

2016-2017 DYF Awardees Information & Abstracts

1. Hanlon, Ashley

Program/Dept: Chemistry

Dissertation Chair/Advisor: Erik Berda

Abstract: Nanotechnology presents both the promise and challenge of advancing science in a variety of key areas, including medicine, electronics, and energy. Despite our advances in the fabrication of remarkable soft nanodevices, contemporary synthetic techniques lack the control necessary to produce well-defined structures that operate with the function and precision seen in biological systems. There is a demand for development of synthetic techniques for the fabrication of nano-sized objects that allow for precise size control and tailored functionalization. To this end, the collapse or folding of single polymer chains into architecturally defined nanostructures is the focus of this work. Traditionally, single intrachain reactions are triggered for single-chain nanoparticle formation. This work aims to explore the use of multiple intrachain cross-linking strategies and the effect of the placement of cross-links within a polymer chain. A better understanding and control over polymer folding will help to develop strategies to design functional nanomaterials.

2. Mirshekari, Morteza

Program/Dept: Civil Engineering

Dissertation Chair/Advisor: Majid Ghayoomi

Abstract: Hundreds of millions of people around the globe are confronted by significant risks to their lives and properties due to catastrophic earthquakes. Strong ground motions cause damages and failures to buildings, transportation infrastructure, and lifeline systems. Accurate prediction of seismic ground response plays a vital role in earthquake-resistant, sustainable, and cost effective design of infrastructure. While earthquake waves radiate away from the bedrock to the ground surface mechanical and hydraulic properties of geo-material influence the propagated motion. Importantly, surficial soil layers are often partially water-saturated, however, seismic design codes and procedures only consider ground in either dry or fully saturated conditions. My research seeks to investigate the effect of soil-water interaction on seismic site response where various degrees of water saturation will be simulated through infiltration models. Success of this project, with its innovative modeling approach, will yield to practical guidelines for safer and more efficient seismic design of geosstructural systems.

3. Brewer, Ben

Program/Dept: Economics

Dissertation Chair/Advisor: Karen Smith Conway

Abstract: State policies are presumably enacted with achieving certain goals but may also have unforeseen or unintended impacts in other areas as well. Understanding both the

intended and unintended consequences is necessary to evaluate both the total costs and total benefits associated with these policies. Having this full information is crucial for state governments to be able set policies which not only achieve their targeted goals but whose net effects are beneficial to everyone else as well. To ensure that current and future policy decisions are made with the best interests of society in mind, I identify the direct and indirect consequences of three state policies that are currently being disputed across states: income tax benefits for the elderly, state health expenditures and traffic safety laws.

4. Clarke-Vivier, Sara

Program/Dept: Education

Dissertation Chair/Advisor: Paula M. Salvio

Abstract: Discussions about the purposes of K-12 education are often centered on the idea of preparing students for life in the “real-world”. The idea of college and career readiness, emphasized in modern educational reforms, foregrounds the critical and cognitive strategies required for students to transition their knowledge and skills beyond school walls. Non-formal learning centers like museums are a site for students to extend and develop these skills. For teachers, non-formal resources can strengthen their teaching while providing an opportunity for autonomy in the face of an increasingly standardized curriculum. However, design and implementation requires time, material resources, and knowledge that may not be accessible to all educators. To that end, my dissertation will explore the following questions: What conditions support teachers’ use of sites other than school within their communities? How do teachers experience and value these opportunities, particularly in respect to integration within the formal school curriculum?

5. You, Xiaoqiong

Program/Dept: English

Dissertation Chair/Advisor: Christina Ortmeier-Hooper

Abstract: The student population at U.S. universities is becoming more international, and as a result, more linguistically and culturally diverse. Writing in a second or third language is particularly difficult for many of these students. The field of Composition, specifically Writing Across the Curriculum, does not have enough knowledge to help faculty, particularly writing intensive faculty, respond to the new challenges arising from these students’ writing. My interdisciplinary dissertation, drawing on the fields of composition-rhetoric, second language writing, and TESOL, fills this gap by exploring how these students write and how the faculty learns to work more effectively with these writers. This qualitative research study—a series of case studies of undergraduate international students—follows students for a semester in their first writing-intensive business school course. My project enriches the current movement in the composition and second language studies that utilizes international students’ strengths, values, and ideologies as resources for writing.

6. Demmer, Amanda
Program/Dept: History
Dissertation Chair/Advisor: Kurk Dorsey
Abstract: My project, "The Last Chapter of the Vietnam War: Normalization, Nongovernmental Actors and the Politics of Human Rights, 1975-1995," challenges two myths about the Vietnam War. The first is that U.S. involvement in Vietnam ended abruptly after the 1975 fall of Saigon, and the second is that the issue of American servicemen listed as missing in action/prisoner of war was the sole exception to this trend. Near constant refugee crises--including "boat people," political prisoners, and Amerasians--kept the U.S. consistently involved in Vietnam after 1975, however. I argue that Vietnamese Americans and human rights organizations played a definitive role in making the resolution of refugee concerns a major objective of U.S. foreign policy. The project thus highlights the importance of non-state actors to U.S. diplomacy, demonstrates the centrality of humanitarian concerns to U.S.-Vietnamese normalization, and revises our understanding of the long transition to peace in Indochina.

7. Lacroix, Patrick
Program/Dept: History
Dissertation Chair/Advisor: Ellen Fitzpatrick
Abstract: In his presidential campaign, in 1960, Senator John F. Kennedy endured a grueling vetting process by virtue of his Catholic faith. Conventional narratives depict Kennedy's ultimate victory as a turning point announcing a new era without religious prejudice. This dissertation, "Struggling Towards Secularism: Religion and Public Policy in the Kennedy Years," argues that old resentments did not disappear with the election. Catholics and Protestants continued to cite their faith in political activism under the new administration; Kennedy adjusted to the political problem that his faith still posed. Debates over education, foreign policy, civil rights, and Supreme Court rulings reveal the persistence of a "religious issue" from 1961 to 1963, but also a gradual realignment of denominational activities along ideological lines. Those years were significant not for marking the end of religious prejudice, but for announcing the religious activism more familiar to us at the dawn of the twenty-first century.

8. Bontea, Costel
Program/Dept: Mathematics
Dissertation Chair/Advisor: Dmitri Nikshych
Abstract: The theory of tensor categories is a vibrant field of mathematics with many connections to other fields. One of the open problems in this theory is the classification of such categories. An important tool used in the classification problem is the Brauer-Picard group of a tensor category. Despite its importance, there has been little progress in describing

this object. The goal of my thesis, “Brauer-Picard groups and finite tensor categories”, is to address this issue by computing the Brauer-Picard group for a large family of tensor categories. I have already succeeded in doing this in a particular case and my current work gives me confidence that I will succeed in a more general setting. The achievement of this goal will not only fill a gap in our knowledge about the Brauer-Picard group, but also pave the way for further research in the field.

9. Ardeljan, Milan

Program/Dept: Mechanical Engineering

Dissertation Chair/Advisor: Marko Knezevic

Abstract: I have been conducting intensive research cutting across mechanics, materials science, and applied mechanics focused on creating novel material models aimed at predicting mechanical response of metallic materials under complex loading during manufacturing and in service. To this end, the work under my dissertation will establish fundamental microstructure property relationships that describe deformation of novel multilayer metallic lamellar microstructures composed of Magnesium-Niobium and Zirconium-Niobium layers. These lamellar material systems exhibit extraordinary strength while preserving ductility and are promising candidates in many industries such as nuclear and automotive. Since layer thickness in this composite material approaches several nanometers, the major goal is to develop a strain gradient plasticity material model sensitive to the intrinsic length scales. The successful completion of the proposed work will contribute to fundamental understanding of how materials deform at nanometer length scales and provide a powerful predictive simulation tool that could be used in many subsequent studies.

10. Zecevic, Milovan

Program/Dept: Mechanical Engineering

Dissertation Chair/Advisor: Marko Knezevic

Abstract: Microstructure-based modeling tools for large plastic deformation behavior of light-weight metals Owing to their superior properties, such as high strength to weight ratio, metallic materials are extensively used in wide array of products and structures. One of the widely used ways to form metallic parts of desired shape is by process of plastic deformation. However, metallic materials having desired properties fracture during processing before reaching the final shape, which prevents them from being used. To overcome this issue innovative deformation processes are needed. However, fundamental understanding of how these complex processes effect the material state and allow larger deformation levels without cracking are unknown and require understanding. My research is focused on understanding how materials behave under complex loading conditions by using a combination of material modeling tools and experiments. The knowledge of underlying physics will be used to optimize existing and conceive new deformation processes.

11. Morrison, Eric

Program/Dept: Natural Resources & Earth Systems Science: Environmental Science

Dissertation Chair/Advisor: Serita Frey

Abstract: Global temperatures are expected to rise as concentrations of carbon dioxide (CO₂) and other greenhouse gases increase in the atmosphere due to human activity. The concentration of atmospheric CO₂ is regulated in part by soils, which contain more than two times as much carbon as the atmosphere and emit ten times more CO₂ than is produced by human activities. One of the primary sources of soil CO₂ emissions to the atmosphere is microbial metabolism. Like humans, soil microbes consume food resources in order to grow and release CO₂ as a byproduct. The balance between growth and CO₂ production, termed microbial efficiency, is a primary control on the amount CO₂ that enters the atmosphere. My research examines how microbial efficiency responds to global warming. This response is predicted to determine whether soils release CO₂ or sequester CO₂ from the atmosphere, thereby either exacerbating or mitigating the impacts of anthropogenic CO₂ production.

12. Wilhelm, Jennifer

Program/Dept: Natural Resources & Earth Systems Science: Environmental Science

Dissertation Chair/Advisor: Richard Smith

Abstract: Acceptability of agricultural expansion on the landscape: A visual preference study
A substantial increase in world population by mid-century will result in unprecedented pressure to increase net agricultural productivity. Production can increase either via producing more on existing farmland or through conversion of non-agricultural ecosystems to agriculture. New Hampshire, which is >80% forested, is experiencing an agricultural revival and could see significant areas of forested land converted to farms, potentially reducing the ecosystem services that forests provide. However, we know little about how residents perceive agriculture on the landscape, or what their willingness is to accept agricultural expansion. I will conduct a visual preference survey, using New Hampshire as my study area, to evaluate the environmental preferences of residents. This research will help discern how resident perception might influence future agricultural land-use, and determine how best to meet food provisioning needs in the state, while sustaining important natural resources.

13. Ferradas, Cristian

Program/Dept: Physics

Dissertation Chair/Advisor: Jichun Zhang

Abstract: Ion spectral dynamics near the inner edge of the plasma sheet
Since the era of space exploration started a few decades ago, we have become more aware of our linkage to outer space and of our vulnerability to it. The Earth's magnetosphere represents the outermost layer of our planet's environment and the first layer of shielding from solar charged particles.

This research aims to study the signatures of key processes that positively charged particles, or ions, undergo as they travel through the magnetosphere approaching Earth. This will be performed through a statistical study of such signatures using data from NASA's Van Allen Probes mission and the European Cluster mission. To help interpret the observations, we will carry out computer simulations of ion trajectories using the most recent magnetospheric models. The knowledge gained from this work can be used to significantly improve our current models of the magnetosphere.

14. Saito, Kei

Program/Dept: Sociology

Dissertation Chair/Advisor: David Finkelhor

Abstract: Since the rapid expansion of sex offender legislation starting in the 1990s, scholars have investigated its efficacy in preventing future sex crimes. However, its effects on minors who are convicted of sexual offenses have largely gone underexplored. The limited available research on its effects on juveniles have two shortcomings: First, it has focused predominantly on youth who are already convicted, which may be ignoring important social processes that influences which youth are convicted of sexual offenses to begin with. Secondly, it ignores the experiences and perspectives of other parties who are affected by these policies, such as family members, community members, law enforcement, and the juvenile justice system. This proposal is meant to address both of these shortcomings by using a mixed-method approach, which utilizes both quantitative and qualitative methods. The results of this research will inform policymakers and future researchers by providing a richer picture of this social phenomenon.

15. Staunton, Michael

Program/Dept: Sociology

Dissertation Chair/Advisor: Karen Van Gundy

Abstract: In the United States (US), opioid analgesic painkiller fatalities increased from 4,030 in 1999 to 16,235 in 2014; fatalities in New Hampshire (NH) increased from 25 to 233 (CDC). Understanding adolescent painkiller use is critical because most substance use begins during adolescence, and individuals who use painkillers before adulthood are more likely to develop painkiller disorders (Monnant and Rigg 2015). Painkiller use is more common among rural adolescents than urban adolescents, yet there is limited research explaining this disparity (ibid). I address this problem by combining unique rural and urban datasets to investigate painkiller use among NH adolescents. Using the stress-process framework (Pearlin 1989), I test the complementary hypotheses that rural/urban disparities are a function of variations in both stress exposure and stress vulnerability. This research contributes to substance use interventions, and tests the capacity of the stress-process model to clarify the mechanisms and conditions related to adolescent painkiller use.