



# University of New Hampshire

## **Proudly Presents the Award Recipients for the 2015 Summer Teaching Assistants Fellowship**

1. Name: Zachary Angelini

Program/Dept.: Civil Engineering

Chair/Advisor: Erin Bell

Abstract: I am working to install a sustainable photovoltaic system for a rural school in Toh-Kpalime, Ghana. My involvement in the scoping, installation and training necessary to complete this project will afford me the opportunity to engage in experiential learning. In utilizing renewable energy technology for the purpose of combating the energy crisis in Ghana, I am promoting sustainable development, which is a major focus in my program. By working with teammates, who represent a variety of different majors, I am engaging in interdisciplinary teamwork. I am also acquiring valuable insight and skills which I can utilize in my studies and career when introducing an innovative engineering project into a new community. For example; learning to balance the needs of many different stakeholders involved in such projects.

2. Name: Megan Arpino

Program/Dept.: Earth Sciences

Chair/Advisor: Anne Lightbody

Abstract: Excess fertilization and pollution leads to detrimentally high concentrations of nutrients in estuaries, oceans and lakes, which may lead to harmful algal growth and decreases in oxygen available for fish. Rivers help to reduce these negative impacts through nutrient uptake. Reactions which decrease the concentration of nutrients and other pollutants flowing downstream often occur in riverside wetlands and other areas of slowly flowing water. This summer I will develop a 2-D hydraulic model of the Suncook River in central New Hampshire using high-resolution bathymetry data to assess connectivity between the deep main channel of the river and shallow fringe areas. This 2-D hydraulic model will be the central component of my master's thesis, in which I will assess the potential for nutrient uptake along the Suncook River. Results will be applicable to rivers throughout coastal New England.

3. Name: Shannon Barton

Program/Dept.: Biochemistry

Chair/Advisor: Kevin Culligan

Abstract: Understanding the hypothalamic pituitary axis in basal vertebrates, such as lamprey, will illuminate the origins of the system and its role in evolved vertebrates. Thyrostimulin, a new heterodimeric glycoprotein hormone with an undetermined function, has been

identified in vertebrates. Thyrostimulin is comprised of two subunits, A2 and B5; these subunits are considered to be the ancestral glycoprotein hormone subunits. I propose to isolate and characterize thyrostimulin in lamprey to better understand the evolution of this unique glycoprotein hormone and its function in evolved vertebrates. The lamprey A2 subunit has been identified and recombinantly produced. My work will focus on the identification of lamprey B5 full coding sequence through the synthesis of cDNA, to be utilized in the production of recombinant lamprey thyrostimulin in yeast strain GS115, allowing us to design and perform studies to better understand the function of thyrostimulin on a molecular level and its greater role in lamprey.

4. Name: Alexander Blandina

Program/Dept.: Psychology

Chair/Advisor: Ellen Cohn

Abstract: Dissatisfied customers can cause large-scale damage through retaliation against a company when they feel unfairly treated (procedural unfairness) or they get an unfair outcome (distributive unfairness). Such feelings of unfairness could exacerbate consumers' behavior depending on whether a consumer has no brand loyalty to companies (exchange relationship) or purposefully buys from companies due to previous positive experiences (communal relationship). This summer I will analyze data, and write and submit a manuscript based on two studies examining these factors that cause consumers to express negative reactions based on their experiences with companies. I predict these factors will interact with consumers exchange relationships causing them to retaliate due to unfair outcomes, while consumers with communal relationships will retaliate due to unfair treatment. This manuscript will be the first to examine interactions between consumer relationships and unfair treatment/outcomes on negative consumer behavior. Moreover, the finding will highlight implications for business consumer relations.

5. Name: Rene Buell

Program/Dept.: Chemistry

Chair/Advisor: Samuel Pazicni

Abstract: During the summer of 2015 I will be analyzing data collected from general chemistry students during the spring of 2015 regarding their use of textbooks as study materials. I will then develop an assessment tool which will gain insight into how and why students use textbooks. This tool can be used by instructors who wish to learn more about their students' study habits as well as by researchers who can use that information to improve textbook materials. I will be analyzing data collected from over 800 students through online questionnaires and through interviews. The work which will be completed over the summer will be important so that the assessment tool will be ready for use during the fall 2015 semester, and the results of the assessment will be published and used for my doctoral thesis.

6. Name: Kaitlin Camilleri

Program/Dept.: Psychology

Chair/Advisor: Michelle Leichtman

Abstract: Using an experimental design, my summer research project examines the impact of parent-child conversations on children's memory in a lower socioeconomic status (SES) population. Specifically, the research focuses on how the use of elaborative conversations influences children's memory for scientific conceptual information.

Previous research on parent-child conversations focuses on memory for personally experienced events. The proposed research applies such theory to learning science information, specifically in a lower SES population. This research is important for my academic plan, as it will strengthen our claim that elaborative conversations can be used to enhance memory for science concepts in multiple SES groups. Furthermore, it is an important step towards the eventual development of techniques to train parents in the use of elaborative conversations; such techniques could be applied in our education system to help enhance children's academic learning.

7. Name: Rory Carroll

Program/Dept.: Natural Resources

Chair/Advisor: Russell Congalton

Abstract: Anthropogenic disturbances such as highways and urban development are becoming a ubiquitous environmental obstacle for dispersing fauna in New England. This is particularly true for wide-ranging and fragmentation-sensitive carnivores such as bobcats (*Lynx rufus*). To determine landscape-scale effects on bobcat dispersal, I am performing genetic analyses on 250+ samples collected from NH, ME, MA, VT, and Quebec. Preliminary analyses on a subset of those samples showed bobcats in the region are divided into at least four subpopulations. This research will reveal movement corridors and barriers, highlighting conservation zones critical for the maintenance and/or restoration of genetically healthy populations of bobcats in the greater NH region. This study is making me a highly competitive candidate in the conservation and ecological research market by allowing me to meld technical laboratory training with analytical (spatial, statistical), social (working with government agencies and sportsmen), and educational opportunities (outreach with K-12 and general public).

8. Name: Anna Chase

Program/Dept.: Zoology

Chair/Advisor: Larry Harris

Abstract: Species introductions can have dramatic negative impacts on native organisms. In marine systems, certain introduced species grow more prevalently on submerged manmade structures (eg. docks, pilings) than on adjacent rock surfaces. Though multiple factors are known to contribute to these patterns, few studies have examined the influence of substrate material on marine community development. I have conducted both lab and field studies comparing the settlement and growth of marine organisms on commonly occurring natural (granite) and artificial (concrete, high-density polyethylene, and PVC) marine materials and examining species-specific larval substrate preferences. Preliminary analyses indicate that community composition and settlement preferences differ between concrete and all other materials. These results will help us understand how substrate composition may contribute to non-native species establishment, and may inform decisions regarding material usage in marine construction. During summer 2015 I will complete and defend my Master's thesis, and work to prepare a manuscript for publication.

9. Name: Minyi Chen

Program/Dept.: Economics

Chair/Advisor: Bruce Elmslie

Abstract: Trade liberalization is shown to bring influential benefits in reducing poverty, increasing income levels, and promoting peace. However, countries set different levels of tariffs on importing products, which threatens the world trade. How do countries set tariffs? The literature suggests some determinants of tariffs: market power, import-penetration, political preferences, etc. Some are controversial while some are included in one model but not the other. Also, literature finds evidence for cross-country sample, but the study of tariff determinants of any given country is limited. Thus, there are two main goals of our research: to extend the existing model by examining potential factors, and to establish tariff determinants for a given country. This research also served as part of my PhD dissertation about trade liberalization. It is important to investigate the impediments of trade liberalization since it uncovers the nature of trade liberalization in a world with friction.

10. Name: Matthew Cheney

Program/Dept.: English

Chair/Advisor: Siobhan Senior

Abstract: I propose to study the literary and historical context for Virginia Woolf's 1930s writings, particularly her 1937 novel "The Years", which she began writing in the early '30s. "The Years" is among the least studied of Woolf's novels, and I see it as an intervention in the argument among Woolf's contemporaries about the place of socio-political realism within fiction. I seek to place Woolf's novel more clearly within the literary context she wrote from than has been done previously.

I have written on "The Years" before, and intend to include Woolf in my dissertation, but the limits I feel myself coming up against are the limits of my knowledge of the specific context that Woolf was writing within, rather than simply her biography, which is easily available. Tracing and analyzing the materials of Woolf's literary context in the 1930s is challenging and time consuming.

11. Name: Sara Clarke-Vivier

Program/Dept.: Education

Chair/Advisor: Paula Salvio

Abstract: This project evaluates theater's role in developing student perspectives on race, culture, science, human rights and climate change. Despite the need for global collaboration, discussions of climate change are complicated by competing individual and national interests around issues of fairness, equity, and justice (IPCC, 2014). This research explores whether participation in a play supports changes in individual reasoning about, and understanding of, these intersecting needs. I will analyze pre- and post- show moral reasoning interviews from student actors in a 2014 UNH production of *Sila*, a play about climate change in the Canadian Arctic. This work contributes to an understanding of the pedagogical impact of theatre participation on student moral development, and the role of the arts in public climate change discourse. This project allows me to refine my research skills, and positions me to pose further questions about the roles of education and the humanities in confronting climate change.

12. Name: Eleanor Daniels

Program/Dept.: Natural Resources

Chair/Advisor: Peter Pekins

Abstract: My research involves determining if high genetic diversity provides a selective advantage to blue mussels (*Mytilus edulis*) when faced with environmental stressors such as global climate change and ocean acidification. I will measure byssal thread

tenacity after prolonged exposure to increased temperature and decreased pH in a controlled environment. Using a set of genetic markers (microsatellites), I will determine heterozygosities, which are measures of genetic diversity, and compare them to byssal thread attachment strengths. My research has implications for the aquaculture industry and for the understanding of mussel ecology and biomechanics. The experimental trials will start by the end of spring semester and run through the summer. The resulting data form the basis for my MS thesis, which I hope to defend in Spring 2016.

13. Name: Sarah Dean

Program/Dept.: Psychology

Chair/Advisor: Edward O'Brien

Abstract: The goal of the proposed experiments is to examine how although general world knowledge is always passively activated, readers are not always disrupted when they encode information that can occur in a fictional narrative but not occur in the real world. Across a number of experiments, textual manipulations of fictional narratives will begin to explicate the interaction between general world knowledge and the validation process. This study will contribute to the existing literature on the memory-based view of discourse comprehension, particularly by extending the recently developed RI-Val Model (Cook & O'Brien, 2014). Establishing the fundamental processes occurring during the validation stage is critical for elucidating directions for future research, which will guide my overall academic plan.

14. Name: Amanda Demmer

Program/Dept.: History

Chair/Advisor: Kurk Dorsey

Abstract: My dissertation, "'The Last Chapter of the Vietnam War': Normalization, Nongovernmental Actors and the Politics of Human Rights, 1975-1995," examines the role of non-governmental actors, especially Vietnamese Americans and human rights organizations in the crafting of U.S. normalization policies toward the Socialist Republic of Vietnam (SRV). I argue that these overlooked actors successfully lobbied U.S. policymakers to address the humanitarian crisis that followed communist military victory in 1975, despite the fact that the U.S. refused official economic and diplomatic relations with the SRV until 1995. I not only add new voices to the old narrative, then, but challenge the scholarly understanding of "normalization" itself by demonstrating the importance of human rights concerns and national, transnational and international influences on U.S. normalization policy. Summer financial support will allow me to capitalize on spring research trips and write the first two chapters of the dissertation.

15. Name: Kristiana Dixon

Program/Dept.: Psychology

Chair/Advisor: Michelle Leichtman

Abstract: Researchers have established that family violence increases risk both for later violence re-victimization and perpetration, also known as the cycle of violence. However, the mechanisms underlying these patterns are not readily understood. During the upcoming summer I will be advancing work on two complementary studies that examine selfconcept as a mediator in the cycle of violence. Family violence is proposed to affect selfconcept (views and beliefs about the self), which predicts later patterns of violence (i.e., victimization, perpetration, both, or nonviolence). The first study seeks to examine selfconcept as a mediator between family violence and peer violence patterns. The second project extends this research to partner violence by exploring the impact of dimensions

of self-concept on the cycle of violence. Both studies contribute to my dissertation project, my overall program of research examining the processes involved in the cycle of violence, and the general advancement of violence intervention efforts.

16. Name: Jaya Dofe

Program/Dept.: Electrical Engineering

Chair/Advisor: Kent Chamberlin

Abstract: Computers, tablets, cloud computing, social network media (e.g. Facebook, Twitter, and Linkdin) and many other Internet of Things are gradually changing the way we are used to live with. All those fascinating devices and systems fundamentally rely on one thing—integrated circuits (ICs)

With constantly growing demand for security, ICs started to be used not only for control purposes but for protection as well. Unintended system behavior could have severe consequences, such as heavy financial damage, loss of human life, threat to national security. ICs are becoming increasingly vulnerable to malicious Hardware attacks. My research focus for this summer will be exploiting efficient ways of malicious hardware detection and security primitives to ensure chip security. This summer fellowship will help to carry out relevant experimentation for my research work and publish high-quality journal papers.

17. Name: David Earls

Program/Dept.: Mathematics

Chair/Advisor: Karen Graham

Abstract: There is little research regarding student difficulties with sequences and series in second semester calculus, and no research regarding how these difficulties relate to prerequisite skills that should be acquired from previous courses. I plan to develop a pilot study, and the data from this study will be used to determine how prerequisite knowledge impacts student understanding of sequences and series. This study will fill a gap in the literature, and will lead to a full study that will form a basis for a dissertation in mathematics education.

18. Name: Thomas Fenton

Program/Dept.: Chemistry

Chair/Advisor: Gonghu Li

Abstract: Carbon dioxide (CO<sub>2</sub>) is a renewable feedstock for the production of chemicals, fuels and materials. The mechanism of the reduction of CO<sub>2</sub> is still under debate. A dimer mechanism has been proposed by others, in which two catalyst molecules work cooperatively to reduce CO<sub>2</sub>. Investigation of the mechanism is vital to further develop knowledge of this system. By utilizing surface immobilization with a coupling agent that can bring two catalysts in close proximity, studies can be performed to confirm the dimer complex. Building on our previous results we propose to optimize structures of the coupling agent to facilitate the dimer mechanism CO<sub>2</sub> reduction at low energy cost. Finding experimental evidence of the dimer mechanism can lead to improvement of catalyst designs and help develop more efficient photocatalysts.

19. Name: Marino Fernandes

Program/Dept.: English

Chair/Advisor: Siobhan Senior

Abstract: I will study the academic student group HELP, a group which provides writing support to multilingual students on campus. Specifically, this study will examine how the non-native

English speaking writing tutors in HELP negotiate their identities as non-native English speakers and as authorities in writing in peer conferences.

This study contributes to the fields of Second Language Writing and Writing Center scholarship in that such a study has not been conducted to date. Although the field has studied the writing of non-native speakers, this will be the first project to study how nonnative speakers tutor the writing of their peers. Conducting this project will help me build my academic reputation in the field of Second Language Writing.

This project will result in conference presentations and a submission for publication in the Journal of Second Language Writing. This study will be a major component of my dissertation.

20. Name: Sarah Franco

Program/Dept.: English

Chair/Advisor: Siobhan Senior

Abstract: This summer, I would like to develop one of my dissertation chapters, "Ways of Witnessing" and submit to the journal, Teaching English in the Two-Year College (TETYC). My dissertation project, From Soldier to Student: Student Veterans' (Re)Construction of Identity in Writing Classrooms, investigates how student veterans (re)construct their identities in composition classrooms, and this particular chapter focuses on specific strategies identified by student veterans and writing instructors who work closely with this population that would increase awareness and support of student veterans' unique experiences. With the growing number of student veterans on college campuses, it is imperative that educators engage in ongoing conversations about how to support this unique student population. After exploring the dynamics of instructor/student veteran relationships in previous chapters, this chapter identifies ways to engage educators and student veterans in a conversation about student veterans' needs in the writing classroom.

21. Name: Maxwell Grady

Program/Dept.: Physics

Chair/Advisor: Mark McConnell

Abstract: Using a novel PVD assisted growth process on a Ru(0001) substrate, we have developed a graphene system that displays many unique structural properties. This graphene/Ru(0001) system displays polymorphic moiré domains covering a wide range of superstructure sizes whereas standard graphene on Ru(0001) generally displays only one dominant moiré domain. However, a greater understanding of the exact cause of the induced moiré polymorphism is needed. The precision of a LEEM/LEED experiment will allow us to unlock the exact interfacial structure of this unique graphene system. Moreover, the LEEM experiment will allow us to measure the layer thickness to confirm the presence of single layer graphene in our sample. This measurement is critical to our characterization of this sample and outside the capabilities of our own STM/LEED system. This work will enable future projects utilizing this graphene system as a template for molecular self-assembly.

22. Name: Kyle Gray

Program/Dept.: Mathematics

Chair/Advisor: Rita Hibscheweiler

Abstract: This summer I will study the theory of model categories, a rich and powerful tool in modern mathematics. Under the supervision of Professor Maria Basterra, I will read several texts and research papers on model categories in preparation for my dissertation work in the related field of homotopy theory. I will concentrate on finding explicit, convenient models for homotopy limits in the category of unbounded differential graded

modules. Such findings will give important insights into the role of model categories in this algebraic setting. In addition to preparing me for my upcoming dissertation work, this project will assist me in fulfilling the Major Presentation requirement for the Ph.D. in mathematics, in which the speaker delivers a one-hour talk on his intended research area.

23. Name: Holly Guevara

Program/Dept.: Chemistry

Chair/Advisor: Rudi Seitz

Abstract: A variety of small aromatic compounds are now known to be carcinogenic in nature. Investigation of the metabolic pathways involved in their metabolism in the human body is necessary to understand the toxicity of these compounds. Most of the intermediates involved in benzene metabolism by the cytochrome P450 enzyme are known, but some reactive intermediates, derived from oxepins, are still elusive. The aim of this project is to investigate the existence of 2,3-epoxyoxepin as an intermediate in the metabolism of benzene. The proposed intermediate is a precursor to the toxic metabolites. We will make some related synthetic mimics of a known reactive intermediate (oxepin) and analyze their oxidation by-products using both enzymatic and synthetic oxidation techniques. With the metabolic pathway solved, we can better understand the toxicity associated with aromatic hydrocarbons. This interdisciplinary work will be directly included in my doctoral thesis and will improve synthetic and analytical chemistry skills.

24. Name: Ashley Hanlon

Program/Dept.: Chemistry

Chair/Advisor: Erik Berda

Abstract: Today our society thrives for technological advances in areas like sustainable energy, improved medical treatments, and minimization of continual damage to our environment. Considering each challenge separately, one theme is central to all: There is a critical need to precisely control structure and morphology in 2 and 3 dimensions on nanometer-length scales. In an approach to access a variety of polymeric nanostructures, the self-assembly of a range of star and brush polymers will be studied for doctoral research. Functional nanodevices are expected to be obtained through simple synthetic approaches to gain multiple domains into these structures. Introduction of light, heat, and chemical responsive moieties along with selective incorporation of phase segregated hydrophobic and hydrophilic domains is predicted to control the formation and self-assembly of anisotropic nanoparticles. Our design offers a tunable approach to well-defined complex polymer systems well suited to meet these challenges by bridging current gaps in fundamental capabilities.

25. Name: Audrey Hansen

Program/Dept.: Spanish

Chair/Advisor: Scott Weintraub

Abstract: This project examines how documentary film in Chile has contributed to the country-wide reconciliation process following the human rights violations of Pinochet's 1973-1990 dictatorship. Combatting a tightly-government-controlled official narrative, documentary footage not only provides a record of what happened and preserves the memory of lives affected by the dictatorship, but also depicts the process of reconciling with a difficult past and moving forward. STAF funding will permit me to travel to Chile to attend the Santiago International Documentary Festival (June 2015) in order to see the latest Chilean documentaries on human rights. I will also conduct valuable research at nearby institutions, such as the Museum of Memory and Human Rights and the National Film Archive. This research will form part of my final Spanish MA project on memory and trauma in Chilean film. It will contribute to the ongoing dialogue between countries and individuals in negotiating histories of state-led violence.

26. Name: Jessica Henry

Program/Dept.: Chemistry

Chair/Advisor: Sterling Tomellini

Abstract: Shellfish monitoring programs have been established worldwide to prevent human consumption of contaminated shellfish meat. Many programs monitor the toxins that cause Paralytic Shellfish Poisoning (PSP). PSP is an incurable disease that causes facial paralysis and respiratory arrest in humans. Current methods use mice to determine the amount of PSP toxins in shellfish. When toxin levels rise above the regulatory limit, the shellfish industry must stop harvesting and close the shellfish beds. Through collaboration with the toxicologists and analytical chemists at the New Hampshire Public Health Labs (NPHL), the goal of this project is to develop a more ethically favored, alternative method for the analysis of PSP toxins. Using advanced instrumentation located at the NPHL, this interdisciplinary project will provide both the exposure to the public health laboratory environment and the opportunity to use the instrumentation alongside toxicologists and chemists currently working in the field.

27. Name: Donna Hogan

Program/Dept.: Biochemistry

Chair/Advisor: Kevin Culligan

Abstract: While it is standard practice to normalize ion intensity to the median within a given LCMS experiment, cross-linked peptides require an additional normalization step due to the two main factors which influence cross-linking occurrences: proximity and reactivity. Previously, we developed a method for incorporating surface modified peptide ion intensity to normalize cross-linked peptides. Semi-quantitative information about conformational changes can be deduced by normalizing cross-linked peptide ion intensity by the geometric mean of the cognate surface modified peptides. Next, we plan to demonstrate this method with phosphodiesterase 6 (PDE6), and hope to uncover novel interactions between the subunits in different conformations and further validate the method.

28. Name: Erik Kehoe

Program/Dept.: Mathematics

Chair/Advisor: Rita Hibscheweiler

Abstract: This summer I will be working with Professor John F. Gibson from the Dept. of Mathematics and Statistics to aid his research in high-dimensional computational fluid mechanics. In particular, we will describe the geometry of state space in plane Couette flow. I will be reading on inertial manifolds and numerical approximations of manifolds, then applying this knowledge to Gibson's research. The research, along with a write up and presentation of my findings, constitutes my Minor Project for the Math Ph.D. program. A better understanding of the geometry of state space will greatly improve our knowledge of turbulent flow. Explicitly, when we discover a new geometric structure in state space it provides restrictions to the dynamics of a particle near it. Completing this work will fulfill my Minor requirement for my program, and provide me with an opportunity to apply my general knowledge in topology.

29. Name: Colin Lee

Program/Dept.: Zoology

Chair/Advisor: Win Watson

Abstract: My project explores the neural mechanisms that underlie satiation in the sea slug *Melibe leonina*. So far I have demonstrated that stomach distention correlates with a reduced motivation to feed in this species, and also identified the nerves that communicate

stomach distention to the rest of the brain. This summer I will be attempting to demonstrate that stomach distention actually causes a reduction in feeding; I will monitor the parts of the Melibe brain that control feeding, and see how stomach distention alters their activity. This research will add to our understanding of satiation, and more generally will further our understanding of the way that nervous systems control the motivation to perform behaviors. My experiments this summer will complete my thesis research.

30. Name: Alex Levin

Program/Dept.: Mathematics

Chair/Advisor: Maria Bastera

Abstract: I will study group cohomology and produce an expository paper and formal presentation, to be delivered in early Fall 2015. This project satisfies the Minor Project requirement of my PhD program in mathematics. Cohomology is an active area of research in the field of mathematics called algebraic topology. Professor Maria Bastera in the Department of Mathematics and Statistics developed a new branch of cohomology theory; she will advise this project. Professor Dmitri Nikshych, also in the Department of Mathematics and Statistics, makes extensive use of group cohomology in his research. The expertise I develop this summer will allow me to conduct research as a part of his working group using group cohomology to classify fusion categories. Fusion categories have applications in quantum physics that may lead to the next generation of quantum computers.

31. Name: Rachael Mack

Program/Dept.: Natural Resources

Chair/Advisor: Russ Congalton

Abstract: Accurate measurement of public opinion is increasingly important to natural resources management and planning. Approximately 3,000 surveys sent to households in the greater New England area, meant to evaluate environmental concern, as a follow-up to work done by researchers at UNH to complete a Coastal Tourism Inventory and Visitor Needs Assessment for the Rockingham Planning Commission, to assist with their planning and management of the coastal Route 1A & 1B Byway. If awarded a fellowship, time would be spent organizing, evaluating, and analyzing the data for patterns between demographic variables and amount of environmental concern, as well as changes in response due to the type of answer format an individual was provided. Much work has been completed with regard to how changes in length or labels affect responses using a particular scale, but less is known about how different formats compare to one another.

32. Name: Ashley Marcinkiewicz

Program/Dept.: Microbiology

Chair/Advisor: Cheryl Whistler

Abstract: The gastric pathogen *Vibrio parahaemolyticus* sequence type (ST)36 has recently invaded the Atlantic coast from the Pacific Northwest, causing unprecedented outbreaks. My dissertation goal is to determine what factors influence the competitiveness of ST36 strains if they were to invade a new environment, particularly focusing on competitions against the natural *V. parahaemolyticus* population, and ability to establish within the oyster. In this STAF project, I will be determining if vibriophage content in the *V. parahaemolyticus* genome is one factor influencing competitiveness. This will include bioinformatically categorizing phage content in over 200 *V. parahaemolyticus* strains, isolating the phage from ST36 strains to see if it can lyse environmental strains, and competing strains in the presence of phage to determine if phage can change a simulated bacterial population. Understanding specifically how

individual strains react to phages, particularly invasive ST36 strains, can help phage therapy and managing shellfish in the face of dissemination.

33. Name: Jovana Milosavljevic

Program/Dept.: English

Chair/Advisor: Siobhan Senier

Abstract: The goal of my research is to examine English as second language (ESL) students' understanding of task instructions given in two courses in the Mechanical Engineering department at UNH. While I was teaching an ESL first year writing course in the fall semester 2014, I noticed students' vague understanding or misunderstanding of assignment instructions, including words such as "analyze", "discuss", and "evaluate". I researched this topic as a final project for ENGL 815 and the findings showed that students did have difficulties. Considering that the instructions are used across curriculum my summer research would be a pilot study for my Master's thesis that would focus on difficulties ESL students have with the comprehension of task instructions. Having talked to a couple of students from Mechanical Engineering, I discovered that they had the same issue. The results would contribute to students' performance and teachers' efficiency in teaching.

34. Name: Hossein Mohammadiarani

Program/Dept.: Chemical Engineering

Chair/Advisor: Harish Vashisth

Abstract: There continues to be a huge gap between the number of protein sequences and the number of known structures. The most precise structural characterization of proteins is provided by experimental techniques such as X-ray crystallography and NMR spectroscopy. However, owing to the labor intensiveness and technical difficulties of these methods, the number of protein structures determined by experimental methods developed more slowly than the accumulation of protein sequences. In this study, we aim to investigate using molecular simulations the structure of the transmembrane domain of the insulin receptor, a protein that plays important role in glucose regulation. Interestingly, the structure has been probed experimentally by NMR, and therefore we aim to correlate predictions from simulations with emerging experimental findings. Importantly, such studies will lead to computational methods that can be used on novel sequences for structure determination, and thereby decrease the sequence-structure gap in the field of structural biology.

35. Name: Brandon Montemuro

Program/Dept.: Applied Mathematics

Chair/Advisor: Gregory Chini

Abstract: Our plan is to systematically simplify or "reduce", mathematical models that retain a clear and explicit connection to the governing Navier Stokes equations, but that render feasible computer simulations in realistic parameter regimes. To date, no research groups have attempted to systematically exploit this aspect of flow self-organization. Our key idea is to leverage a technique from applied mathematics known as asymptotic analysis to derive from the "master" Navier Stokes equations simplified equations that govern the behavior of the fluid within the uniform momentum zones and within the vortical fissures. This will be a key element in getting started in my research that will lead to my dissertation and subsequent publications in academic journals to get my name out in the fluids community.

36. Name: Derek Nelson

Program/Dept.: History

Chair/Advisor: Kurk Dorsey

Abstract: At the turn of the twentieth century, Americans spoke in the gravest of terms about an assortment of invasive marine woodborers called "teredo". The sinister phrase the "ravages of teredo" appears repeatedly in congressional reports, newspapers, poems, stories and even crossword puzzles. Teredo's bad reputation came from its habit of secretly boring out and destroying wooden structures. Consequently, teredo caused millions in annual damage, injured people in gruesome wharf collapses and halted commerce to smaller coastal communities unequipped to handle infestations. Few today have ever heard of the word "teredo," but it was once on the tips of many tongues. By researching the lost history of teredo, my dissertation attempts to pull the field of environmental history into neglected coastal landscapes. I contend that the longforgotten teredo played an important role in shaping the American shoreline in geographic, social and cultural terms for a century.

37.Name: Justine Oliva

Program/Dept.: History

Chair/Advisor: Jessica Lepler

Abstract: My doctoral dissertation, "Anne Lynch Botta and the Formation of America's Professional Middle-Class," explores the development of the professional middle-class in Antebellum America through the life and works of the salonnière, author, editor and educator Anne Lynch Botta (1815-1891). While scholars have cited the early nineteenthcentury as the point-of-origin for many middle-class professions, they have not fully addressed the social and political nature of this new cohort. Botta's popular New York City salon attracted many of the most renowned authors, artists, actors, clergymen, politicians, and businessmen of the day. The group identity and individual relationships fostered in Botta's salon collapse the boundaries between nineteenth-century professions, as well as between public and private life. My dissertation argues that Antebellum-era men and women laid the foundation for modern capitalism as they constructed a business culture rooted in the interplay between the senate, the stock market, and the salon.

38. Name: Shiwaha Park

Program/Dept.: Biochemistry

Chair/Advisor: Clyde Denis

Abstract: Protein-misfolding disease is a group of disorders that involve the accumulation of improperly folded protein clusters. These include progressive neurodegenerative diseases such as Alzheimer's, Parkinson's, Huntington's, and Lou Gehrig's diseases that affect millions people worldwide. While there is currently no cure for these diseases, promising research offers new hope for understanding their causes and possible treatments.

Using yeast as a model system, my research examines the interaction between various molecules that assist the folding process known as chaperone proteins. The goal of this research is to elucidate the molecular mechanism of formation of mis-folded protein aggregates. I will determine the abundance and the composition of mis-folded protein clusters using the analytical centrifugation system, a novel technique. I will use this knowledge to examine the association between different chaperone proteins to develop additional tools for investigating the structure, size, regulation of specific aggregates, and potential therapeutic targets.

39. Name: Andre Pereira

Program/Dept.: Animal and Nutritional Sciences

Chair/Advisor: David Townson

Abstract: Previous research in our laboratory identified that farmers are challenged by high costs of feed. We tested an alternative broadly used feed supplement (field peas) for dairy

cows that has lower cost, maintain milk production and pollute less the environment. Field peas is a protein and starch supplement that can be used to replace more expensive supplements (corn meal and soybean meal). High levels of field peas result in decreased milk and milk protein production, but no studies evaluated why. Also, the environmental pollution was never analyzed when feeding this dietary supplement. We identified that field peas are lacking in the essential amino acids lysine and methionine and that milk production and milk protein production is improved when diets with peas are supplemented with amino acid sources. The results of this study will allow farmers to produce milk with lower costs and lower environmental footprint, using scientific based decisions.

40. Name: Danny Rasco

Program/Dept.: Psychology

Chair/Advisor: Rebecca Warner

Abstract: Every year thousands of college students discontinue their education without a degree. This decision negatively impacts individuals through reduced income and job security, colleges through lost tuition and lower graduation rates, and the nation as collegeeducated individuals pay more taxes and require assistance such as unemployment benefits less. The proposed studies evaluate formative assessments (e.g., quizzes) as a way to improve academic performance. These studies address inconsistencies in the existing literature on quiz placement (pre-lecture, post-lecture), and they are the first to consider if quizzes can improve learning about distractors: Closely-related but incorrect answer choices on multiple-choice questions. This research will help me develop as an instructor, complement the Cognate in College Teaching, and enhance my chances of obtaining employment at a university that highly values teaching. Once published in a peer-reviewed journal, the studies may also help other instructors use quizzes more effectively, which could reduce student attrition.

41. Name: Louise Roy

Program/Dept.: Oceanography

Chair/Advisor: Rosemarie Came

Abstract: Clumped isotopes are a new and innovative paleoclimate proxy that scientists have to reconstruct past climates. The current proxies for recreating past climate require many adjustments and assumptions that can be eliminated by calculating the clumped isotope values of carbonate samples. In order to be able to use it, however, we must first create a baseline calibration of known values and temperatures against which we may compare geologic samples. To calibrate the data that are being collected at different labs we must determine why variability is present between calibration studies at the colder end of the scale. For my thesis I am analyzing several samples of Antarctic coral for their clumped isotopic signatures to determine why these fluctuations may be occurring. This project complements the research being conducted by Dr. Rosemarie Came in the Earth Science department and will be a strong base for my PhD work in the future.

42. Name: Kei Saito

Program/Dept.: Sociology

Chair/Advisor: David Finkelhor

Abstract: Since the early 1990s, there has been an increase in the number of sex offender laws in hopes of protection children from sex crimes. These policies have expanded over time both in number and in scope, which has more recently raised concerns among both legal scholars and social scientists. However, systemic empirical investigation of some of the more recent sex offender laws have been limited and it is unclear if these policies are truly effective in protection children from sex crimes. I will be conducting a systematic review of different sex offender laws in the United States and when they were

enacted, as past research have shown there is considerable state-by-state variation. This research will contribute to my dissertation, which will be investigating the effectiveness of sex offender policies taking into account both temporal and place-based variation that have not been sufficiently considered in prior research.

43. Name: Samantha Sinclair  
Program/Dept.: Earth Sciences  
Chair/Advisor: James Pringle

Abstract: During the last ice age, the Laurentide ice sheet (LIS) dramatically modified the landscape in New England and produced a variety of glacial landforms. Previously unrecognized clusters of subtle ridges have recently been discovered in the Seacoast region of New Hampshire from newly acquired remote sensing LiDAR data. Based on their dimensions and distribution, these ridges are interpreted as moraines that mark the retreating edge of the LIS during the last deglaciation. The origin of this type of moraine is debated. The purpose of this project is to develop a conceptual model for moraine genesis in New Hampshire through sedimentological and morphometric analyses. Understanding how these moraines form will provide insight into ice sheet retreat patterns in the Seacoast and contribute to the knowledge of glacial processes in regions where these moraines are observed globally. This work provides the foundation for my future study of glacial dynamics in New Hampshire.

44. Name: Nathaniel Stafford  
Program/Dept.: Psychology  
Chair/Advisor: Robert Drugan

Abstract: Stress is a significant contributor in the etiology of depression. However, some are resilient to stress and do not develop depression, which prompts questions about the characteristics of an individual that confers stress resilience. Unfortunately, current animal models of stress resilience are limited because these procedures require manipulation or testing of the subject, which may mask the neurobiological changes associated with the initial stress exposure. Our laboratory has recently begun evaluating innate resilience through the use of rodent ultrasonic vocalizations as a non-invasive forecast of stress resilience. Ultrasonic vocalization emission may be analogous to coping, and may be mediated by coping-resilience associated neural pathways. The proposed project will examine the neurobiological activity of the resilience circuit in brains of vocalizing rats immediately following a swim stress. Furthermore, this work will serve as an initial experiment for my dissertation to investigate the neural correlates of innate resilience.

45. Name: Ian Ster  
Program/Dept.: Biochemistry  
Chair/Advisor: Cheryl Whistler

Abstract: This research project examines an uncharacterized hybrid-histidine kinase and its role in improving the symbiotic fitness of a non-native squid symbiont in a highly specific, beneficial relationship between the marine squid, *Euprymna scolopes* and marine bacterium, *Vibrio fischeri*. To determine its role, we are investigating the kinase's domains and function. Ultimately, understanding the regulation of this HHK and the role in this squid-microbe model will further elucidate how new bacteria-host relationships are established.

This study will contribute to the field of biochemistry by defining how a phosphorelay cascade was tweaked through evolution and its implication in the establishment of microbe-host interactions. Examining how these marine organisms are able to interact with one another will further my overall career path of applying scientific techniques to understand the physiological importance of biochemical pathways of marine organisms.

46. Name: Erik Swanson

Program/Dept.: Microbiology

Chair/Advisor: Louis Tisa

Abstract: Chemical pollution jeopardizes human health and environmental integrity. One class of chemicals, polycyclic aromatic hydrocarbons (PAHs), is particularly concerning due to their tendency to build up in the fatty tissue of humans and other animals which poses serious health risks. Currently, PAH remediation strategies are costly and disruptive. The proposed research will address the potential of the Frankia-Alder symbiosis to efficiently degrade PAHs and thus remove them from the environment. Three aspects of this potential will be tested. First, the ability of Frankia to grow in the presence of PAHs will be assessed. Second, the ability of Frankia to degrade PAHs and the genetic basis for this ability will be assessed. Third, the rate of PAH degradation by Frankia alone and by Frankia in symbiosis with alders will be compared. Summer funding is requested to complete the first goal of this project and begin work on the second.

47. Name: Katherine Ver Ploeg

Program/Dept.: English

Chair/Advisor: David Rivard

Abstract: Within literature, there is a long tradition of walking and writing: William Wordsworth, Henry David Thoreau, Bill Bryson. However, despite the recent success of Cheryl Strayed's *Wild*, few outdoor adventure narratives are written by women. In summer 2015, I will walk 300 miles across Scotland's remote northern Highlands. As a nonfiction writer whose personal essays examine the intersection of travel and gender, I hope to use this walk to offer a fresh perspective on a landscape so influential in the early British walking narratives that later inspired American travel and nature writing, genres which inform my own work. This opportunity will enrich my MFA thesis, a collection of narrative essays that draw upon personal experience to explore self-protection and vulnerability, trust and independence. I hope my writing will deepen and complicate readers' understanding not only of gender and adventure, but of what it means to be human.

48. Name: Catherine Welter

Program/Dept.: English

Chair/Advisor: Siobhan Senior

Abstract: My plan for the summer is to work on two of my dissertation chapters so that I will be able to complete my dissertation next spring. I use an innovative critical approach (a combination of theories from Disability Studies and Mobility Studies) in order to analyze how Victorian novelists, including Dickens and Braddon, both shape and subvert cultural and bodily norms in their work. In particular, I focus on how transgressive motion and embodiment enables characters identified as "disabled" or "different" to resist oppression. This work fills a gap in the existing scholarship on the Victorian novel, but it also contributes to the fields of Mobility and Disability Studies by expanding our knowledge of Victorian mobilities and by responding to David Mitchell and Sharon Snyder's call for the humanities to provide a "more sophisticated history of disability to Disability Studies and people with disabilities" (42).

49. Name: Yilong Yang

Program/Dept.: Plant Biology

Chair/Advisor: Larry Harris

Abstract: The strawberry is a commercially important fruit, and is one of the most genetically complex crop plants. The cultivated strawberry *Fragaria x ananassa* is an allo-octoploid, meaning its genome is derived from multiple diploid ancestors, and consists of eight sets

of chromosomes. Unresolved questions about the evolutionary history and subgenome composition of strawberry have caused substantial challenges for breeding. My Ph.D. research goal is to answer these questions via a phylogenetic approach. Phylogenetic trees were constructed using sequencing data of 24 nuclear genes from 96 plant samples. My results revealed the phylogenetic relationships among species of different ploidy levels, and confirmed the identities of two diploid progenitors of the octoploids. This knowledge is critical for effective use of a wide germplasm in strawberry improvement. In addition, my study developed a bioinformatics pipeline that is useful for large scale phylogenetic analysis of other important polyploid crops.

50. (Name) Ali Zarringhalam

Program/Dept.: Mathematics:

Chair/Advisor: Rita Hibscheiler

**Abstract:** My project is in the field of Function Theory, the study of certain mathematical objects called Function Spaces and operators (functions) acting on them.

The ultimate goal of my summer project is to give a presentation on the topic mentioned above. This will serve as my Ph.D Minor Project in mathematics. Professor R.

Hibscheiler has agreed to advise me through this study. Based on the summer study, I will prepare my Ph.D Minor presentation, tentatively planned for October 2015

I am planning to do my doctoral research in the field of Functional Analysis. The interplay between Function Theory and Functional Analysis will make my Ph.D minor project an excellent opportunity to explore a different but closely related field of mathematical research under the supervision of the experts of these fields at UNH.