon and then to create a three-dimensional model to predict and analyze the braid architecture of military grade suspension lines. These goals will be realized by developing a fundamental understanding of the braid architecture of a parachute suspension line through complimentary experimental and computational methods.

Polcari, M., Sherwood, J.  
*Mechanical Engineering*  
**DESIGN FOR THE AUTOMATION OF COMPOSITE WIND TURBINE BLADE MANUFACTURING**  
(Advisor: James Sherwood & M.C. Frank)

Traditionally, the forming of composite wind turbine blades has been accomplished with the use of a hand-layup process. The blade to blade quality variance of this hand-layup process is high. Fabric layers of hand-layup preforms can exhibit out-of-plane wrinkling and in-plane waviness. Fabric imperfections such as these can reduce the strength and stiffness of the formed structure. To address these concerns, a piecewise shifting method has been proposed as an automatic fabric placement method. This method has been shown to reduce the out-of-plane wrinkling resulting from applying a curvature to a fabric preform. This automated layup method saves time on the preform process and reduces quality variability from blade to blade. The goal of the current research is to simulate the automated shifting layup method using a robust and easy-to-use finite element modeling software. A discrete modelling approach will be used that accounts for fabric shear stiffness evolution and fiber orientation changes during the forming process. The simulation approach will be demonstrated on the geometry of the trailing edge of a wind turbine blade. The simulation will consider the mechanical behavior of the fabric and reliably predict fabric deformation and failure zones. Analysis of the detailed modeling of the forming process will inform design changes that mitigate defects or relocate them to non-critical areas of the structure. The simulation will allow for the revision and iteration of fabric system selections without requiring the actual forming and testing of prototype parts. Benefits of the simulation include reduced prototyping costs and time expenditure, reduced material usage, and improved blade reliability and service life due to reduced structural defects. Keywords: composites, FEM, wind turbine blades

Wysocki, A., Hansen, C., Babcock, L.  
*Mechanical Engineering*  
**EVALUATION OF STYRENE-FREE RESINS AND GLASS FIBER COMPOSITES**  
(Advisor: Christopher Hansen)

Unsaturated polyester resins form the backbone of the domestic consumer composite products industry. Typical polyester resins are composed of polyester polymer chains dissolved in 35-50 volume percent styrene monomer. From a technical and economic standpoint, styrene offers excellent mechanical properties at an economically competitive price. However, styrene is a volatile organic compound (VOC) that has been classified as a hazardous air pollutant (HAP), respiratory tract irritant by the IARC (International Agency for Research on Cancer), a possible carcinogen, and has been identified as a
"chemical of high concern" by the Minnesota Department of Health. Composites manufacturing employees who work with styrenated polyester resins are subject to the health risks associated with styrene, including frequent over-exposure to vapors from the styrenated resins, as well as to the possibility of physical contact with styrenated resins. Prior efforts have focused on mitigation of these exposure routes primarily via engineering controls, such wax additives, metering equipment, and increased ventilation. An alternate approach is to change the resin formulation to reduce or eliminate styrene emissions. The American Composites Manufactures Association (ACMA) estimates that up to 66% of styrene emissions during open molding techniques (e.g., spray-up) can be eliminated by using reduced styrene chemistries as well as implementing best practices for open molding techniques (ACMA UEF-1-2001a). Here, a hazard reduction-oriented approach is pursued to evaluate commercially available styrene-free resin formulations. In conjunction with the University of Minnesota's Technical Assistance Program (MnTAP), manufacturers of styrene-free resins were identified as candidates for this work. Fiber-reinforced samples were created by infiltrating chopped glass fiber reinforcement using vacuum-assisted resin transfer molding (VARTM). This closed molding technique was chosen to reduce the variability associated with spray-up operations in order to determine the baseline mechanical properties. Tensile and flexural specimens are fabricated from the non-styrenated resins and are compared to styrene-based control specimens. The mechanical performance, fabrication cycle, and production cost requirements are compared and contrasted with industry standard styrene based resin materials.

Cohen, E., Vaillancourt, J., Kaplan, D., Armiento, C., McCarthy, S.

Plastics Engineering
NON-LINEAR BEHAVIOR OF SILK FIBROIN ELECTROGELS’ ELECTRICAL PROPERTIES, A WORK IN PROGRESS
(Advisor: Stephen McCarthy)

Silk Electrogels (E-Gels) are electrically mediated silk fibroin hydrogels formed by applying an electric current to a solution of silk fibroin in deionized water. These gels exhibit non linear electrical properties. These gels are stable at room temperature, inherently tacky, biodegradable and can be reversed back into solution form by reversing the electric poles used to grow them or by heating. Silk E-Gels exhibit unique electric properties. The current-voltage behavior of these materials was studied and has shown dependence on growth voltage, growth time and the material of which the electrode used to grow the gel is made of. Moreover, the metal-gel interface exhibits diodic-like behavior. It is believed that molecular alignment along with introduction of metal ion moieties are the source of this previously unpublished phenomenon.

Kiratitanavit, W., Xia, Z.

Plastics Engineering
POLYPHENOL-TITANIA COMPLEX AS A POSSIBLE FLAME RETARDANT ADDITIVE FOR POLYOLEFINS
(Advisors: Jayant Kumar & Ramaswamy Nagarajan)

Most commodity polymers are flammable and in order to ensure fire safety, additives known as Flame Retardants (FR) are often compounded into the base polymer. Halogenated compounds are one of the most commonly used of FR additives for polyolefins. However, some of these halogenated FR are toxic, environmentally persistent and harmful impact to humans and others forms of biological life. We have recently reported that polymers of phenols can be used as FR additives. The mechanism of action of these polyphenols is predominantly radical scavenging and char formation. In an attempt to improve the effectiveness of these FR, polyphenols have been complexed with metal oxides. Here we report the polymerization of an acid-functionalized phenol (4-hydroxyphenylacetic acid - HPA) using enzyme catalysis; followed by electrostatic binding of the polymer onto titania (TiO2) nanoparticles to produce
polyphenol-titania complex. The poly(HPA) was characterized using spectroscopic techniques and thermal techniques. The polymer exhibited high char formation (about 40% at 750oC) and low heat release capacity [HRC] (less than 20 J/gK). Thermal characterization of the complex using TGA revealed the presence of 10% by weight polyphenol bound to the titania. The polyphenol-titania complex was blended into polypropylene. The thermal stability and heat release capacity of these blends were also determined. HRC of polypropylene decreased more than 30% as compared to the virgin polypropylene. This decrease is similar to some of commercially used halogenated FR like hexabromocyclododecane. The detailed synthesis and characterization of this new class of FR additives will be presented.

Ogueri, K.S., Mohd Aris, Z., Nagarajan, R.
Plastics Engineering
THERMOSETTING RESIN COMPOSITIONS BASED ON BIO-DERIVED SUGARS AND PHENOLS (Advisor: Ramaswamy Nagarajan)

As the first commercial synthetic resin, phenolic resins have played an indispensable role in the resin industry as a thermally stable, thermosetting binder with wide-ranging applications from construction materials (laminates), transportation to electronics. However, the toxicity of phenol and formaldehyde (as a carcinogenic chemical), have posed formidable challenges to its production and use. Herein, we report the synthesis of novel bio-novolac phenolic resins using naturally occurring carbonyl containing sugars or sugar derivatives as substitute for formaldehyde and non-toxic phenolic compounds as replacement for petroleum-derived phenols. The bio-based resins were synthesized by reacting phenol or polyphenols (synthetic and bio-derived) with an aldose in the presence of benign catalyst at 120 oC. Analysis of the resins using gel permeation chromatography (GPC) and Fourier Transform Infra-Red spectroscopy (FTIR) confirmed the formation of Oligomers. The new sugar-based resins were thermally cured with the typical cross-linker (Hexamethylenetetramine) for PF resins and also with bio-based epoxy curing agents. Differential scanning Calorimetry (DSC) showed that the cure time of the new class of resins was in the same range as the conventional Phenol-Formaldehyde (PF). The cured resins showed satisfactory thermal stability with good char yields at 600 oC. The flexural strength of compression-molded glass reinforced composites made from this resin is comparable to those made using phenol-formaldehyde resins. Preliminary studies indicate that this new class of bio-based phenolic resins exhibit promising properties and have the potential to be used as an alternative to phenol-formaldehyde.

Xia, Z.
Plastics Engineering
UNRAVELING THE MECHANISM OF THERMAL AND THERMO-OXIDATIVE DEGRADATION OF TANNIC ACID (Advisor: Ramaswamy Nagarajan)

Tannic acid is a naturally occurring polyphenol found in tree barks that provides thermal and microbial protection. Apart from providing numerous reactive hydroxyl groups, tannic acid can also impart good thermal stability and char forming characteristics. In order to utilize tannic acid as a char forming additive, it is important to understand its thermal and thermo-oxidative degradation under nitrogen and air. A combination of techniques such as Thermogravimetric analysis (TGA) coupled with Fourier-Transform Infrared (FTIR) Spectroscopy (TGA-FTIR), Pyrolysis - Gas Chromatography - Mass Spectroscopy (Py-GC-MS) and Attenuated Total Reflectance (ATR)-FTIR was used to deduce the mechanism of thermal and thermo-oxidative degradation of tannic acid. The condensed phase and gaseous phase degradation studies were combined to deduce a degradation pathway under nitrogen and air. We have also demonstrated that tannic acid can be used as char forming additive when blended into plastics.
Graduate School of Education

Covino-Poutasse, K.
Language Arts & Literacy
CRITICAL LITERACY AND GENDER: TENSIONS IN DISCOURSE AND IDENTITY
(Advisor: Jay Simmons)

This study focused on the tensions in Discourse and identity that emerged, intermingled, and conflicted, within and between the participants and texts, during literacy instruction in an urban, second-grade classroom. Interested in exploring the nature of these tensions, and the ways they intersected with the teaching and learning of critical literacy and gender, I formulated the following research question to explore the classroom teacher's perspectives - What is the nature of tensions in Discourse and identity that emerge when an urban, second-grade, literacy instructor incorporates critical literacy and gender into her planning and teaching of reading and writing? To explore this question, I collected and analyzed many data sources including curriculum guidelines, text suggestions, rubrics, critical literacy integration suggestions, notes/transcripts from planning and reflection meetings, researcher memos, transcripts from class videos of Interactive Read Aloud (IRA) and Writing About Reading (WAR), and student writing samples generated during Writing About Reading (WAR). Viewed collectively, the data shed light on the dynamic and complex interplay of intrapersonal tensions in Discourse and identity that existed within the second-grade literacy instructor, related to the intersection of critical literacy and gender. The data suggested the following finding - As the classroom teacher's Discursive identity shifted from that of a veteran teacher committed to 'continuity' to that of a critical pedagogue committed to 'change, she had to reconcile the shifts in her teaching 'self' with the expectations and guidelines of the district-wide curriculum.

Manning School of Business

Li, J., Lin, J., Karim, K.
Accounting
DO DIRECTORS HAVE A STYLE? BOARD INTERLOCKS AND PROPERTIES OF ACCOUNTING EARNINGS
(Advisor: Jingrong (Karen) Lin)

We test whether board interlocks between two firms increase similarities in the firm-pair's accounting practices. In particular, we examine whether differences in accounting conservatism and timeliness are smaller when two firms share one or more board members. We measure firm-level accounting conservatism (reporting timeliness) using C_Score (G_Score) (Khan and Watts, 2009). We find that board interlock reduces the difference in reporting timeliness as well as conservatism between interlocked firms. A further examination reveals that when two firms are linked through key directors (i.e., CEO, CFO, the board Chair, Audit Committee Member and Audit Committee Chair), differences in both conservatism and timeliness are smaller compared to the rest of interlocked firms that are not linked by key directors. Our study sheds light on the role of the board in shaping accounting numbers, and also adds to the evidence that network among companies affects accounting practices in general. Key Words: Accounting Conservatism; Reporting Timeliness; Board Interlocks;
Liu, Y.
*Accounting*
CLASSIFIED BOARD AND RESTATEMENTS
(Advisor: Taewoo Kim)

Prior literature suggests that classified boards may have two opposite impacts on financial restatements: one emphasizes the exacerbating impact, whereas the other advocates the mitigating impact. This study extends prior research by examining whether classified boards exacerbate or mitigate restatements. Specifically, we find that the presence of classified boards is significantly negatively associated with the incidence of restatements. Overall, the results cast doubt on the view of the exacerbating impact, while they are consistent with the argument on the mitigating impact as shown by the reduction in the incidence of restatements in firms with classified boards.

Tang, J., Karim, K., Suh, S.
*Accounting*
DO ETHICAL FIRMS CREATE VALUE?
(Advisor: SangHyun Suh)

Purpose - This study aims to examine the value relevance of ethics information. Design/methodology/approach - This paper adopts event study methodology to test market reaction around the announcement of World's Most Ethical Companies (WME), a ranking based on firms' overall CSR performance. We calculate the abnormal returns of firms on the WME list to investigate how stockholders respond to the disclosure of ethical information. Findings - We find significant and positive abnormal returns around the announcements of the lists of ethical firms. Specifically, we observe positive market reaction on the first day after the WME announcement (day 1). Originality/value - This study contributes to the existing literature of the relationship between business ethics and firm value. We provide evidence that ethics can be aligned with firms' financial goals. Further, we are the first to use WME announcement as a proxy for ethical firms. Keywords: Corporate social responsibility (CSR), Ethical firms, Value relevance, Abnormal returns

Balasubramanian, S., Yang, Y., Tello, S.
*Entrepreneurship*
DOES UNIVERSITY ENTREPRENEURIAL ORIENTATION MATTER? EVIDENCE FROM UNIVERSITY TECHNOLOGY COMMERCIALIZATION AND REGIONAL ECONOMIC DEVELOPMENT
(Advisor: Yi Yang)

Entrepreneurial orientation (EO) and its beneficial relationship to firm performance have been examined immensely through a growing stream of research in both entrepreneurship and strategic management literature. EO reflects the entrepreneurial strategy-making processes that key decision makers use to enact their firm's organizational purpose, sustain its vision, create competitive advantages, and eventually influences firm performance. But, most prior studies have focused on firms in the private sector, and implications of EO in other organizational settings including universities remain an underexplored area. Through the theoretical lenses of resource based view, we seek to demonstrate that universities with a higher EO will achieve better performance and sustain competitive advantage by leveraging its tangible and intangible resources through its entrepreneurially oriented actions. Using computer aided text analysis, we measure university EO as manifested in university president letters and establish its relationship to both university technology commercialization and regional business development outcomes. We find that EO influences university performance both in terms of technology commercialization outcomes and contributions to regional growth. Our study enhances the understanding of the relationship between EO and performance in entrepreneurial universities - a rather understudied
phenomenon. These findings have significant managerial implications for higher education administrators and policy makers as universities are emerging as a key institution in generating new knowledge and facilitating regional economic growth.

Mumi, A.
*Entrepreneurship*
**ENHANCING STARTUPS’ PERFORMANCE BY ACTIVELY MANAGING SOCIAL MEDIA**
(Advisor: Yi Yang)

Recently, social media has been a topic of interest in both business practices as well as academic research due to its functions that enhance connectivity. Extant literature on social media has emphasized on its influences toward various business and marketing activities; however, limited research has been conducted regarding how entrepreneurs in startup organizations could be beneficial from social media. Through the theoretical lenses of organizational learning theory, this study seeks to answer the questions of how entrepreneurs in startups could utilize social media for their learning activities and improve performance. The panel data of 142 startups' twitter accounts in the industries of online data warehouse and biotechnology were collected. The major results of the research reveal that actively managing twitter activities is a significant influencing factor for startups' performance as it reflects how entrepreneurs perceived knowledge from social media activities. The finding implies that entrepreneurial companies should implement social media as one of their growth strategies.

Pulya, S.
*Entrepreneurship*
**IS LOCATION A SECRETE INGREDIENT OF A UNIVERSITY’S EFFICIENCY?**
(Advisor: Berk Talay)

Universities are increasingly looking for applying their research by licensing the technology. As universities turning entrepreneurial they are assessing the productivity of the R&D efforts and how much of such R&D produced can in turn generate income for the business. This paper contributes to existing studies in the area of factors causing such efficiency by examining the efficiency of the universities in light of the eco system & location where the University situation. This paper first ranks all universities using data envelopment analysis and later employs regression analysis to examine the university efficiency with the location factors. We find that the licensing has increased where universities are surrounded with industrial presence or other universities. Given all universities are more entrepreneurial, our research proposes efficiency reasons and factors related to difference of efficiencies in commercialization.

Kumar, D.
*Finance, Management*
**TECHNOLOGY IN THE FRENCH CLASSROOM**
(Advisors: Carole Salmon & Danielle Boutwell)

This study aims to determine how the use of technology in the classroom improves student's learning. For this study, I worked with kindergartners at Ste. Jeanne d’Arc Elementary School, a private French Catholic school in Lowell to determine what programs would be most beneficial for their learning styles. I then created various games and activities for the kindergartners to use. Because many concepts taught in this class repeat in higher level classes, the programs can be used as a review for all the other grades. The most important factors that each game or activity needed to have was quick start-up and close time, ease of use for both the teacher and the students, and an added benefit to the classroom. After the games were created and tested, the teacher used them with her kindergarten classes to determine if they were in fact helpful for the students. Whenever these games were played in the classroom, all the students paid more
attention to the teacher and each other. They also participated more and because of the nature of the
games, each student was allowed to play so the teacher was able to individually test each student's
knowledge without taking any extra class time. The results of this study conclude that by using
technology in a classroom, students are more attentive and more students are able to grasp the material
faster and for longer. This demonstrates that technology in the classroom is in fact an improvement to the
classroom.

Nguyen, N.

Finance

THRIVING ON A SHORT LEASH: CORPORATE DEBT MATURITY STRUCTURE AND MERGERS
AND ACQUISITIONS
(Advisor: Hieu Phan)

Prior literature documents that short-term debt exposes the borrowing firms to refinancing risk but can
mitigate managerial agency problem and improve firm performance. In this research, we empirically
investigate the relation between corporate debt maturity structure and mergers and acquisitions (M&As).
We find that short-term debt is negatively related to acquisitiveness. When firms pursue M&As, those
with high short-term debt ratio are more likely to use stock for payment and select targets with relatively
lower short-term debt ratio, which helps relieve the acquirers' financial constraint. Additional analysis
indicates that the pre-merger short-term debt level is positively correlated with acquirer's M&A
announcement abnormal stock returns and the financial constraint relief due to the decrease in short-term
debt financing is positively related to acquirer long-term stock performance.

Sun, L., Phan, H., Simpson, T.

Finance

THREAT OF EXIT AS GOVERNANCE: EVIDENCE FROM BLOCKHOLDER OWNERSHIP, STOCK
LIQUIDITY, AND CORPORATE CASH HOLDINGS
(Advisor: Hieu Phan)

Previous literature documents that blockholders' threat of exit from a firm can be an effective governance
mechanism and that the threat of exit increases in stock liquidity. This research investigates the effect of
blockholders' threat of exit on corporate cash holdings and value of cash. Exploiting an exogenous shock
to stock liquidity caused be decimalization to identify the relationship between threat of exit and
corporate cash holdings, we find that blockholders' threat of exit is positively related to corporate cash
holdings and value of cash. Our finding is consistent with the notion that blockholders' threat of exit is an
effective corporate governance mechanism.

Turner, L.

Leader & Organization Studies

DEVELOPING ONES CULTURAL COMPETENCE PROMOTES LEADERSHIP EFFECTIVENESS
(Advisor: Kimberly Merriman)

Existing studies in leadership literature have shown that transformational leadership correlates positively
with high employee performance, and ultimately increased organizational performance outcomes,
however, limited studies have explored fully the effects that race/ethnicity biases and stereotypes held by
a leader have on the leader’s effectiveness. This study will illustrate the personal and organizational
benefits derived when leaders’ awareness and understanding of their own held biases and stereotypes
related to race/ethnicity is enhanced and self-improvement is actively pursued. The basic premise is that
transformational leaders are more effective when they have a deeper understanding of themselves as
human beings and when they value diversity, respect differences and develop their knowledge about
cultural differences. We found that leaders who make this commitment will develop more effective working relationships with their employees, enabling them to be generally more effective as leaders of diverse teams today and into the future as the demographics of the U.S. workforce continues to shift and become more diverse.

Albashrawi, M., Turner, L., Mumi, A.
Management Information Systems
EFFECT OF SELF-EFFICACY ON USAGE INTENTION OF MOBILE ERP: A STRUCTURAL EQUATION ANALYSIS OF TRADITIONAL-ERP ORGANIZATIONS
(Advisor: Luvai Motiwalla)

Mobile ERP is a new phenomenon emerging in the realm of Enterprise Resource Planning (ERP). ERP is defined as business software that integrates core business functions into a single system. Hence, mobile ERP can carry out these functions on the move to increase operational efficiency. The updated IS success model, employed in this study as a theoretical framework, encompasses system quality, information quality and service quality. These factors are examined to provide a deeper understanding of this phenomenon among regular-ERP firms. However, the objective of this paper is to investigate firms' intention to use mobile ERP under the effect of self-efficacy.

Kartal, H.
Management Information Systems
ID-IMPURITY: A NOVEL PRIVACY MEASUREMENT FOR MULTIPLE TUPLES
(Advisor: Xiaobai (Bob) Li)

With the purpose of securing privacy of individuals in data publishing, the area of anonymization has been extensively studied. However, most of the existing literature in anonymization, have an a priori condition assuming that each individual in data has no more than one tuple. This assumption does not hold in many cases such as patient diagnosis, prescription or call detail records that are undermining the protection of individual identities. To deal with this problem, our paper provides a novel approach to avoid from re-identification attacks. First, the study reveals further risk of disclosure result from the initial assumption of single tuples. Second, it proposes a new privacy measurement called id-Impurity guaranteeing anonymization under the condition of multiple tuples exists. Third, to implement impurity measurement, we suggests two different algorithms for both numerical and categorical data. Also new algorithm allows to work with categorical data without a need for any hierarchy or an ordinal ranking. Index terms: privacy preservation, k-anonymity, impurity, multiple tuples, partitioning trees.

Liu, X.
Management Information Systems
CUSTOMER DATA ACQUISITION: A VALUE-BASED DESIGN AND ANALYSIS
(Advisor: Xiaobai Li)

In this paper, we study data acquisition. Some data, like privacy, are either not available or by law we cannot use it without consent from its owners. Therefore it is imperative to purchase some data. Firstly we use Generalized Second Price (GSP) auction to purchase data. Unlike traditional gift-card style incentive, GSP pays more for those who get paid and GSP encourages more people to participate. Since GSP auction in our study has large number of bidders, it has nice properties that regular GSP does not have. We prove that when the number of bidders is large the best bidding strategy is true-telling. Secondly we select the data acquired from the GSP auction using both quality and cost criteria. The new dataset is an optimal selection which has minimal probability distribution distance to the population at minimal waste of budget.
Pham, H.  
*Management Information Systems*  
PREDICTING FIRM PERFORMANCE USING FIRM'S NETWORK STRUCTURE  
(Advisor: Hongwei (Harry) Zhu)

This study predicts cash flow and revenue of firms based on the information in previous year of firms' neighbors. The neighbors of firm are identified through spectral clustering which maximizes the similarity of firms within a cluster. The input to the spectral clustering is the firm-tag matrix which is formed through usage mining of Generally Accepted Accounting Principles (GAAP).