

2018 – 2019 Graduate School Dissertation Year Fellows

Awardees, information, and abstracts

Rory P. Carroll

Program/Dept: Natural Resources & Environmental Study

Dissertation Chair/Advisor: Marian Litvaitis

Abstract: Bobcats are an ecologically, economically, and politically important species in New England. As human impacts rapidly expand across the landscape, maintaining long-term viability of this highly mobile yet reclusive species is a major conservation challenge. Land use change, habitat loss, and fragmentation can divide breeding populations, disrupt wildlife community dynamics, and even affect the physiology of individual animals. Using recent and historical specimens, I explore how 60 years of intense development in New England has altered the genetic structure, diet, and hormonal balance of our native wildcat. My goal is to incorporate knowledge from these three disparate fields to enhance bobcat conservation efforts and create a management framework that can be applied to other species of concern. A more holistic understanding of how species respond to human land use will have wide-reaching implications for the health of the wildlife community and the ecosystems in which we all reside.

Elizabeth A. Moschella

Program/Dept: Psychology

Dissertation Chair/Advisor: Victoria Banyard

Abstract: Interpersonal violence (e.g., sexual violence) is a widespread community problem that disproportionality affects college students. Research has identified a variety of factors that buffer against negative consequences of victimization (e.g., academic failure), however, little research has examined the role of mattering (i.e., our perception that others acknowledge us, care about us, and depend on us) in the aftermath of victimization. College students have an increased opportunity to matter at both the interpersonal level (e.g., friends) and institutional level (e.g., college). Thus, the purpose of the proposed project is to better understand the role of mattering in the context of interpersonal violence. The findings of this study may inform service providers so they can better support victims and help to boost victim outcomes. In addition, understanding how mattering may protect against academic failure in victims during their time at college may be beneficial to academic institutions.

Daniel J. Savage
Program/Dept: Mechanical Engineering
Dissertation Chair/Advisor: Marko Knezevic

Abstract: As technological demands for advanced materials grow, computational tools for the virtual design of materials are needed to accelerated development and application design. Materials such as Magnesium and Titanium are relevant materials to the automotive, aerospace, and defense industries; yet predictive microstructure-based modeling of ductile fracture for these materials has not been widely developed. To address this inadequacy, recent modeling methodologies are being extended and combined with experiments performed at UNH to provide robust predictive modeling capabilities based on microstructure. The success of this project will enable fast calibration of empirical models for component-level design as well as systematic investigation of the key properties governing ductile fracture in materials such as Magnesium and Titanium.

Joy D. Erickson
Program/Dept: Education
Dissertation Chair/Advisor: Ruth Wharton-McDonald

Abstract: Research shows that reading motivation declines across schooling; at least one empirical investigation suggests decline begins in kindergarten. Though many have examined the reading motivation of older students, research specific to young readers is thin, and fewer studies probe students' motivation-related perceptions of school programming. When considering the profound impact motivation has on skill development alongside the value the U.S. places on standardized achievement, the gap in the literature becomes especially troubling. This dissertation utilizes participatory methods to qualitatively explore K-2 students' perceptions of a reading intervention program. Programmatic benefits and drawbacks conveyed by children are considered alongside teacher and researcher evaluations of individuals' engagement. Findings contribute to the field by evidencing the extent to which and in what ways young children articulate benefits and costs of intervention, shedding light on how the program is potentially influencing students' motivation, and by offering methodological insight for eliciting children's views.

Jordan T. Coulombe
Program/Dept: History
Dissertation Chair/Advisor: Kurk Dorsey

Abstract: My dissertation, "Mules, Fuels, and Fission: Crossing the Panamanian Transit Zone," will argue that historians cannot understand attempts to traverse the Isthmus of Panama without emphasizing the importance of energy, a concept that historian Richard White has defined simply as "the capacity to do work." I intend to uncover the connection between energy and the environmental history of Panama by excavating the dynamic relationships between muscles, motors, and matter, and the environmental alteration they enabled in the Panamanian Transit Zone between 1800 and 1980. Ultimately, I will suggest that energy can provide environmental historians with a new lens to reconstruct otherwise overlooked aspects of the past, broadening our understanding of the relationship between humans and the environments they alter.

Te-Hsin Chang
Program/Dept: Education
Dissertation Chair/Advisor: Suzanne Graham

Abstract: When students perceive being cared for by their teachers, there are positive effects on both cognitive and non-cognitive development. However, in an era of accountability focused almost exclusively on standardized testing, there has been little empirical research investigating the impact of critically important non-cognitive factors such as care. In my three-part dissertation, I first conduct a critique of different theories and identify the strongest care theory for educational research. Next, I conduct a methodological critique of current measures of care in quantitative research in education. Finally, I develop a theoretically and psychometrically sound instrument to measure caring relationships between students and teachers in educational settings. My study will provide an important contribution to both the theory and measurement of student-teacher caring relationships, and on a larger scale can inform educational policy and practice recommendations related to non-cognitive factors in education and learning.

Wenjing Liu
Program/Dept: Mathematics
Dissertation Chair/Advisor: Don Hadwin

Abstract: The structure of finite dimensional matrices and their infinite dimensional counterparts, operators, holds great importance in physics, chemistry, and our understanding of the structure of Algebras. They help us find the spin of atoms and the pairing of chemical elements. To understand the structure of matrices we need only understand the way they fix various subspaces. The Beurling theorem gives us our first look at these fixed subspaces for a special class of operators and a special class of algebras. Taking the Beurling Theorem and current advancements thereof as my starting point, I will generalize these results to larger classes of operators in commutative and noncommutative von Neumann algebras.

Jin Lee
Program/Dept: English
Dissertation Chair/Advisor: Monica Chiu

Abstract: History inherently has blind spots: written by the victors of major global conflicts, historical narratives are often silent about the oppressed. However, literary and graphic arts can effectively give voice to the voiceless, offer (in)sight to unremarked histories. My dissertation examines ways in which Asian American novels and graphic narratives can foreground historical trauma, advancing the fields of Asian American studies and comics studies, of which the latter has positioned graphic narratives as a "literary form," a defensive posture against the supposed privileging of words over images. As once-repressed histories emerge through my attentive seeing, we may see our own implication in relation to the invisible and voiceless in the globalized world. Departing from Nicholas Mirzoeff's "right to look" in his opposition to a history presented by the victors, my dissertation will suggest that we must exercise the right to look, an obligation to look beyond history's blind spots.

Devon O'Rourke

Program: Molec & Evol Systems Biology - Dissertation Chair: Jeffrey Foster

Abstract: Millions of North American bats have died from an invasive fungal disease, White-nose Syndrome (WNS), first detected in 2006. However, there is evidence of persistence in bat populations in areas with the most prolonged WNS exposure suggesting that disease resistance may have evolved. While initial studies found correlations between bat behavioral and survival, no work has yet directly evaluated whether these persisting populations ultimately survive because of underlying genetic factors. My research involves sequencing the genomes of hundreds of disease-resistant and disease-susceptible bats to assess whether heritable genetic variation explains why some bats have survived this disease. This approach provides the first diagnostic to evaluate a population's capacity for resistance to WNS and provides a template for future investigations with other species threatened by this disease. The resulting genetic data offers insights into the likelihood and structure of the recovery of two bat species decimated by this pathogen.

Mark A. Anthony

Program: Nat Resrces & Envirn Stdy - Dissertation Chair/Advisor: Serita Frey

Abstract: The bitterness of mustard and horseradish has danced on most of our tongues. The nature of this flavor arises from glucosinolates, chemical compounds produced in the tissues of mustard plants (Brassicaceae). A certain dose of glucosinolates is healthful to humans, but can be toxic to other organisms. I am interested in how these compounds mediate interactions with fungi that play critical roles in the growth and health of plants. Glucosinolates are lethal to certain fungi, and may function to suppress fungi that form mutually beneficial relationships with plants known as mycorrhizae (myco: fungal; rhizo; root). I hypothesize that glucosinolates deter the mycorrhizal lifestyle in mustards, which are among just 15% of plants worldwide that do not form mycorrhizae. This would show glucosinolates equip mustards with chemical defenses against the most widespread symbiosis on land. This knowledge can be applied to better grow mustard crops and manage invasive mustard species.

Bence Cserna

Program/Dept: Computer Science - Dissertation Chair/Advisor: Wheeler Ruml

Abstract: Autonomous vehicles and robots are becoming widespread not only in industry and the military, but also in consumer applications. The actions of an autonomous agent are chosen by a software component called a planner. In many applications of planning, the objective is not only to achieve the goal as quickly as possible but also to ensure safe operation of the system. In practice, safety and speed are often contradicting objectives. For example, a very fast self-driving car is inherently unsafe. My research focuses on developing the first methods that optimize the speed of achieving the goal while guaranteeing absolute safety. The preliminary version of our novel methods were deployed by one of the leading self-driving car companies. This allows their cars to not only respond faster, but more importantly, stay safer. Our methods are general, and apply to a wide class of autonomous systems.

Miranda J. Francoeur

Program/Dept: Psychology - Dissertation Chair/Advisor: Robert Mair

Abstract: The prefrontal cortex (PFC) is a region of the brain controlling executive functions such as decision making, attention, and memory. Executive functions are impaired in schizophrenia, addiction, autism, ADHD, dementia, and Parkinson's disease. Treating such disorders requires knowledge about how PFC and its connections function. One area of the brain with PFC connections is the thalamus. Until recently the function of thalamus has been restricted to a simple "sensory relay", passing information about sensations in the environment to specialized areas in the brain. My research contributes to a growing argument for a role of both PFC and thalamus in the control of executive functions. Current treatment options for psychological disorders do not consider the thalamus as a target area for intervention. My dissertation will assess the influence of thalamus on PFC activity giving rise to executive functions to inform current research and improve treatment options for cognitive disorders.

Andrea Jilling

Program: Earth&Environmental Sci - Dissertation Chair/Advisor: Stuart Grandy

Abstract: Plants use nitrogen from soil to maintain photosynthesis, protein assembly, and other critical metabolic processes. However, the specific origins in soil of this essential nutrient remain unclear and thus measuring its supply to plants is challenging. To compensate, fertilizers are often applied in excess, which can lead to leaching and gaseous losses of nitrogen to the environment. Nitrogen is likewise enigmatic in natural systems and the processes that control its supply to plants remain uncertain. In my research, I examine a commonly overlooked but potentially important source of nitrogen: organic matter bound to clay particles. Although generally considered inaccessible to plants, I explore how plant root inputs drive the microbial and non-biological release of nitrogen from clay associations. Through a conceptual framework and a series of laboratory incubations, I aim to reveal novel mechanisms that will improve our ability to predict the dynamics of this critical soil nutrient.

Marino I. Fernandes

Program/Dept: English - Dissertation Chair/Advisor: Christina Ortmeier-Hooper

Abstract: The Institute for International Students reports the number of international undergraduates enrolled in US colleges and universities increased from 175,000 to 400,00 from SY1979-80 to SY2014-15 (IIE 2015). International Multilingual (ML) students are often thought of as perpetually in need of remedial language support. I identify HELP (Hi, English Learning Partner), an unofficial writing center serving other multilingual students, as a site of identity formation leading to student agency, and as an instance of understanding language difference as resource, disrupting the narrative of helplessness that follows MLs. My dissertation investigates how participation in HELP has impacted their identities as students, writers and writing tutors, and how those identities in turn affect their sense of agency. Occupying a position of expertise has a forceful impact on their identities that merits exploration, which would enrich research and pedagogy in Second Language Writing and suggest reform at the institutional level.

Yusi W. Turell

Program/Dept: Nat Resrces & Envirn Stdy

Dissertation Chair/Advisor: Michael Swack

Abstract: Social entrepreneurs use business and market forces to develop innovative, financially sustainable solutions to social or environmental problems and then implement them on a large scale. Despite growing interest in ‘business as a force for good,’ management scholars are just beginning to explore actors who hold simultaneous goals of both running a thriving enterprise and of changing a broader institutional field, such as through public policy. Using a lens of hybrid institutional logics, I propose an exploratory inductive multiple-case study to examine the processes of an exemplar group of social entrepreneurs who both lead market-based social enterprises and have played a major role in changing public policy. My research will contribute to theories of multilevel opportunity processes and the coevolution of organizations and fields, with practical implications for social entrepreneurs and other actors who work across sectors to address grand challenges of society and the natural environment.