University of New Hampshire

Proudly Presents the Award Recipients for the 2016 Summer Teaching Assistants Fellowship (STAF) Information & Abstracts

1. Ange, Meghan
   Program/Dept.: Genetics, MS
   Chair/Advisor/Coordinator: Jeffrey Foster, Subhas Minocha
   Abstract: As a graduate student in the field of genetics, I have decided to aid in the research of White-Nose Syndrome, a devastating fungal disease that has caused over 90% declines in populations of crucial species of bats. My work will answer questions concerning the genetic changes that bats are going through as a result of strong selection in the face of this disease with the overall goal of aiding in their conservation.

2. Aviado, Kimberly
   Program/Dept: Earth & Environmental Sciences, PhD
   Chair/Advisor/Coordinator: Jennifer Bourgeault, Julie Bryce
   Abstract: My research seeks to elucidate the processes driving volcanic activity in two of the largest continental rift systems on Earth, the East African Rift system and the West Antarctic Rift system. Through detailed geochemical investigations of volcanic samples from both rifts, my work will help quantify the nature and origins of anomalous chemical structures beneath the rifts, that forms the basis of my dissertation research, and will improve scientific understanding of dynamic continental processes.

3. Bartaula, Radhika
   Program/Dept: Genetics, PhD
   Chair/Advisor/Coordinator: Iago Hale, Subhash Minocha
   Wheat stem and stripe rust are destructive diseases that affect wheat crops worldwide. These pathogens currently pose the threat of a global epidemic due to their rapid evolution, which renders known resistance genes ineffective. As a part of global efforts to find novel sources of durable rust resistance genes, my dissertation goal is to understand the genetic mechanism of rust resistance in these pathogens' alternate host, barberry. For the summer, I am focusing on building genomic resources and characterizing barberry populations for conducting genome wide association studies. This will include characterizing mapping populations for their response to rust diseases, validating genetic markers found in my previous studies and consolidating a reference genome. This summer work will lay the groundwork for achieving my main research goals of dissecting rust resistance loci to better understand the genetic mechanism of resistance, and finding ways to implement novel resistance genes into wheat breeding programs.

4. Drummond Biles
   Program/Dept.: Mechanical Engineering, PhD
   Chair/Advisor/Coordinator: Chris White, Yannis Korkolis
   Abstract: Fluids dynamics is the study of water, air, or a number of other substances at rest or in motion, and it affects many important aspects of our lives. The ability to understand and model energy transport in fluid flows allows for the determination of important parameters used in engineering design. To be optimized, these models must capture the correct physics occurring within engineering systems such as gas turbines, or reciprocating engines. Current models assume that the fluid environment is not rapidly changing. This assumption is violated when analysing the dynamic systems above and leads to applications of incorrect physics within current engineering designs. Construction of a new wind tunnel at UNH allows for investigation of these changing fluid environments. Research conducted in the summer of 2016 will improve the current experimental facility, investigate new measurement techniques, and accomplish new laboratory experiments which explore transport in rapidly changing flow environments.

5. Burns, Wilton
   Program/Dept.: Oceanography, MS
   Chair/Advisor/Coordinator: Tom Lippmann, Kai Ziervogel
   Abstract: Carbon export from the surface ocean to the deep sea plays an integral role in the global carbon cycle. Marine phytoplankton photosynthesize and produce carbon substrates that are utilized by marine bacteria as a food source. I will conduct laboratory experiments on phytoplankton growth, marine snow formation and sinking, and bacterial degradation of phytoplankton-derived organic carbon. Despite the fact that surface ocean environments contain a wide range of turbulence, the majority of research conducted on the formation of marine snow and bacterial remineralization of carbon has been done in stagnant laboratory systems. The outcome of my work will include predictions on the changes in carbon export produced in photic zones that contain mixing levels ranging from open ocean wind-driven energy systems to high energy storm-like systems. These experiments are the basis of my Master's thesis in the Oceanography Department at UNH.

6. Camilleri, Kaitlin
   Program/Dept.: Psychology, PhD
   Chair/Advisor/Coordinator: David Pillemer, Michelle Leichtman
   Abstract: I will develop and test a program focused on training parents to use elaborative conversational techniques when discussing science events experienced by children in the kindergarten classroom. Developing a successful program will contribute a valuable tool that helps parents enhance children's memory for scientific information. Such research will contribute to the field of memory development by providing support for the use of elaboration in parent-child conversations when talking about science. In addition, this research will contribute to the education field, as I hope that educators will eventually choose to implement elaboration training programs in their schools to increase students' academic performance. This research is the first component of my dissertation research in which I plan to examine the effectiveness of the training program over time. I hope to

demonstrate that the training program has long-term effects on parents' use of elaborative conversational techniques when talking with their children.

7. Cheney, Matthew
   Program/Dept.:
   Chair/Advisor/Coordinator:
   Abstract: I propose to study the 1980s work of Samuel R. Delany in his archives at Boston University's Mugar Memorial Library. Delany is a writer whose work will be the focus of one third of my dissertation, and this research is vital to it. Delany is becoming an ever more important focus of study within multiple fields: contemporary literature, glbtq studies, African-American literature, and popular culture. He has given me permission to access his archives for this work, which will require me to read some unpublished manuscripts and correspondence, much of which has not been studied by other scholars. My goal is to assess the effect of growing awareness of the AIDS crisis in New York City in the early 1980s on his aesthetic choices.

8. Dai, Zhongwei
   Program/Dept.: Physics, PhD
   Chair/Advisor/Coordinator: Per Berglund, Karsten Pohl
   Abstract: I'm studying the surface structure of 2D materials such as MoS2 and SnSe2 using a technique called LEED IV analysis. The newly discovered 2D materials such as MoS2 and SnSe2 have great potential applications in modern electronic devices and materials utilized in solar cells, flexible displays, touch screens and so on. The surface structures of these 2-D materials have significant influences on their properties and potential applications. Determination of the surface structures of these materials is of fundamental significance of understanding their properties, growth mechanism and providing guidance for their applications. LEED IV dynamic analysis is a modern newly developed powerful technique for surface structure determination. I'm going to use this technique to solve the surface structure of MoS2 and SnSe2 to provide basic understanding of the new materials and guidance for their potential application.

9. D'Ambrosia, Abigail
   Program/Dept.: Earth & Environmental Science, PhD
   Chair/Advisor/Coordinator: William Clyde, Jennifer Bourgeault
   Abstract: My research focuses on how early mammals have responded to a series of carbon dioxide-induced ancient global warming events. I have found that on multiple occasions, mammals responded by dwarfing in size. Furthermore, the amount of dwarfism was proportional to the magnitude of the associated climate change event. Whether atmospheric carbon dioxide levels, temperatures, or some other factor controlled the dwarfism response has not yet been resolved. Thus, the focus of my doctoral research during the summer of 2016 will involve modeling the ancient environmental conditions in which these mammals lived. By accurately reconstructing the dwarfism response through a model, I may be able to parse out the true mechanisms contributing to the body

size response. This is important because understanding responses of organisms and ecosystems to these past climate events will help us better predict and prepare for similar responses to global warming today.

10. Deily-Swearingen, Susan
    Program/Dept.: History, PhD
    Chair/Advisor/Coordinator: Kurk Dorsey, William Harris
    Abstract: The legacy of "The Free State Of Winston" is still a ubiquitous specter in a county that found itself divided between Confederate and Union loyalty during the Civil War. Tensions between the descendants of those who found themselves on opposite sides of a violent debate about county loyalty still run high. Still, their versions of what happened during the war years support a congruous version of the past. However, I have recently discovered maps and genealogical records that challenge earlier versions of the Winston story and complicate previous investigations of both race and Unionism in the South during the war. These documents suggest the Unionist opposition in Winston transcended the borders of Alabama extending into Tennessee, Georgia, and North Carolina to form a larger movement, "The Free State of Nickajack." An earlier allegiance to Andrew Jackson, Unionism, and mixed Scots-Irish/ Cherokee ancestry united the new movement.

11. Dittrich, Bradfield
    Program/Dept.: English, PhD
    Chair/Advisor/Coordinator: Robin Hackett, Christina Ortmeier-Hooper
    Abstract: Writing theorists often argue that online genres have led to increased cases of fraud and plagiarism, because they encourage unfettered use of pre-existing material. These conversations often treat appropriation as a new phenomenon. In fact, until the mid-nineteenth century, dominant attitudes toward rhetoric held that there was very little original material in the world –good writers primarily borrowed and adapted the works of others. Students and professionals alike were encouraged to keep commonplace books, collections of borrowed quotes and ideas which the writer could appropriate for his own use. By the end of the century, the publishing market had essentially stamped out such imitation practices. By examining commonplace books and other materials housed in the Harvard Archives, this project illuminates the nineteenth-century origins of current ideas about originality. This fellowship would allow the author to draft a dissertation chapter, and to prepare it for submission to Rhetoric Society Quarterly.

12. Earls, David
    Program/Dept.: Mathematics Education, PhD
    Chair/Advisor/Coordinator: Karen Graham, Sharon McCrone
    Abstract: Little is known about student difficulties with sequences and series in second semester calculus. Moreover, there is no research indicating how these difficulties relate to prerequisite knowledge students are expected to have prior to entering a second semester calculus course. I plan to analyze data from my dissertation study including student work from an exam on sequences and series, interviews with students working

through open ended problems on sequences and series, and a multiple choice assessment on sequence and series. My dissertation study intends to fill a gap in the literature and explain the difficulties students are having with these topics.

13. Ennis, Nathaniel
    Program/Dept.: Microbiology, PhD
    Chair/Advisor/Coordinator: Louis Tisa, Cheryl Whistler
    Abstract: Ecological studies of bacterial populations focus on extreme environments to understand how these organisms survive and function in inhospitable conditions. Geodermatophilaceae, unexplored stone-dwelling bacteria, are linked to stone degradation in historic African ruins and challenge the preservation of these cultural heritage sites. In this project I will perform metagenomic analyses of bacterial DNA isolated from three separate Tunisian stone ruins to determine the stone-dwelling constituents of these bacterial populations. I expect that these stone-dwelling populations primarily contain Geodermatophilaceae members, but they may also hold previously undiscovered species. By understanding these bacterial communities, we may help preserve these historic ruins and find biotechnology applications of these bacteria. In addition, this project will provide insight for further studies into the population distribution of bacteria living in extreme environments. The data obtained from this study is instrumental to my future research on the ecological properties and potential biotechnological applications of these stone-dwelling bacteria.

14. Ethridge, Aaron
    Program/Dept.: History, PhD
    Chair/Advisor/Coordinator: Kurk Dorsey, Jason Sokol
    Abstract: My dissertation explores race relations in the lower Midwest during the late twentieth century. The Midwest is often thought of as "typical America." By examining the region through the lens of race, my project asks: What can we learn? I will explore many different stories, including the election of the first black mayor in American history in Gary, Indiana, the somewhat successful presidential campaigns of Alabama Governor George Wallace, and a tumultuous battle for school desegregation in Indianapolis. Although historians have studied race in cities like Detroit or Chicago, my dissertation moves away from those metropolises to relatively un-excavated grounds - cities like Indianapolis, Cincinnati, and even St. Louis. If received, the STAF award will be used for research trips throughout the Midwest over the summer. This will allow me to write in New Hampshire over the following year.

15. Fan, Haihui
    Program/Dept.: Mathematics, PhD
    Chair/Advisor/Coordinator: Don Hadwin, Sharon McCrone
    Abstract: John von Neumann's characterization of unitarily invariant norms in terms of symmetric gauge norms on the nxn matrices had a huge impact on linear algebra. Recently his results were extended to factor von Neumann algebras and already there have been many important applications. The factor von Neumann algebras are the atomic building blocks from which every von Neumann algebra can be built. My work is aimed

at extending von Neumann's results to an arbitrary von Neumann algebra using the theory of direct integrals. I have already made a lot of progress and my final results should have many new applications and should lead to a much clearer understanding of unitarily invariant norms. The work I plan to do in the summer, identifying the appropriate analogue of symmetric gauge norms for an arbitrary von Neumann algebra, will be an important step to the solution of my thesis problem.

16. Feldsine, Natalie
    Program/Dept.: Plant Biology, MS
    Chair/Advisor/Coordinator: Jessica Bolker, Gregg Moore
    Abstract: This summer I plan to continue with the dune field experiments that have been conducted since the spring 2015 season. Dune planting is highly dependent on the season and weather so plantings must be restricted to the spring and fall seasons. An additional spring planting season will occur during April and early May and will need to be monitored throughout the rest of the summer. This additional field season will provide more field data which will hopefully better inform researchers and coastal community members regarding the best practices for dune restoration. Additionally, it will benefit the current data set and help improve methodology. The goal at the end of the summer is to have a thorough data set that will allow for better analysis and interpretation. Publication of this information will also be pursued.

17. Foreman, Joshua
    Program/Dept.: Writing, MFA
    Chair/Advisor/Coordinator: Ann Williams, Sue Hertz
    Abstract: My thesis project is an examination of Southern culture through the lens of my family's history. It begins with my ancestor William Foreman, who fled a 17th-century England torn by civil war for a new life in the Virginia Colony. With a Summer TA Fellowship, I will travel to Norfolk County, England, and explore the place William Foreman came from. In Norfolk I will look for cultural connections between England and the South, speak to Foremans who never left, and dig through old church and government records in search of information about William. My project follows the model of Ian Frazier’s Great Plains. In it, Frazier travels through the Plains, meeting people, observing, and telling the story of Crazy Horse and the Lakota. My project, like Frazier’s, relies on interviews, field research and commentary to tell a story that transcends traditional histories

18. Francoeur, Miranda
    Program/Dept.: Psychology, PhD
    Chair/Advisor/Coordinator: Michelle Leichtman, Brett Gibson
    Abstract: I am interested in examining how one neuron, out of the billions of neurons in the brain, contributes information to facilitate adaptive decision making. My previous research indicates that neurons in prefrontal cortex (PFC) encode information related to events and the spatial context in which they occur. This summer, I propose to further investigate the spatial coding properties of neurons in PFC. Information about context aids in decision making by providing clues about what is appropriate, favorable, or expected in the current situation. Rats will run two tasks, one altering the position of a

choice, and another manipulating contextual cues, to determine if spatial context influences decision making. My proposed project has the potential to advance knowledge in the field of neuroscience because little is known about how single neurons carry information about spatial context and also has implications for clinical research, therapeutic treatments, and classroom applications.

19. Gillman, Katherine
    Program/Dept.: Natural resources & Environmental Studies, PhD
    Chair/Advisor/Coordinator: Jeff Foster, Jennifer Bourgeault
    Abstract: My research will study the impacts of white-nose syndrome on summer colonies of little brown bats in the northeastern U.S. This disease is caused by a fungal pathogen and kills bats during hibernation, leading to a majority of research being conducted in the winter. This has left a large gap in our understanding of how WNS is affecting reproduction and survival of juveniles, both vital for long-term existence of the species. For three summers, beginning this year, I will conduct mark-recapture studies at approximately a dozen maternity colonies in New Hampshire, Massachusetts, and Vermont. The data from these studies will be compared to historic data and used to analyze population trends. Furthermore, I will work with citizen science projects in these three states to increase monitoring of colonies and educate the public about bats. The summer is thus essential to both little brown bats and my overall academic plan.

20. Guevara, Holly
    Program/Dept.: Chemistry, PhD
    Chair/Advisor/Coordinator: Arthur Greenberg, Howard Mayne
    Abstract: Benzene is an environmental pollutant and human carcinogen. Investigation of the metabolic pathways involved in its metabolism in the human body is necessary to understand its toxicity. Most intermediates involved in benzene metabolism by the cytochrome P450 enzyme are known, but the mechanism for formation of some toxic metabolites, derived from oxepins, are still elusive. The aim is to investigate the existence of 2,3-epoxyoxepin as an intermediate in the ring opening metabolism of benzene resulting in formation of a highly toxic metabolite. We have synthesized model metabolites and analyzed the oxidation products using both enzymatic and synthetic oxidation methods. We have successfully verified the intermediacy of 2,3-epoxyoxepin as a result of enzymatic oxidation of one model metabolite and are currently exploring other substrates. The results of this study should lead to a more sound understanding of the toxicity of benzene and will contribute directly to the doctoral thesis work.

21. Healy, Christine
    Program/Dept.: Natural Resources: Wildlife & Conservation Biology, MS
    Chair/Advisor/Coordinator: Russ Congalton, Pete Pekins
    Abstract: For the past few years, New Hampshire's moose population has been in decline, due to abnormally high infestation of winter ticks, which ultimately result in elevated calf mortality in March-April. Because tick larvae are immobile, the location in which moose encounter ticks in September-November, when ticks are looking for hosts, and that in which adult females dropped off their host the previous April to lay their eggs, must be the same. Coordinate data received from moose outfitted with GPS-collars will

be used to compare microhabitat use during these two periods, to test the prediction that seasonal habitat usage is similar. Once seasonal microhabitat usage has been determined, the locations can then be compared to overall habitat availability, and potentially used to create a model that effectively predicts habitats of high risk tick infestation. If it were reliable, such a model could have important implications in management and conservation.

22. Houts, Amanda
    Program/Dept.: Earth Sciences: Geology, MS
    Chair/Advisor/Coordinator: Joseph Licciardi, Jamie Pringle
    Abstract: Current knowledge of ice sheet geometry and extent in Iceland during the Last Glacial Maximum (LGM) and subsequent deglaciation is based on marine and terrestrial records and glaciological model simulations, but aspects of Iceland's glacial history remain poorly known. One long-standing question concerns whether a restricted ice cap on the West Fjords peninsula existed independently from the main Iceland ice sheet during the LGM, or if two ice sectors coalesced into one ice complex. This project, forming the foundation of my Master's thesis, is focused on developing a suite of 36Cl surface exposure ages on glacially scoured bedrock in northwest Iceland, where the two ice sectors may have merged, provides an opportunity to test hypothesized ice sheet configurations. This study will help define the pattern and chronology of ice sheet margin retreat in northwest Iceland, and project outcomes will inform future glaciological modeling and paleoclimate studies in Iceland.

23. Kindrat, Laszlo
    Program/Dept.: Matt Applied, PhD
    Chair/Advisor/Coordinator: Marianna Shubov, Mark Lyon
    Abstract: My proposed research focuses on the mathematical analysis of an aircraft wing model developed at NASA Dryden Center and at UCLA Flight System Research Center, and tested in a series of flight experiments at Edwards Air Force Base. To suppress flutter, NASA engineers suggested taking advantage of smart materials; hence, piezoceramic patches have been inserted into an experimental wing and tested. The model is equipped with specific dynamical boundary conditions, which translate the effect of aforementioned smart material inclusions into mathematical language. As part of a future dissertation, the solvability and solution properties of an initial-boundary value problem – consisting of the model equations subject to the non-standard boundary conditions – are investigated. Derivation of an analytic formula for the flutter frequency and investigating its dependence on mechanical and airflow parameters is proposed. The availability of such a formula would help experimentalists and wing designers to avoid dangerous frequency domains.

24. Koloski, Tyler
    Program/Dept.: Microbiology, PhD
    Chair/Advisor/Coordinator: Cheryl Whistler, Louis Tisa
    Abstract: The use of chemical pesticides in agriculture has led to health risks to both humans and animals. The use of natural processes of bacteria as pesticides is a strong emerging solution to lowering our dependence on toxic compounds. The proposed

research plan will investigate the potential of the bacterium Serratia sp. strain SCBI to be pathogenic to insects through the excretion of its exoenzymes. The genes responsible for exoenzyme production, and excretion will be identified through differential media, and their role in insect pathogenesis will be assessed through insect mortality assays. The results of this study will contribute to my goal of understanding the insect virulence and expression of virulence factors in Serratia sp. strain SCBI, giving more insight on its potential as a natural insecticide.

25. Langley, Katharine
    Program/Dept.: Biological Sciences: Integrative & Organismal, MS
    Chair/Advisor/Coordinator: Jim Haney, Jessica Bolker
    Abstract: During the summer of 2016 I will travel to lakes across New Hampshire collecting aerosol and corresponding water samples. Samples will be analyzed for cyanobacteria and two cyanotoxins: microcystin (MC) a hepatotoxin and β-N-methylamino-L-alanine (BMAA) a neurotoxin. Cyanotoxins threaten human and wildlife health. Though there are recommended exposure limits to the ingestion of MC, BMAA is not regulated. MC has a 10-fold higher toxicity and availability when nasally applied versus orally ingested, however inhalation is not considered in exposure guidelines. My work aims to begin understanding the relationship between cyanobacteria density and toxicity in the water versus the air, and the factors that increase or decrease their aerosolization. This will be an important first step in evaluating the risk of this route of exposure. This fieldwork must be done during the summer months and will be the basis of my master's thesis in Integrative and Organismal Biology.

26. Liu, Wenjing
    Program/Dept.: Mathematics, PhD
    Chair/Advisor/Coordinator: Sharon McCrone, Donald Hadwin
    Abstract: In summer research, I will finish my major project, expository paper and do doctoral research, which will lead to a dissertation. Mathematician Beurling characterizes the shift-invariant subspaces of the Hardy space, what I am doing is that extending the classical Beurling Theorems for Commutative and Non-commutative von Neumann algebra cases. My study will help us more understand its algebra structure and Beurling theorem in von Neumann algebra case and also will have applications in quantum theorem,non-commutative geometry, algebra operator and analysis.

27. McLarney, John
    Program/Dept.: Biochemistry, MS
    Chair/Advisor/Coordinator: Estelle Hrabak, Thomas Foxall
    Abstract: Protein Acyltransferases are biological catalysts (enzymes) common to plants, animals, and all eukaryotic organisms alike. These enzymes function to modify target proteins within the cell by adding fatty acids or 16-carbon chains which can activate or alter the function of the target protein, this type of regulation is characteristic of cellular signaling pathways. The model plant organism Arabidopsis thaliana has 24 protein acyltransferase enzymes. When the function of one of them, protein acyltransferase-14, has been compromised the plant exhibits premature aging (senescence) and death. The goal of my research project is to identify target proteins of protein acyltransferase-14 and

characterize their role in cell physiology and senescence regulation. To accomplish this, target proteins with 16-carbon chains will be isolated from a homogenized plant sample. Once isolated, these target proteins will be analyzed via mass spectrometry which identifies the most abundant target proteins in the purified homogenized plant sample.

28. Medrano, Juan
    Program/Dept.: Psychology, PhD
    Chair/Advisor/Coordinator: Michelle Leichtman, Robert Ross
    Abstract: Cognitive control refers to a series of cognitive processes utilized in the pursuit of goal directed behaviors. The use of encephalography (EEG) has shown that oscillatory activity varies as a function of cognitive control, with alpha and beta frequencies increasingly linked to these processes. Dopaminergic polymorphisms, as well as diagnoses of Parkinson's disease, have been associated with differential cognitive control functioning, suggesting a dopaminergic role in cognitive control. By comparing oscillatory activity during a cognitive control task between young adults, older adults, and adults suffering from Parkinson's disease, the effects of aging, Parkinson's, and genetic variations in dopaminergic neurotransmission can be analyzed. This summer, I intend on beginning the first step in this examination by analyzing EEG data collected from a sample of sixty-six healthy, young adults, as well as learning the skills necessary to analyze processed DNA, with an emphasis on genes affecting dopaminergic neurotransmission.

29. Nitsch, William
    Program/Dept.: Electrical Engineering, MS
    Chair/Advisor/Coordinator: Richard Messner, Kent Chamberlin
    Abstract: Researchers at UNH are studying a leukemia-like cancer observed in soft shell clams due to its prevalence in wild populations and molecular similarities to human cancers. It is useful for these researchers to know the progression of cancer in individual clam specimens, but unfortunately the current method of categorizing the clams is imprecise and very prone to human error. To alleviate this issue, I am developing a computerized image processing and classifier system capable of analyzing photomicrographs of soft shell clam hemocytes and providing a more accurate and consistent measurement of cancer progression for each specimen. By removing various sources of human error such as differing experience levels and fatigue, the reliability of this experimental data is improved. Currently, no such algorithm exists for the automated identification of cancerous clam hemocytes. I am nearing completion of my research but feel that the summer is necessary to finish my thesis.

30. Oliva, Justine
    Program/Dept.: History, PhD
    Chair/Advisor/Coordinator: Jessica Lepler, Kurk Dorsey
    Abstract: Is it possible to understand public events without peering behind the curtains and examining private life? My doctoral dissertation answers this question with a firm no. It uses the life and works of the salonnière, author, and educator Anne C. L. Botta (1815-1891) to show that friendship proved central to nineteenth-century capitalism. Botta's New York City salon attracted many of the most renowned authors, artists, clergymen,

politicians, and businessmen of the day. Presenting essential networking opportunities to its guests and fostering a sense of group identity among them, Botta's salon doubled as an informal circle of friends and a codifying professional community. Collapsing perceived boundaries between public and private life, my dissertation will help redefine the development of modern capitalism by revealing the extent to which it was rooted in, and dependent on, female-directed social networks.

31. Orde, Katilyn
    Program/Dept.: Biological Sciences: Agricultural, MS
    Chair/Advisor/Coordinator: Rebecca Sideman, Jessica Bolker
    Abstract: Consumer demand for fresh strawberries beyond the traditional "strawberry season" is strong in the Northeast, but growers are limited by current tried-and-true production systems not conducive to prolonged production. The adoption of alternate varieties, updated mulching systems, and inclusion of small protective tunnels have preliminarily shown to extend the fruiting season to nearly six-months in our region. Such a prolonged season could significantly impact local producers by quadrupling season length and position regional farmers to supply a greater share of strawberries on the market. The primary objective of my study is to determine the potential of this new system for our region and its impact on strawberry fruit quality, yield, and season duration. Addressing the ever-present need for tools that support season-extension, the project is highly relevant to local farmers and aligns with the AS program's goal of improving the sustainability of crop production systems and local agriculture.

32. O'Rourke, Devon
    Program/Dept.: Molecular & Evolutionary Systems Biology, PhD
    Chair/Advisor/Coordinator: David Plachetzki, Jeffery Foster
    Abstract: Bat insect consumption provides extensive ecosystem services including potential control of agricultural and forest pests. I conducted a pilot study that followed previously described molecular techniques to determine the composition of bat diets in New Hampshire by collecting bat guano weekly throughout a single summer season; this work will expand to monitor particular forest and agricultural landscapes with known invasive pests and measure bats' contributions to minimizing economic and environmental impacts of insect pests. Initial analyses of just 44 of the 1100 samples collected reveal a diverse arthropod diet with over 240 operational taxonomic units discovered – many described to a species level. Furthermore we detected the presence of an invasive pest (Serropalpus substriatus) an invasive bark beetle pest to endemic Pine species previously unknown to southern NH. This study provides a foundation for further research to measure potential impacts of decreased bat populations and correlated changes in insect community composition.

33. Oshone, Mirkat
    Program/Dept.: Civil Engineering, PhD
    Chair/Advisor/Coordinator: Jo Daniel, Ricardo Medina
    Abstract: At certain point, we all might have experienced road disruptions, and uncomfortable rides arising from cracks on asphalt pavements. Pavements that fail prematurely should be avoided at any cost as they lower ride quality, and elevate the

chance of road accidents and also cause agencies to spend considerable amount of tax payer's money on pavement maintenance and rehabilitation. My research is intended to streamline design and evaluation of crack resistant pavements by developing a parameter that will predict whether or not the pavement will crack. The parameter will be calibrated with commonly used materials and structures to create a relationship between predicted pavement life and final pay adjustment factor. The findings of this project will help state agencies to avoid failure for a given period of time based on predicted lives. The incentive in the form of pay adjustment will also encourage contractors to produce substantially high performing pavements.

34. Park, Shiwha
    Program/Dept.: Biochemistry, PhD
    Chair/Advisor/Coordinator: Clyde Denis, Chu Feixia
    Abstract: Prion proteins form misfolded amyloid aggregates that result in lethal neurodegenerative diseases. Important to prion aggregation are chaperone proteins that help refold misfolded proteins. However, nothing is known either about the different sizes of aggregates that prions can form or which chaperones are present in which aggregates. I have shown that the prion protein prior to forming toxic aggregates can form a range of discretely sized soluble aggregates containing only certain chaperone proteins. My summer research proposal will determine which chaperones are present and at what concentration in each of these novel soluble aggregates. These studies will advance our understanding of how lethal forms of prions are created, what chaperone factors influence prion aggregation, and what therapeutic agents may be used to alleviate aggregate formation and their toxic effects in these and related diseases like Alzheimer's and Parkinson's.

35. Prior, Holland
    Program/Dept.: Writing, MFA
    Chair/Advisor/Coordinator: Ann Williams, Sue Hertz
    Abstract: Women in the American Evangelical Church in the 1800s rode a wave of inclusion that had mysteriously crashed by the mid-1900s. As an ordained minister, I am well-acquainted with the backlash against women. In summer 2016 I will explore the lives of three clergywomen from before, during, and after the era of inclusion to glean insight into how the change occurred and its impact on women and the larger church. This opportunity will support my MFA thesis, a series of narrative nonfiction essays that uses the stories of clergywomen, interwoven with my own, to trace the rise, fall, and re-emergence of women as clergy. Nonfiction has a long tradition of blending historical research with personal experience to weave a narrative that retells a slice of history for today, and my project will provide an alternative narrative that will advance the status of women throughout the church and society by extension.

36. Roberson, Matthew
    Program/Dept.: Physics, PhD
    Chair/Advisor/Coordinator: David Mattingly, Per Berglund
    Abstract: Holography is a powerful new mathematical tool useful in many fields of modern physics. According to the holographic principle, the information contained in the

volume of space can be thought of as being encoded on a boundary of that region. Mathematically, holography allows us to identify the equations and physical quantities of one type of physical theory with those of certain other physical theories, providing a powerful framework for studying physical systems and often simplifying problems. In the past decade, holography has been explored in numerous relativistic systems, but realizing the holographic principle in non-relativistic systems has proven difficult. Newer modified gravitational theories, however, show promise of extending holographic techniques to the non-relativistic case. The proposed study seeks to utilize these new theories to extend the holographic principle to a larger class of non-relativistic physical systems. This will provide new tools benefiting a broad class of physical scientists.

37. SenChoudhury, Rebecca
    Program/Dept.: Economics, PhD
    Chair/Advisor/Coordinator: Michael Goldberg, Karen Conway
    Abstract: This research is the first to investigate the spillover effects that tobacco policies might have on adolescent healthy behaviors like physical activity. The study provides a conceptual framework that shows how tobacco policies may affect youth physical activity through multiple channels and in unpredictable ways. The empirical analysis uses data on smoking and physical activity measures from the national Youth Risk Behaviour Surveys (YRBS) which is merged with state level data on taxes and spending on tobacco control policies. I look forward to presenting this research at a conference in the coming academic year and also including it as one of my dissertation essays. It also provides a pathway for my future investigations into other unintended effects that tobacco policies might have on the health of teenagers such as pushing them towards more dangerous methods of weight loss

38. Sheckler, Elizabeth
    Program/Dept.: English, PhD
    Chair/Advisor/Coordinator: Robin Hackett, James Krasner
    Abstract: Responding to social and scientific tumult, the Victorians fundamentally shifted their ideas about medicine, especially regarding women caregivers. They wrote new laws and standards, which systematically devalued the traditional healing work of women, like midwives. Today, the medical field is more gender progressive, yet still choked by Victorian prescriptions about gender and caregiving. My research this summer, which will add historical context to my dissertation on gender and the sick body in Victorian literature, is to explore The British Medical Journal and Association Medical Journal online archives in an effort to understand the impetus toward medical professionalization in terms of gender. Although scholarship has been written investigating Victorian medicine, scholars have often neglected sources like the expansive BMJ and AMJ. My work will help open a dialogue between historical accounts and literature, especially regarding how we think about caregiving in terms of gender, and how caregivers manifest in Victorian literature.

39. Shell, Wyatt
    Program/Dept.: Biological Sciences: Integrative & Organismal, PhD
    Chair/Advisor/Coordinator: Sandra Rehan, Jessica Bolker

Abstract: There is evidence in socially polymorphic species, such as the small carpenter bee (Ceratina calcarata), that ecological variation may dynamically alter expression of social form. Thus, such species can be studied to explore the mechanisms behind evolutionary transitions in sociality. Recent observations suggest C. calcarata in Georgia may have up to two broods per year, and thus may be forming more complex social groups than populations in New Hampshire (which have only one). My summer research will involve methodological testing in New Hampshire, punctuated by intensive fieldtrips to Georgia, allowing me To- A) establish reliable field sites and a comprehensive ecological data baseline for Georgian C. calcarata populations; B) test the effects of field enclosure cages on the reproductive biology of C. calcarata, allowing for highly informative translocation experiments between northern and southern populations in future; and C) establish collaborative mentorships with students at Spelman College in Atlanta, GA.

40. Sterans, Clio
    Program/Dept.: Education, PhD
    Chair/Advisor/Coordinator: Leslie Couse, Joseph Onosko
    Abstract: The Responsive Classroom program is a ubiquitous social emotional learning program that aims to teach children particular ways of behaving and responding to conflict. I am in the midst of collecting observational data on the use of Responsive Classroom in a kindergarten class in an urban public school, with an eye toward arguing that the program is problematic in its denial of conflict and difficult feelings. My summer project will be to code and analyze this data as it relates to contemporary and historical educational theory and theories about emotion. This project is an outgrowth of a paper I published last year reviewing the literature on Responsive Classroom and social emotional learning. My hope is to conduct further and more extensive observational studies that will lead to further publications as well as a dissertation oriented toward the study of engagement with negative affect and bad behavior in elementary schools.

41. Stephens, Ryan
    Program/Dept.: Earth & Environmental Sciences, PhD
    Chair/Advisor/Coordinator: Rebecca Rowe, Russell Congalton
    Abstract: Northeastern forests provide many important ecosystem services from timber production to carbon sequestration. Sustainably managing forests to provide these services requires an understanding of how interactions among species affect tree growth and health. In forested systems, mycorrhizal fungi form associations with tree roots allowing for uptake of soil nutrients. These fungi are necessary for the growth and establishment of trees and a high diversity of fungi helps maintain forest health. However, mycorrhizal fungi cannot disperse independently and depend on small mammals to disperse their spores through consumption and defecation of truffles (underground fruiting bodies). Thus, small mammals play a critical role in maintaining diverse fungal networks which subsequently impact forest composition and health. My summer research examines the types of truffles consumed by small mammals and whether competitive interactions among small mammal species alters spore dispersal. These data will form the basis of the second portion of my PhD dissertation.

42. Swanson, Erik
    Program/Dept.: Microbiology, PhD
    Chair/Advisor/Coordinator: Louis Tisa, Cheryl Whistler
    Abstract: Dioxin-like compounds are associated with numerous deleterious conditions including cancer, birth defects, immune suppression, and acute toxicity. Current dioxin remediation techniques are plagued by high costs or poor performance. Thus, a more effective and practical remediation approach is needed. The proposed study will investigate the dioxin-remediation potential of the Frankia-actinorhizal plant symbiosis. Previous research demonstrated the free living Frankia degrades two representative dioxin-like compounds: biphenyl and dibenzofuran. The current research will elucidate how symbiosis affects dioxin degradation by Frankia. This will be accomplished in a series of microcosm experiments containing Frankia-nodulated actinorhizal plants, uninoculated plants, or free living Frankia. The rate of dioxin degradation and the health of the actinorhizal plants will be quantified and compared between the treatments. These data will be used to determine the effect of symbiosis on Frankia-mediated dioxin degradation. The results of this study will inform the design of future field-based remediation studies with Frankia.

43. Temko, Ezra
    Program/Dept.: Sociology, PhD
    Chair/Advisor/Coordinator: Karen Van Gundy, Rebecca Glauber
    Abstract: Public policy has important implications for our communities, but some current practices used to develop public policy produce less than optimal outcomes. One method to improve policy outcomes is to properly integrate stakeholders (those persons, groups, or organizations that can affect or are affected by the policy's objectives) into policy development. This proposal contributes towards addressing a lack of information regarding the extent to which policy practitioners use stakeholder analysis, how they are using these techniques, as well as specifically how they address power disparities among stakeholders. I will conduct a literature review, a survey of state policy makers, and corresponding data analysis. I will write an empirical paper to share my findings. This study will contribute to my understanding of social stratification (structural inequality), my specialty within sociology. It is also an opportunity to do sociological research, which is an important part of developing as a sociologist.

44. Tooley, Christian
    Program/Dept.: Chemistry, PhD
    Chair/Advisor/Coordinator: Samuel Pazicni, Howard Mayne
    Abstract: Due to the negative effects of greenhouse gases, the development of catalysts for producing hydrogen is crucial. While many small molecule catalysts for producing hydrogen have been characterized, they tend to be inefficient and/or decompose. [FeFe] hydrogenase, a metalloenzyme found in primitive organisms, is highly efficient at producing hydrogen under mild conditions at the metal center. Many small molecule models based on the [FeFe] metal center suffer from the aforementioned shortcomings. Indeed, the well-defined folded macromolecular structure of the protein surrounding the metal center is important for the enhancement and stabilization of the protein. We propose a cheaper and facile route to mimic the enzyme – binding a model of [FeFe] to

polymer chains, which are functionalized for controlled folding into a single-chain nanoparticle (SCNP). The use of polymer chains allows access to various hydrophobic/hydrophilic macromolecular environments that can be tuned to optimize conditions for hydrogen production.

45. Turner, John
    Program/Dept.: Mechanical Engineering, PhD
    Chair/Advisor/Coordinator: Martin Wosnik, Brad Kinsey
    Abstract: An experimental study of an array of up to 100 model wind turbines is investigated. The study is conducted in the UNH Flow Physics Facility (FPF), the largest boundary layer wind tunnel in the world. For a given configuration (spacing, initial conditions), the model wind farm reaches a "fully developed" condition which occurs in full scale farms. Very large model wind farms of up to 20 rows are possible in the FPF at the wind turbine scale used. The present studies in the FPF are able to achieve a fully developed wind turbine array boundary layer condition, which can provide valuable insight to the optimization of wind farm energy production and provide data sets for modelers. Better understanding of the fluid dynamics that governs wind turbine arrays will lead to increased renewable energy efficiency and decreased cost. This initial study is a jumping point for future wind farm array interests.

46. Whalen, Emily
    Program/Dept.: Natural Resources, MS
    Chair/Advisor/Coordinator: Serita Frey, Russell Congalton
    Abstract: Previous research demonstrates that long-term nitrogen deposition leads to a reduction in leaf litter decomposition and manganese concentrations in forest soils. However, the mechanism by which decomposition is reduced remains unclear. Manganese availability is positively correlated with decomposition rate, and may be critical to the litter decay process. Given declines in soil and litter manganese observed under nitrogen deposition, I aim to determine if manganese loss is a factor reducing decomposition. Diminished decomposition leads to an accumulation of soil organic matter (i.e. carbon). More carbon storage in soils means less carbon release to the atmosphere, potentially mitigating global warming. Understanding mechanistic controls on decomposition under nitrogen deposition will enhance our ability to predict how ecosystems respond to this global change stressor. The fieldwork I conduct this summer and data I generate will constitute the bulk of my master's thesis and could lay the groundwork for a PhD project.

47. Zargar Shoushtari, Shokoufeh
    Program/Dept.: Civil Engineering, PhD
    Chair/Advisor/Coordinator: Erin Bell, Ricardo Medina
    Abstract: The purpose of the study is to assess the risk of loss of structural integrity of transportation casks and nuclear fuel rods after extended storage. Due to the lack of experimental data, reliable numerical models are needed to predict the dry casks behavior and structural integrity over the years. Transportation casks are composed of a canister, a basket, and the fuel-assembly system. The fuel assembly is fabricated to accommodate bundles of fuel rods containing uranium, which provides the fuel for the reactor. The

emphasis of my summer research will be on the development and calibration of numerical models based on the experiments performed on unirradiated fuel rods. Once these models are calibrated, the effects of material degradation and aging on the structural integrity of fuel rods will be evaluated numerically. Furthermore, a set of guidelines will be developed to model complete transportation casks for future work.

48. Zhang, Rui
    Program/Dept.: Civil Engineering, PhD
    Chair/Advisor/Coordinator: Tat Fu, Ricardo Medina
    Abstract: Buildings provide safe shelter and comfort to people. To ensure comfort (e.g., heating, cooling), the building sector is one of the largest energy consumers in in the United States; and, thus, reducing building energy usage will considerably help the growing energy demand and environmental pollution concerns. On the other hand, recent disasters (2011 Tōhoku earthquake and 2015 Nepal Earthquake) illustrated the vulnerability and safety concerns in building structures. My research addressed both safety and energy efficiency issues by creating an integrative smart building that integrates environmental control (double skin façades) and structural control (mass dampers) systems. My research focus for this summer will be performing experimental studies on active structural control and structural health monitoring in one smart building system to explore the synergy among them. These two projects will consist two major chapters of my dissertation, the finding in will be summarized and submitted two peer-reviewed journals.

49. Zhao, Jianyu
    Program/Dept.: Chemistry, PhD
    Chair/Advisor/Coordinator: Glen Miller, Howard Mayne
    Abstract: Currently, I am carrying out the interdisciplinary project in areas of organic chemistry and materials science, named linearly extended pyrylium and thiopyrylium salts as n-type organic semiconductors. Organic semiconductors exhibit comparable performance as inorganic semiconductors like silicon but have advantages including good compatibility with flexible substrates, solution-processable and property modification through tailoring of molecular structures. Although has the same importance as p-type organic semiconductors in the organic electronic devices, n-type ones were less developed in the past few decades. With the highly electron-deficient and extendedly conjugated backbones, good solubility and stability, my target molecules could be potential high-performance n-type organic semiconductors. Syntheses of the targets and preliminary characterization of optoelectronic properties are important parts of this project. After that, organic electronic devices will be fabricated with target molecules and performance will be tested. The feedback will be referred to further modify target structures or methods of device fabrication.

50. Zhao, Meng
    Program/Dept.: Statistics, PhD
    Chair/Advisor/Coordinator: Ernst Linder, Sharon McCrone
    Abstract: The goal of my summer work is to combine current methods in spatial extremes for exceedances with climate change downscaling methods to obtain projections of

extreme precipitations that are more precise than those currently available. To be specific, I would like to perform spatial estimation of precipitation extremes over New England based on station data as well as on regional climate model (RCM) outputs. I will then research the feasibility of new methods of downscaling that are based on an entire spatial field of values rather than a by-station pointwise downscaling. The results of this work in the summer will lead to my thesis work where I will implement and extend upon this research. Improved precision in extremes forecasting will contribute to science application of climate change impact assessment as well as to the methodology development of spatial extremes in the field of statistics.