The UNH Graduate School is pleased to announce the fifteen awardees of the Dissertation Fellowships for the 2012 - 2013 academic year. These fellowships recognize and support outstanding UNH doctoral students in the final year of their Ph.D. programs. A committee of graduate faculty representing the colleges/schools of the University evaluated the applications and made their recommendations for the awards.

Laura Beaudin  
**Program:** Economics  
**Dissertation Chair/Advisor:** Ju-Chin Huang  
**Abstract:**  
Former debates on climate change have resulted in most parties acknowledging the negative effects of changing weather patterns. However, most of the economic costs of climate change have not yet been quantified and assessed. This dissertation aims to fill this gap by providing unique data and developing and implementing new theoretical techniques for measuring the effects of changing weather on the competitiveness of particular industries. With the new evidence and measurements of economic welfare loss, this dissertation also provides a method for businesses to remain successful, even in the face of uncertain production inputs, such as weather.

Jishnu Bhattacharyya  
**Program:** Physics  
**Dissertation Chair/Advisor:** Per Burglund  
**Abstract:**  
My research is in theoretical gravitational physics, with a focus on holography. Holography is a key guide towards the long sought after resolution of the well-known incompatibility between gravity and quantum mechanics. My proposed research projects explore holography further within and beyond general relativity, the currently accepted theory of gravity. This is a necessary step towards establishing the fundamental nature and robustness of holography, and will significantly clarify the obstacles towards unifying gravity with quantum mechanics. Additionally, I propose to extend my work on understanding properties of ordinary materials as a novel application of holography.
Ethan Burns  
**Program:** Computer Science  
**Dissertation Chair/Advisor:** Wheeler Ruml  
**Abstract:**  
Heuristic search is a technique used in artificial intelligence to synthesize plans. Currently, heuristic search algorithms can either spend a prohibitive amount of time finding a solution that requires very little time to execute, or they can spend very little time finding a solution that requires a prohibitive amount of time to execute. I plan to study search algorithms that attempt to minimize the sum of planning and execution time. This is significant because one usually cares about solving a problem as quickly as possible; this includes planning and execution time, not just one or just the other.

Andrii Drach  
**Program:** Mechanical Engineering  
**Dissertation Chair/Advisor:** Igor Tsukrov  
**Abstract:**  
Utilization of copper alloys in marine applications will result in reduced maintenance costs, prolonged service life and increased reliability. However, substitution of traditional materials with copper alloys requires significant revision of established design techniques and analysis procedures due to the difference in material properties and manufacturing methods. My PhD studies include investigation of the physical and mechanical properties of copper alloys, hydrodynamics of copper nets, and development of engineering procedures for the design of systems with copper alloys. The technological challenges of integration of copper alloys in marine aquaculture applications are addressed and solved through experimental and numerical studies.

Borys Drach  
**Program:** Mechanical Engineering  
**Dissertation Chair/Advisor:** Igor Tsukrov  
**Abstract:**  
Carbon/carbon composite is a high-performance material with a unique set of remarkable thermo-mechanical properties, which make it irreplaceable in some aerospace and biomedical applications. Its complex hierarchical microstructure presents materials scientists and engineers with substantial modeling challenges when it comes to predicting material’s behavior under various loading conditions. My research has been focused on characterization, accurate modeling and mechanical testing of this composite. Methods that have been developed within the framework of my work will provide valuable tools applicable not only to carbon/carbon composite, but a wide range of fiber-reinforced composites and materials with irregularly shaped particles.
Cara Fiore  
Program: Microbiology  
Dissertation Chair/Advisor: Michael Lesser  
Abstract:  
It is well known that microbes play an important role in the health of many important coral reef organisms such as corals and sponges; however, detailed information on the taxonomic and functional composition of many of these microbial communities is not known. My research on the ecology and physiology of the microbial community of the sponge Xestospongia muta will provide valuable insight into microbially-mediated nutrient cycling and host-microbe interactions. This information will be useful to scientists and managers who are working to better conserve and manage coral reefs, particularly in the face of environmental threats such as climate change.

Gillian Galle  
Program: Mathematics Education  
Dissertation Chair/Advisor: Tim Fukawa-Connelly  
Abstract:  
An implicit assumption of many undergraduate mathematics classes is that students will spend a large amount of time outside the classroom refining their understanding of the material. However, little is known about what students do to fulfill this didactical contract with their instructors. This study seeks to provide a detailed description of what students do while studying mathematics in self-created groups outside of the classroom setting. In particular, this study will determine what materials students utilize while studying together, how the students make use of these resources, and what roles students assume while interacting with each other as a group.

Olesia Kozlova  
Program: Economics  
Dissertation Chair/Advisor: Michael Goldberg  
Abstract:  
Economists would like to believe that returns in financial markets are driven in part by participants’ assessments of the risk of capital loss. But the empirical failure of their models of risk suggests otherwise; it appears that risk plays no role and that outcomes in asset markets are driven by irrational participants. This thesis puts forth a different view. It undertakes an empirical investigation of returns in currency markets and presents evidence that the problem in the literature stems not from a lack of rational decision-making, but from the inability of economic models of risk to account for such behavior.
Meghan MacLean  
**Program:** Natural Resources and Earth Systems Science  
**Dissertation Chair/Advisor:** Russell Congalton  
**Abstract:**  
Over the last 25 years, the human population in the Coastal Watershed of New Hampshire has grown substantially and consequently, so has development. Urbanization has increased the amount of impervious surface in the area as well as fragmented many crucial habitats, especially forests. The fragmentation of these habitats can have negative effects on water quality, nutrient cycling, and biodiversity in general. Therefore, mapping fragmented habitats and analyzing the effects is important for conserving and protecting critical habitat for wildlife, rare species, and many other natural resources. My work explores how to effectively and efficiently map the fragmentation of the watershed.

Justin Massing  
**Program:** Chemistry  
**Dissertation Chair/Advisor:** Roy P. Planalp  
**Abstract:**  
It is well known that copper toxicity is directly related to its bioavailability. Currently employed techniques for the monitoring of this metal, however, lack the ability to distinguish bound copper from that which is free, and therefore toxic. While ligands exhibiting a change in fluorescent signal have been shown to respond to free metal ions, copper remains a unique challenge due to its ability to quench fluorescence. Through careful ligand design, we have demonstrated the ability to accurately sense free copper with a fluorescent polymer indicator in the presence of other interfering metal ions.

Jessica Ulrich  
**Program:** Sociology  
**Dissertation Chair/Advisor:** Thomas Safford  
**Abstract:**  
Rural places rich in natural amenities are experiencing rapid population growth. Knowledge, however, about the social implications of population growth at the community-level is limited. How are residents of rapidly changing rural places maintaining, making, and experiencing community? Using mixed methodologies and multiple data sources, I will examine community making in two amenity-growth counties in Colorado. I will also examine the role of proximity to urban places, individual and community attributes, and social stratification in the community making process. This dissertation will provide useful information for those concerned with maintaining vibrant and sustainable communities during rapid socioeconomic and demographic change.
Matthew Vadeboncoeur
Program: Natural Resources and Earth Systems Science
Dissertation Chair/Advisor: Erik Hobbie
Abstract:
Understanding the processes that supply nutrients in forest ecosystems is critical to managing forests to sustain wood production, biodiversity, clean water, carbon storage, and other ecological services. In my dissertation research, I identified the nutrients that limit production in northeastern forests and modeled nutrient depletion from forest soils under a range of management approaches. I found that better estimates of soil mineral weathering rates would greatly improve the accuracy of long-term projections; my remaining research will focus on improving methods for understanding the role of symbiotic fungi in regulating this and other nutrient-acquisition processes across the landscape.

Jun Wang
Program: Physics
Dissertation Chair/Advisor: Karsten Pohl
Abstract:
Enormous efforts have been made in seeking alternative pathways to more effectively use green energy due to the energy crisis and environmental concerns. Organic solar cells, composed essentially of carbon-based nano-materials, have attracted considerable scientific and industrial attentions because of their economic and environmental benefits. My research involves assembling the two core elements, electron donors and acceptors, into a highly ordered structure for the active layer in organic solar cells, aiming to further the fundamental understanding of organic heterostructure formation at a molecular level, and predict how the nanoscale geometric/electronic structures will affect/improve the overall energy conversion properties.

Timothy Warner
Program: Psychology
Dissertation Chair/Advisor: Robert Drugan
Abstract:
Depression is a debilitating disorder from which no person is immune. One variety of depression, called anxious depression, demonstrates a low rate of recovery and poor response to current treatment methods. My research provides new insight into understanding depression by looking at the role of anxiety and coping mechanisms. I will achieve this by investigating both behavioral and brain mechanisms. Too often, researchers have limited their focus to just behavioral measures. However, to accurately understand the role of depression, one must directly examine the brain.
Wei Yao

Program: Biochemistry
Dissertation Chair/Advisor: Rick Cote

Abstract:
As the central effector enzyme of the visual signaling pathway, the activation and inactivation of PDE6 must be exquisitely regulated to control the excitation, recovery and adaptational phases of the photoresponse in rods and cones. Scientists have conducted extensive research on its regulatory mechanisms, but several major issues are still unclear. As its binding partner, GARP2 is considered as a candidate regulatory protein for PDE6, whose function is unknown. My work is focused on revealing the structural and functional regulatory interaction between GARP2 and PDE6 to provide new insights and strategies for therapeutic intervention of retinal diseases.