



C U U G R
C E N T E R F O R
UNDERGRADUATE RESEARCH

2013 Undergraduate Research & Academic Showcase

List of Abstracts

**April 16, 2013
University of Maine
Wells Conference Center**



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Exhibits

Communications & Journalism

1. Lauren Reeves, Casey Weed, Holly Stanhope, Clark Shepard, Dominique Scarlett, Joseph Sturzi , & Lauren Fleury

The Economic State of Higher Education at Maine's Public Universities

Faculty Mentor: Jennifer Moore

Department: Communications & Journalism

Abstract

Our project is focused on higher education and Maine's public universities. This is a capstone digital journalism project by students in Department of Communication and Journalism. As journalists, our process is to perform research and conduct interviews about the relationship between the University of Maine and the economy. The goal of our project is to produce a digital magazine that will be viewable on the web and on mobile devices, such as smart phones and tables. Every student on this project will produce one story that will include multiple media such as text, video, audio, photographs and information graphics.

Electrical & Computer Engineering

2. Bipush Osti

Input Device for Visualization Wall

Faculty Mentor: Bruce Segee

Department: Electrical & Computer Engineering

Abstract

A supercomputer is able to process data many times faster than a conventional computer by utilizing many CPUs simultaneously to work on a different piece of the same problem at the same time. This allows for large scale scientific modeling for weather and ocean topography and since humans best understand data visually these models can be displayed visually. The high resolution of these visual models means that with an ordinary monitor the user has to constantly zoom in and out to see a specific portion or the entire image. Utilizing a wall sized, tiled display provides the necessary resolution. Traditional input devices such as a mouse allows for easy navigation in a single monitor, however for a wall of monitors mouse and keyboard do not scale well. This project aims to build an input device and a software, that interacts with it and the monitor wall, to give the users easy navigation of any visualized data.

3. Carolyn Pugliano

A Lateral Field Excited Gas Sensor

Faculty Mentor: John Vetelino

Department: Electrical & Computer Engineering

Abstract

Previous research at the University of Maine has led to the development of a lateral field excited (LFE) sensor. The LFE sensor, which is composed of an AT -cut quartz crystal wafer with electrodes on one surface, is able to detect electrical and mechanical property changes in the target measurand. For this research project, the quartz crystal substrate was optimized to make it more sensitive to environment property changes than its predecessors. Surfaces of increasing curvature were tested using a network analyzer to determine the optimum convex curvature associated with the LFE sensor platform. Additional tests were conducted with the aid of LASST facilities in order to determine the electrode placement on the quartz crystal. Through this research, the basis for an optimized LFE sensor that can detect harmful gases has been established.

New Media

4. Coralie Dapice

Study of Creative Storytelling

Faculty Mentor: Joline Blais

Department: New Media

Abstract

Over the course of last semester I researched how to tell a story effectively. I had written a fictional short story based on the events that my family experienced at Dutton Cottage in Steuben, Maine. I experimented with several different story-telling platforms and ended up creating a short animation and a WordPress site to communicate my story. Not only did I have to research the presentation but also interviewed my family, and researched the area around the Cottage to create an accurate representation of the land.

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**5. Lindsay Heald**

*View From Above*

Faculty Mentor: Mike Scott

Department: New Media

*Abstract*

New media is a vehicle for digital interactivity and one which encompasses many different creative fields. This project will essentially be an evolving new media art piece that integrates photos from all over the world to create photo mosaic portraits. Once photos are collected, they will be repackaged to create new images. The main objective of this project is to give new meaning to old things. Several different technologies will be combined to achieve this goal. This project is important to the field of New Media as it addresses the third and most important paradigm of computing: many-to-many.

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6. Duane Shimmel

MLTI Journey

Faculty Mentor: Owen Smith

Department: New Media

Abstract

The Maine Learning Technology Initiative made Maine the first state to seize the potential of technology to transform teaching and learning in classrooms statewide; first with a plan to equip all students and teachers in grades 7 to 12 with personal learning technology statewide; first to empower every 7th through 12th grade teacher in every school statewide with professional development and support to fully tap the potential of computers and the Internet. My project will be a multi-media, interactive iBook looking at the MLTI program from its inception through today.

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**7. Anna Werner**

*Sprout: The Social Network for Gardeners*

Faculty Mentor: Jon Ippolito

Department: New Media

*Abstract*

Sprout is a social network designed to help Orono’s gardeners connect and collaborate with one another. Sprout allows its members to message each other, bookmark their favorite gardens/organizations, and post “help wanted” listings to entice other users into bulk buying seeds together, or volunteering to help with a garden walk. The social network is designed to allow for online communication, but it also encourages gardeners to interact in the real world. Sprout’s website will be ready to launch by the end of February. Sprout has the potential to connect Orono’s gardeners in an unprecedented way, allowing them an online space to build real world relationships with their fellow growers.

**Spatial Information Science & Engineering**

**8. Jonathan Cole**

*Virtual Simulations of Driving Scenarios with Age-Related Vision Loss*

Faculty Mentor: Nicholas A. Guidice

Department: Computing & Information Science

*Abstract*

Age-Related Macular Degeneration (AMD) is a form of late-onset vision loss that affects a person's ability to see clearly within their central visual field. This poses an issue of driving safety in the state of Maine, which has the highest median age in the nation. The goal of this research is to study the deleterious effects of AMD on driving through virtual simulations of this disease, and to explore possible compensatory techniques to reduce them. This research will provide useful insight into the development of future driving interfaces for this large and growing demographic.

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Posters

Anthropology

1. Kendra Bird

Specialized Activities in the Middle Woodland Period: An Analysis of Feature 8, Holmes Point West

Faculty Mentor: Brian Robinson

Department: Anthropology

Abstract

The University of Maine's archaeological field school is working alongside the Passamaquoddy Tribal Historic Preservation Office to better understand the petroglyphs of Machias Bay. Excavations at Holmes Point West have yielded some interesting pit features that appear to have been filled approximately 2000 years ago, including one associated with an intentionally-placed standing stone. They may be related to the oldest petroglyphs, possibly as remnants of spiritual or ceremonial activities complementing their production and meaning. Through analysis of soil samples and artifacts retained from these features, we hope to further understand them and their relationship to the occupation areas and petroglyphs.

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### 2. Samantha Dunning

*Biogeography and History of the Chirikof Island Ground Squirrel*

Faculty Mentor: Catherine West

Department: Anthropology

#### *Abstract*

Evidence of animal translocation, present around the world, is crucial to understanding how different species were introduced to different habitats. The Arctic ground squirrel (*Spermophilus parryii*) found on Chirikof Island, Alaska is a prime example of why it is important to understand the movement of species, particularly species introductions to small island environments. The United States Fish and Wildlife Service argues that the Arctic ground squirrel is an invasive species that requires aggressive regulation and eradication. Our project, in conjunction with existing archaeological data, could be beneficial to the understanding of the history of Arctic ground squirrel, how this species fits into the Chirikof Island ecosystem, and what their future regulation methods should entail.

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Biology

3. **Christie M. Edwards**

The Effects of Ketamine on Alcohol Withdrawal-Induced Depression

Faculty Mentor: Alan Rosenwasser

Department: Biology

Abstract

The focus of this experiment is to measure the locomotor activity of alcohol-withdrawn mice. The mice will first be group-housed in alcohol vapor chambers, where they will be exposed to either air or intermittent alcohol for seven consecutive days. At the end of the seven days, the mice will be moved to individual housing in running-wheel cages for continuous measurement of locomotor activity. Twenty-four hours after the last vapor exposure, half of the mice will be given ketamine at a sub-anesthetic dose. We hypothesize that ketamine will be able to alleviate the negative effects of alcohol withdrawal on locomotor activity.

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### 4. **Jillian King**

*Isolation of Salmonella and Staphylococci from Maine Wild Turkeys*

Faculty Mentor: Peter Milligan

Department: Biology

#### *Abstract*

Comparison of the microbial health of Maine's wild turkey and domestic population is important for sustainability of agricultural livestock and the hunting industry. From January to October of 2012, 44 live and 30 dead or euthanized wild turkeys and 24 live domestic turkeys from two flocks were sampled for *Salmonella* and *Staphylococcus* species.

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5. Carl Tugend III

Study of Jordan Pond Water Quality Change

Faculty Mentor: Jasmine Saros

Department: Biology

Abstract

Jordan Pond is an iconic lake situated in Acadia National Park. Over recent decades, the clarity of this pond has declined at a steady rate. The cause of this decline is unclear but may be the result of algal blooms, which are strongly affected by changing water temperatures and chemistry. I analyzed samples of algae that were collected from the water column of Jordan Pond every one to two weeks from May to October 2012. Changes in algal species were compared to the temperature, water clarity, and water chemistry data over time to better understand how and why algae are changing in Jordan Pond.

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**6. Rafael Garcia**

*Potential for the Production of Mycotoxins by Fungi Isolated from Maple Syrup*

Faculty Mentor: Seanna Annis

Department: Biology & Ecology

*Abstract*

Contaminated maple syrup is a concern of processors in New England. We have identified 47 fungal isolates from 37 samples of contaminated maple syrup. The most common species found was *Penicillium brevicompactum*, which is known to produce mycotoxins such as mycophenolic acid (MPA). Currently we are growing three genetically distinct strains of *P. brevicompactum* in medium optimized to produce MPA. Using high performance liquid chromatography we will quantify the MPA produced over time. If we detect MPA we will grow *P. brevicompactum* in maple syrup and quantify any MPA produced to see if it is a concern for human health.

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7. Amy Michaud

*Alteration of Microflora of the Insect Parasitic Nematode *Pristionchus entomophagus* and its potential application as a biological control agent*

Faculty Mentor: Eleanor Groden

Department: Biology & Ecology

Abstract

The bacteriovorous nematode *Pristionchus entomophagus* (family: Diplogastridae) is, found free-living in soil and can be a facultative parasite of some soil dwelling insect species. Insect parasitic nematodes are known to have a symbiotic relationship with microbial flora. The microbial flora causes mortality in the insect and the nematode completes its life cycle within the cadaver. The aim of this project is to determine if and how it is possible to replace the pre-existing microflora with specific pathogenic bacterial species to enhance the virulence of the nematode. A potential application of this project is using nematodes for biological control of invasive and harmful insect species.

Business

8. Robert Brown

Bridging the Gap: Intergenerational Perceptions with Regard to Professional Usage of Social Networking Websites

Faculty Mentor: Christian Graham

Department: Business

Abstract

The purpose of this study is to identify the perception gap between Generation Y (i.e. “the Net Generation”) and older generations with regard to Social Networking Sites (SNS). Particular emphasis will be placed upon applications within a professional setting. An empirical study is to be conducted, with two separate surveys employed (one for Faculty and one for Undergraduates) to answer the following question: Do different generations perceive the same “value” in Social Networking Websites? Responses gathered from Undergraduates/Faculty at the University of Maine, Orono will serve to answer this question. Results will provide insight into intergenerational conflict within the workplace, and subsequently bridge the gap between generational cohorts.

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**9. Matthew Chabe**

*Identifying the Market for UMaine's School of Engineering Race Car Kit*

Faculty Mentor: Harold Daniel

Department: Business

*Abstract*

In 2012, the University of Maine (UMaine) School of Engineering embarked on an academic project to develop a kit race car. The project developed within the auspices of Formula SAE (FSAE), an engineering competition in which students create an open wheel race car along with a business plan to market it. In May 2013, the team will travel to Michigan to compete against 119 other schools. In Fall 2012, the School of Engineering approached the Marketing Research class, under the instruction of Dr. Harold Daniel, to develop market research for the project. Utilizing a number of different processes and tools, the class conducted regional consumer research and analyzed the results to develop consumer clusters based on interest and purchase intent of the projected vehicle kit. Findings were presented to the School of Engineering; despite the variance in analysis methods, the resulting findings in regards to consumer clusters showing an interest in the product were remarkably similar.

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10. Abigail L. Davis

Multi-Asset Class Diversification Using ETF's: A Study

Faculty Mentor: Pankaj Agrawal

Department: Business

Abstract

Common forms of investing for the long term investor include trading equities (stocks) as well as purchasing/selling mutual funds. Prof. Pankaj Agrawal, my instructor in finance, has created an alternate way for the investor to enter the market; an all ETF, low cross-correlation, zero-trade portfolio that has been tracking six highly liquid ETFs since 2004. Inspired by his work I have been following this portfolio along with a trading simulation game with 23 students. I intend to share the risk-return outcomes of these two vastly different approaches to investing, to my fellow students.

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11. **Jacob Kane, Casey Hudson, & Scott Johansen**

*Capturing the Student's Spirit: Using Conventional Models to Harness Unconventional Wisdom*

Faculty Mentor: Patti C. Miles

Department: Business

*Abstract*

The purpose of this research is to address the changing expectations of today's future employers. Today's competitive job market is a new frontier for students and professors. Preparing students for this market is challenging. Gone are the days when the all-knowing professor could stand in front of the class and impart knowledge, facts and figures. And, gone are the days that students could passively sit in the classroom and absorb the knowledge, and perfectly recite it for a midterm or final. Instead, it seems future employers seek applicants who are abstract thinkers, possessing a toolbox of creative problem solving skills, which they are able to deliver beautifully in writing or presentation format. To this end, this research begins with the fundamental step of increasing student participation designed to facilitate learning the application of knowledge in a core required business course.

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12. **Daniel Sipe**

Going Cheap Hurts: Triple vs. Single Digit Stocks

Faculty Mentor: Pankaj Agrawal

Department: Business

Abstract

The focus of this project is to explain the difference in return and volatility of Single-digit and Triple-digit stocks. The goal is to articulate the conundrum of why people keep buying single digit stocks even though the returns tend to be smaller. Prof. Agrawal and I will go about doing this experimentation by tracking these two portfolios over a complete market cycle (2007-2013). In addition to cumulative returns we will include MPT stats such as betas and Sharpe ratios. We hope to present this information to a non-finance audience to highlight the risks of going cheap, over the long run.

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## Civil & Environmental Engineering

### 13. **Michael Scott Dandy**

*Infrastructure Design Adaptation to Climate Change*

Faculty Mentor: Shaleen Jain

Department: Civil & Environmental Engineering

#### *Abstract*

Changing patterns of temperature and rainfall have resulted in heat waves, floods, and droughts. Impacts from extreme events (such as Hurricane Irene) involve significant damage and failure of our infrastructure. The future well-being of our communities relies on sound engineering design that takes into account effects from variable and changing climate. My research work analyzes long records of extreme participation in Maine to understand return level changes. My preliminary results indicate a 3.5-fold increase in risk of a 50-year return period in Eastport, ME. My goal is to develop analysis methodologies to analyze and visualize time-varying extreme rainfall characteristics.

~~~

14. **Katrina Martin**

Sustainable Design in Orono

Faculty Mentor: Eric Landis

Department: Civil & Environmental Engineering / Margaret Chase Smith Policy Center

Abstract

This project focuses on sustainable design- the idea that life on campus could be applied to downtown Orono, Maine. On campus, students walk to class, to get food, to socialize, etc, yet when we step off campus our mode of transportation becomes vehicular. The goal of this project is to combine design conventions that are simple and affordable with survey results to improve resident satisfaction with their neighborhood and lifestyles. That is, the outcomes of this project will help create a more Community-Friendly Orono rather than a Commuter-Friendly one by collecting traffic and pedestrian data in the downtown area.

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## Communication & Journalism

### 15. **James Gibbons, Dana Freshley, & Patrick Pittis**

*Television's Role in the Cultivation of Normative Gender Roles*

Faculty Mentor: Claire Sullivan

Department: Communication and Journalism

#### *Abstract*

This study draws heavily on George Gerbner's Cultivation Theory and gender studies. We examine the relationship between the amount of television a college student consumes and their perception of the nature of gender roles, fluid or rigid. Heavy television viewers will have a more rigid conception of gender roles than lighter viewing peers. We will be distributing surveys to 100 level communication classes to approximately 100 participants. Participants will be asked to self-report on their viewing habits, and will fill out the Bern Sex Role Inventory (BSRI). The BSRI measures perceived value of normative masculine, feminine, and neutral traits. Data will be coded, and then analyzed using SPSS. Our findings will demonstrate the relationship between consuming "heavy" amounts of television and the formation of rigid gender identities, roles, and performances.

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16. **Kaylie Reese**

Student perception of interview and resume presentation: A survey

Faculty Mentor: Claire Sullivan

Department: Communications & Journalism

Abstract

This study is an effort to examine students' perception of two key components in applying for a job: the interview and the resume. Prior studies show that first impressions hold a significant impact in judgments, so the resume and interview need to best represent applicants. A survey questionnaire will be conducted and analyzed to examine students' perception of an interview and a resume, in regard to presentation. Finding what may be differing presentation expectations between students may shape how resume writing and interview practices should be taught to best serve students when they apply for a job.

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## Communications Sciences & Disorders

17. **Lydia Drown, Brett Radosti, & Michelle Landry**

*Effects of Mild-to-Moderate Traumatic Brain Injury on Speech in Adolescents*

Faculty Mentor: Nancy Hall

Department: Communication Sciences & Disorders

*Abstract*

This poster explores the Speech-Language Pathologist's role in working with an adolescent who has experienced a mild to moderate traumatic brain injury that affects speech. The areas researched were prosody, articulation, and fluency. Each area of speech researched showed significant deficits as a result of traumatic brain injury. Much of the research addresses severe traumatic brain injuries; however this poster explains why it is important to discuss mild to moderate traumatic brain injuries as well.

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18. **Danielle Fossa, Laura Pirruccello, & Carly McCann**

Does Peer Implemented Social Skill Intervention Increase Generalization of Pro-Social Behavior and Language in Preschoolers with Autism Spectrum Disorders?

Faculty Mentor: Nancy E. Hall

Department: Communication Sciences & Disorders

Abstract

This poster offers a review of research concerning the effects of peer-implemented intervention for children Autism Spectrum Disorders (ASD) and presents preliminary findings from a case study. Studies on peer-implemented intervention demonstrate a great need for intervention methods targeting preschool-aged children with ASD that occur in naturalistic settings and utilize typically developing peers. The present study included one male preschool child with ASD and four same age peers in a program of peer-mediated intervention aimed at improving social skills and language. While research is ongoing, positive changes in the target child's behavior with his peers are observed.

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19. **Amanda Ketch, Tara LaRose, & Jennifer Williams**

*Noise-Level Exposure in Children's Toys: Probable Causes of Noise Induced Hearing Loss*

Faculty Mentor: Nancy Hall

Department: Communication Sciences & Disorders

*Abstract*

The study provides an overview of the negative effects noisy toys have on children's auditory systems. The review explores historical and current research on the sound level output in youth's toys. Results reveal that with today's technology, children's toys continue to pose harmful threats to young, developing auditory mechanisms. Research indicates that excessive noise levels among children's toys is directly related to noise induced hearing loss. These findings highlight the need for increased public awareness and research on dangerous decibel levels within animated toys.

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20. **Bethany Neal, Jenna McGuire, & Joshua Monica**

Natural Route: Equine Assisted Activities on the School Age Child with Autism Spectrum

Faculty Mentor: Nancy Hall

Department: Communication Sciences & Disorders

Abstract

This library based research project examines the beneficial effects of Equine Assisted Activities on the school age child (ages 6-12) with Autism Spectrum disorders (ranging from low to severe impairment). EAA is a newer interactive therapy for ASD that specifically targets the symptoms of ASD by exposing the child to an environment that allows growth through learning and socialization. The three main areas of focus are: expressive and receptive language, attention (social function), and quality of health and life. All of the information gathered for this research has come from previous case studies and various scholarly journals.

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21. **Lauren Peer, Morgan Lincoln, & Kacy Thibodeau-Harvey**

*Effects of Preschool on Children's Language Ability and Possible Implications for Children with a Specific Language Impairment*

Faculty Mentor: Nancy Hall

Department: Communication Sciences & Disorders

*Abstract*

Our research examines the effects that attending preschool has on a child's language ability. Normally developing children's expressive and receptive language skills benefit from attending preschool. However, there are numerous factors that contribute to a child's language ability. Our research also includes the effects that preschool attendance has on children with specific language impairments. If, as we hypothesize, attending preschool is beneficial for children with specific language impairments, it should help those children communicate more successfully throughout their lives and improve their academic abilities.

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22. **Rhiannon Vigue, Jenna Marcellina & Kayla Valliere**

Childhood Apraxia of Speech: How do impaired motor and/or phonological representations effect language and literacy acquisition?

Faculty Mentor: Nancy E. Hall

Department: Communication Sciences & Disorders

Abstract

This project was based on library research regarding language and literacy development in children with Childhood Apraxia of Speech (CAS). The study focused on two opposing theories of the origins of CAS - speech-motor planning (the most widely accepted) and linguistics. Evidence from both perspectives clearly shows that negative effects on language and literacy can be explained by both theories. Thus, controversy surrounding the etiology of CAS continues. Research is recommended to evaluate outcomes of speech-motor programming therapy compared to those of linguistic-based therapy to better illustrate the role of each approach in explaining CAS.

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## Electrical & Computer Engineering

### 23. **Michelle Beauchemin**

*Exfoliation and Electrical Characterization of Graphene*

Faculty Mentor: Rosemary Smith

Department: Electrical & Computer Engineering

#### *Abstract*

Graphene is a single layer of carbon atoms in a hexagonal array. It has unique electrical and mechanical properties and is a promising material for improving silicon devices. My research aims to investigate the application of graphene to single molecule analysis and sensing. Graphene is obtained by mechanically exfoliating graphite flakes and transferring them to silicon dioxide coated silicon wafers. Optical characterization is used to verify if graphene is produced. Methods for making electrical contacts to the graphene are being developed for subsequent electrical characterization and eventual testing as a sensor.

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24. **Evan Kus**

Tracking Juvenile Amphibians with Harmonic RADAR

Faculty Mentor: Nuri Emanetoglu

Department: Electrical & Computer Engineering

Abstract

Wireless tags will be used for locating and tracking juvenile wood frogs in suburban and forest environments. These juvenile frogs have a length of less than 4cm and a weight of approximately 0.6g, making battery-powered tag applications impractical. Because of these constraints, a passive transceiver consisting of a Schottky diode in parallel with an inductor will be used. A radar system operating at 5.8GHz will energize the tag, which in turn will re-transmit a signal at its second harmonic, which is at 11.6GHz. Testing of different tag designs with a portable radar unit and juvenile wood frogs is detailed.

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25. **Lonnie Labonte**

*Wireless Feedback Network for Future Rocket Control*

Faculty Mentor: Ali Abedi

Department: Electrical & Computer Engineering

*Abstract*

The success of next generation launch vehicles with improved reliability and operability depends in part on the development of advanced control systems. When a feedback system gets more advanced it adds complexity and weight to the rocket. The possibility of making feedback control systems in rockets wireless would be a large step in the right direction to make more efficient rockets to reach further into space with less fuel. The wireless sensors are used as a feedback system to control the flight path and orientation of the rocket. In large rockets this would significantly reduce weight and increase payload space.

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26. **Anin Maskay & Jesse Rodgeron**

SleepMove Device: A Brain Injury Detection System

Faculty Mentor: Ali Abedi & Marie Hayes

Departments: Electrical & Computer Engineering and Psychology

Abstract

The SleepMove detection system is a non-invasive biomedical device that detects the distributions of sleep movements. Low amplitude sleep movements and respiration data are detected using pressure sensors and are wirelessly transmitted via the device to a computer. Studies have shown that brain injury is commonly accompanied by sleep disturbance and sleep deprivation. The aim of the project is to develop a portable and unobtrusive device that can be used in either a hospital or household setting and use the sleep-wake analysis and profiles of sleep movements to evaluate the brain status in infants, children, adults, and the elderly.

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27. **Anthony Nuzzo**

*High Power Three Phase Inverter*

Faculty Mentor: Nathan Weise

Department: Electrical & Computer Engineering

*Abstract*

This research involves optimizing methods for power conversion in wave energy converter (WEC) systems. A prototype WEC has been designed and built by the mechanical engineering department. A three phase inverter is designed and constructed to harness and convert energy from ocean waves. Control algorithms are developed to extract maximum power under varying wave conditions using feedback from the WEC. Results of this project will lay ground work for future WEC research.

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28. **Jesse Rodgerson & Anin Maskay**

Localization of Wireless Sensor Networks using Received Signal Strength and Angle of Arrival

Faculty Mentor: Ali Abedi

Department: Electrical & Computer Engineering

Abstract

RFID technology has continued to evolve to meet new demands for localization and tracking. This presentation examines the applicability of angle-of-arrival (AOA) estimation and received-signal-strength (RSS) to the localization of passive RFID tags. The scenario considered is passive RFID tags placed on the surface of the NASA lunar habitat at the University of Maine. Through performance analysis and simulation results, it is seen that RSS performed better at closer distances and AOA performed better at greater distances. The aim of the project is to combine AOA and RSS to create a hybrid location estimation method using statistical models in MATLAB.

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## Food Science & Human Nutrition

### 29. **Kathleen Crosby**

*Omega-3 Fortified Blueberry Fruit Leather*

Faculty Mentor: Denise Skonberg

Department: Food Science & Human Nutrition

#### *Abstract*

This research is focused on creating a new blueberry fruit leather product fortified with omega-3 fatty acid-rich fish oil to produce a value-added product beneficial to consumers' health. Research is being conducted on fruit leather processing methods, comparing the effectiveness of two forms of fish oil at two levels and the stability of the product during a four-week shelf-life study finishing in March. To date, research has focused on preventing microbial growth by testing the pH and water activity levels. After 18 test batches, a formulation has been achieved that should prevent microbial growth while providing satisfying flavor and texture.

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30. **Xinruo Zhang**

Stability of Phytochemicals in Blueberries with respect to Different Blanching Methods and Storage

Faculty Mentor: Balunkeswar Nayak

Department: Food Science & Human Nutrition

Abstract

Bioactive phytochemicals in wild blueberries, such as anthocyanins and other phenolic acids, are susceptible to degradation during processing due to intensity of thermal exposure. The project focuses on the stability and extraction of the phytochemicals, including anthocyanins and total phenolics when exposed to microwave and steam blanching and stored for different durations. Chemical assays, including DPPH and ORAC, are utilized to analyze antioxidant activities of the phytochemicals. The results from this experiment will help understanding better techniques for extraction and storage of bioactive phytochemicals of blueberries to retain the health benefitting compounds.

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## Forestry

### 31. **Emma Gajic**

*Creep Behavior of Oriented Strand Boards*

Faculty Mentor: Stephen Shaler

Department: Forest Resources

#### *Abstract*

In this study, an examination of the flexural creep performance of Oriented Strand Board (OSB) panels under constant load and a range of stress levels on creep behavior was conducted. Two types of tests were performed, first was center-point flexure test according to ASTM D3034-11, and second was two-point loading creep test according to ASTM D6815-09. Center-point flexure tests were performed in order to obtain mechanical properties (strength and stiffness) of panels, which were further used for calculating loads and stress levels for creep tests. Creep test specimens have been subjected to different constant loads for up to 90 days or until the occurrence of failure. Creep tests are still in progress.

## Marine Sciences

### 32. **Tyler Carrier**

*Effects of prepared and macroalgal diets on somatic growth of juvenile green sea urchins (*Strongylocentrotus droebachiensis*)*

Faculty Mentor: Steve Eddy

Department: Marine Science

#### *Abstract*

Green sea urchins (*strongylocentrotus droebachiensis*) are a high value marine species in Maine, but fishery landings continue to decline. Sea urchin aquaculture (echinoculture) methods have been developed in Maine, but formulated urchin feeds are prohibitively expensive for further growth of the industry. The developing seaweed aquaculture industry in Maine could provide a low-cost feed source for echinoculture. A feeding trial was conducted with juvenile urchins comparing different species of dried or fresh macroalgae to a formulated feed. Results suggest that dried kelp can be a sustainable feed for sea urchins, which could benefit both echinoculture and seaweed aquaculture in Maine.

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33. **Keri Feehan**

Reproductive Ecology of Seven Species of Eastern Pacific Cold-Water Corals

Faculty Mentor: Rhian Waller

Department: Marine Sciences

Abstract

This study examined the reproductive ecology of seven Eastern Pacific deep-sea corals, distributed from Washington to Southern California coasts. The sexuality, reproductive mode, oocyte size, and fecundity of each species was identified using histological techniques. This research will drastically increase the knowledge of basic life histories of deep-sea corals. By examining and comparing reproductive processes between cold-water coral species, there is potential to estimate population turnover and species recovery rates in response to anthropogenic impacts (such as fisheries damage and climate change). These data will ultimately aid scientists and conservation managers to protect deep-sea corals and the highly diverse communities they support.

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34. **Molly Flanagan**

*Sediment Choice by Juvenile Razor Clams, *Ensis directus**

Faculty Mentor: Paul Rawson

Department: Marine Sciences

*Abstract*

I determined the burrowing rates of juvenile razor clams at two ages to help identify appropriate sediments for nursery phase culture. Using self constructed "ant farm" like video analysis tanks, juvenile *Ensis directus* were filmed in mud, sand, and mud sand mix and these videos were analyzed for sediment-dependent burrowing rates. The results of my research will aid in the development of razor clam aquaculture techniques that can be used by Maine's shellfish culture industry.

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35. **Kimberly Picard**

The Distribution and Abundance of Sturgeon in the Damariscotta River Estuary

Faculty Mentor: Gayle Zydlewski

Department: Marine Sciences

Abstract

Little is known about sturgeon in small coastal rivers of Maine. From Apr-Dec 2012, receivers in the Damariscotta River estuary recorded acoustic signals from tags placed in shortnose and Atlantic sturgeon from the Penobscot River. From Sep-Nov ten locations on the Damariscotta were surveyed weekly for surface and bottom temperature, salinity, dissolved oxygen, depth, prey availability, and sturgeon presence. Seven sturgeon used the Damariscotta throughout the year, three in early spring and four in early fall. Sturgeon presence will be related to physical conditions and prey availability. These results are important for species management and recovery programs in Maine.

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36. **Christina Genz**

*Study of Micro-plastics in the Estuarine Waters of Maine*

Faculty Mentor: Rhian Waller

Department: Marine Sciences

*Abstract*

This Capstone enumerated micro-plastic particles in the Gulf of Maine, primarily from estuarine waters. The total and type of micro-plastics were counted and recorded through filtering water and microscopic examination of filters during the fall semester. Eighty-five samples were analyzed from 15 locations. Results reveal that filament micro-plastics are the most dominant type, with East Boothbay having the highest quantity of particles. These particles have been shown to be taken up by filter feeding organisms, thus determining the number of micro-plastics in estuarine waters along the coast of Maine will help to quantify the risk within local waters.

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Mathematics

37. Mahadi Osman

Composites in Different Bases that Remain Composite After Changing Digits

Faculty Mentor: Andrew Knightly

Department: Mathematics

Abstract

In [1], Filaseta et. al. proved that there are infinitely many composite numbers that remain composite after changing any digit in the decimal expansion by constructing an infinite arithmetic progression of such composite numbers. We show that there are infinitely many composite numbers in base b that have this property for $2 \leq b \leq 9$. We then attempt to show that there are composite numbers in base b that remain composite after replacing any two adjacent digits in the base b expansion.

Reference

[1] M. Filaseta; M. Kozek; C. Nicol; J. Selfridge, Composites that remain composite after changing a digit, J. Comb. Number Theory 2 (2010), no. 1, 25{36 (2011).

Mechanical Engineering

38. Alex Briggs

Affordable and Efficient Wood Furnace

Faculty Mentor: Michael Boyle

Department: Mechanical Engineering

Abstract

Although humans have been burning wood for a very long time, to this day it is generally horribly inefficient- an overall efficiency of 20% (chemical potential energy converted to home heating) is not uncommon. While efficient pellet stove designs have been made, significant purchasing barriers remain to their broad adoption. The heating oil crisis in rural Maine provides the motivation for a cheap and efficient wood furnace design to provide an alternative to liquid propane or heating oil- strengthening Maine's economy and resilience.

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## Molecular & Biomedical Sciences

39. **Jefferson Adams, Eric Arnold, Campbell Belisle Haley, Jamika Cookson, Eliot Gagne, Oleg Gross, Andrew Hart, Brent Martin, Elizabeth Pflugradt, Danny Pham, Monique Theriault, Steven Valentino, & Emily Whitaker**

*The Isolation and Characterization of a Novel Mycobacteriophage EvilGenius*

Faculty Mentor: Keith W. Hutchison

Department: Molecular & Biomedical Sciences

### *Abstract*

Mycobacteriophage (phage) are viruses that infect members of the genus *Mycobacterium*, including *M. tuberculosis*, and have the potential to control diseases caused by mycobacteria. Known isolates have been grouped into 20 clusters. We purified and characterized eight isolates from local soil samples. Physical characterization of the phage potentially places them into at least three clusters (A, E, and K). The DNA of one of the isolates, EvilGenius has been sequenced and annotated. It is in the A2 subcluster. Its closest relative is the previously characterized UMaine phage ChipMunk. This suggests they are of the same lineage.

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40. **Kristyn Daigle**

Improving Extractability of Allergenic Soy Protein Residues in Processed Foods

Faculty Mentor: Balunkeswar Niayak

Department: Molecular & Biomedical Sciences

Abstract

Soy allergy is one of the most common pediatric food allergies in the US, affecting nearly 0.4% of children. Avoidance of soy protein has become increasingly difficult due to its high use in processed foods, its need as a good source of nutrients for infants who are allergic to milk, and its alternative to meat for vegetarians. This study aims to quantify allergenic proteins from soy products such as soy protein isolate, soymilk, defatted soy flakes, raw soybean, or boiled soybean. Novel extraction techniques including microwave and ultrasonic treatment in combination with various pH and temperatures will be performed in determining the optimized conditions for obtaining higher recovery of soy proteins. The recoveries of protein residues will be compared using two commercial ELISA kits. This is important for food scientists as it will provide an improved method to extract allergenic protein residues from processed soy products to further assess its safety for individuals with a soy allergy.

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41. **Joshua Jones**

*Morphogenesis Mediates Candida albicans Dissemination*

Faculty Mentor: Robert Wheeler

Department: Molecular & Biomedical Sciences

*Abstract*

*Candida albicans* typically presents itself as a harmless commensal, but in immune-compromised individuals it can cause life-threatening systemic infection. A major contributor to *Candida's* pathogenicity is its ability to disseminate from localized infections to a system-wide bloodstream infection. We have shown, using a transparent zebrafish model and *in vivo* imaging techniques, that different growth forms of *Candida* play specific roles in establishing disseminated infection. These findings further our understanding of *Candida's* mechanisms of dissemination, a key to understanding the pathogenesis of this organism and uncovering potential therapeutic targets for the treatment of invasive candidiasis.

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42. **Raymond Luc**

Efficacy of Three Newly Synthesized Antibiotics against P. aeruginosa Infection

Faculty Mentor: Carol Kim

Department: Molecular & Biomedical Sciences

Abstract

Pseudomonas aeruginosa is a gram-negative bacterium present in the lungs of patients diagnosed with cystic fibrosis. It can also be characterized by its ability to resist certain drugs. Dr. Tom Chang of Utah State University has recently synthesized three new antibiotics against *P. aeruginosa*: NQM103, NQM113, and Pyrankacin. The aim of this project will be to test the efficacy of these newly synthesized antibiotics against *P. aeruginosa* using the zebrafish (*Danio rerio*) as a model organism for human infectious diseases. We expect our findings to help identify a wide array of drugs already in use to treat similar bacterial infections.

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43. **Derek Rothenheber**

*Microbial Nitrification in a Nitrogen Enriched Environment*

Faculty Mentor: Jean MacRae

Department: Molecular & Biomedical Sciences

*Abstract*

Nitrogen is an essential component of all organisms. Different forms of nitrogen are cycled in the environment by microorganisms. Nitrification is a step that converts nitrogen as ammonium to nitrate, which is preferred by plants, but is also linked to water pollution. Nitrogen enrichment is expected to increase nitrification. In this study, soil from Bear Brook Watershed, a paired-watershed test site where ammonium has been added for 23 years, will be used to determine the effect of elevated ammonium on nitrifying bacteria. The quantity of nitrification genes in DNA extracts from the test and reference watersheds will be compared.

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44. **Derek Rothenheber & Gwendolyn Beacham**

Water Quality in Dulce Vivir, Honduras Before and After Implementation of a Septic System

Faculty Mentor: Jean MacRae

Department: Molecular & Biomedical Sciences

Abstract

Over the past 5 years, Engineers without Borders-UMaine has been working, designing, and implementing a sanitation septic system in Dulce Vivir, Honduras. We are specifically analyzing how this system affects the quality of water and overall sanitation in the community. Water tests from a pre-implementation trip show that the tap water is contaminated. In March 2013, EWB-Umaine will be testing tap and spring water, using total coliform counts and pH, iron, and nitrate tests; we will also be gathering health data to compare to information we have about the original status of health and sanitation in the community.

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## New Media

45. **Christopher Bryant**

*3rd Person Perception*

Faculty Mentor: Mike Scott

Department: New Media

*Abstract removed at student's request.*

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46. **Andrew Robbins**

Boulder Beacon

Faculty Mentor: Jon Ippolito

Department: New Media

Abstract

Boulder Beacon is my attempt to marry the concepts of technology and social media with that of adventure, outdoors and more specifically rock climbing. Inspired by other social networking models, Boulder Beacon lends itself as a tool for friends to share, log and find climbs all over the world. Presented on a mobile platform, Boulder Beacon is the first of its kind in location-based applications and is something I look forward to continue working on beyond my time at the University of Maine.

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47. **Regina Smith**

*Co-evolving watershed education and Programmable Media Concepts: An implementation of the Creative Thinking Spiral*

Faculty Mentor: Shaleen Jain

Department: New Media

*Abstract*

Students are learning new concepts in science, technology/computation, engineering, and math (STEM) areas, often as unlinked strands across subjects. By connecting computational components in math, science, and geography through programmable media, the potential to enrich integrative learning arises. I consider watershed education a focal area in my work. In my research, programmable media environment, Scratch ([www.scratch.mit.edu](http://www.scratch.mit.edu)) is used and affords opportunities for students to explore models for a range of environmental science and other contexts. In this work, I will elucidate this approach by using a workshop-based activity, and data gathered from in-depth interviews with middle-school teachers.

### Nursing

48. **Julia Bousquet, Alyssa Maxwell, Kaitlin Harmon, Teri-Lynn Sanborn, & Allison Corrow**

*Hand Hygiene Education in the Classroom*

Faculty Mentor: Elizabeth Bicknell

Department: Nursing

*Abstract*

This project is to educate elementary students the importance of hand hygiene in preventing the flu and other illnesses to help reduce the number of students who are absent from school. Elementary students will attend an educational group where proper hand washing will be taught by videos and demonstration. To evaluate effectiveness, students will be asked to teach back the proper ways to clean their hands and by comparing pre and post tests given. The outcome is to reduce school absences by preventing the transmission or illness by teaching correct hand hygiene.

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49. **Sara Bowden, Amy Brickel, Brittany Myles, & Sarah Hendry**

Eat This, Not That: Empowering School-Aged Children to Make Healthy Nutritional Choices

Faculty Mentor: Liz Bicknell

Department: Nursing

Abstract

America is currently facing one of the highest obesity rates recorded. Early intervention by healthcare professionals is instrumental in promoting preventative measures and educating healthy lifestyle choices. The data from the community assessment of Winterport, Maine and Waldo County revealed a high level of residents whom are overweight and obese, indicating that these areas need to be addressed. Our group developed a program directed towards fourth grade children to increase their awareness of healthy living through visual aids, activities, and take home materials. Project effectiveness will be assessed by reviewing their responses to our Eat This, Not That game.

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50. **Mallory Curran, Juliet Cobb, Alyssa Hodgdon, Bethany Grant, Emily Fraser, Melissa McGary, & Casey Middleswart**

*Teaching Proper Dental Hygiene to Harrington, Maine First Graders*

Faculty Mentor: Elizabeth Bicknell

Department: Nursing

*Abstract*

The community assessment of Harrington, Maine showed several strengths and weaknesses. Our group partnered with the elementary school nurse and discovered that the number one health concern for these children is poor dental health. Our goal is to provide education on proper brushing and flossing through games and demonstration. We will administer a survey before and after the teaching to assess beginning knowledge and measure the effectiveness of the intervention. We hope that these children will learn the importance of caring for their teeth and will do so throughout their lives to prevent health disparities related to poor dental hygiene.

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51. **Katelyn Duff, Hannah Pillsbury, Olivia Perez, Jessica Ayotte, & Brittney Murphy**
Nursing Students Interventions to Promote Healthy Lifestyles on School Age Children
Faculty Mentor: Elizabeth Bicknell
Department: Nursing

Abstract

Nursing students reviewed and collected data from an elementary school in Skowhegan, Maine. The children and parents showed a need for education concerning healthy eating and active lifestyles. The nursing students will plan a program, which involves children in physical activities and food preparation. The nursing students will prepare and provide literature for parents to outline and summarize the principles of healthy living. The nursing students will assess the event by observing the elementary students for participation, interaction and comprehension. There will be a survey available at the end of the evening to assess parents' opinions about the event.

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52. **Carrie Moses, Alexandra Libby, Ashley Bryant, Melissa McGary, Lauren Daigle, & Ryan Rossignol**  
*Awareness and Prevention of the Dangers of Texting and Driving for Brewer High School Students*  
Faculty Mentor: Liz Bicknell  
Department: Nursing

*Abstract*

Texting while driving is a concerning issue across the United States. This project aims to target teenagers who are or may become drivers at Brewer High School to implement safe driving practices and to avoid texting while driving. The students will be surveyed with an eight-item questionnaire to gather data about experiences and knowledge involving texting and driving. The results of the survey and education will be presented to the students. The project will be evaluated with a questionnaire done by the students at the end of the presentation.

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53. **Kasi Parker, Elizabeth Fisher, McKenzie Houpp, Samantha Wark, Katie St. Pierre, & Alicia Sousa**

Expanding Knowledge & Access to Sexual Education at Oceanside East

Faculty Mentor: Elizabeth Bicknell

Department: Nursing

Abstract

Community assessment for Rockland, Maine identified strengths and weaknesses of the community. One weakness, historically, is Knox County's high teen pregnancy rate. Recent budget cuts at the state level for sexual health education and services at Oceanside East resulted in deficits in information and resources. Based on these findings, Oceanside students will benefit from a program, which reinforces access to resources and existing sexual education provided by the required health curriculum. This educational program will cover pregnancy prevention, birth control methods, local resources, and sexually transmitted infections. Our hope is to promote healthy sexual practices through this program.

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54. **Brandon Walus, Miranda Chadbourne, Nathaniel McNeill, Suzanne Chasse-Davis, Jennifer Pittis, Aaron Cyr, & Alexandra Pastore**

*Distracted Driving Among First Year UMaine Students: A Scared Straight Intervention*

Faculty Mentor: Liz Bicknell

Department: Nursing

*Abstract*

Current literature is nearly in consensus regarding the risks that distracted driving poses to self and others. This assessment sought to examine the self-disclosed prevalence rates of various expressions of distracted driving amongst first-year UMaine on campus residents. Our initial assessment revealed alarming, yet not surprising, rates of self-disclosed instances or patterns of distracted driving. This group of nursing students seeks to address this issue within this population through primary prevention education. We will put on a mock demonstration intended for first year students of a crash scene to illustrate the real life consequences to self, others and property that can occur when driving while distracted. This event will take place at the UMaine campus among first year student dorms. We will measure the effectiveness of the intervention by documenting qualitative measures such as personal narratives.

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55. **Kayla Webb, Kelsey McGrath, Paige Gardiner, Elise Ouellette, Kiley Clement, Myles Mercier, & Casey Taber**

Nutrition & Physical Health Awareness for High School Seniors Transitioning to Adult Life

Department: Nursing

Faculty Mentor: Liz Bicknell

Abstract

The project is aimed at Hampden Academy students, where, no matter the future of these students, the transition from high school to adulthood is challenging, and the outcome of their health is their own responsibility. The focus of this project is to educate high school seniors on physical health and nutrition as they transition into adulthood. The method includes a group presentation at Hampden Academy and hand out evidence based pamphlets to the students. The project outcome will be evaluated through a five-question evaluation tool following the presentation.

Physics & Astronomy

56. **Sean May**

Grain Size Effect on Room Temperature Superconductivity in Doped Graphite Powder

Faculty Mentor: Robert Meulenberg

Department: Physics & Astronomy

Abstract

Magnetic hysteresis was first shown in graphite powder doped with water at room temperature by Esquinazi et al. at the University of Leipzig in September of 2012; magnetic hysteresis is a characteristic of vortex formation in type II superconductors. Using a SQUID the magnetization of the sample can be measured while manipulating the temperature and applied magnetic field. The goal of our research is to find a relation between grain size of the doped powder and the superconductive effect. Preliminary results confirmed hysteresis at room temperature in graphite and research is currently underway examining the effect of grain size.

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57. **Conrad Rier**

*Habitability of Exomoons*

Faculty Mentor: Neil Comins

Department: Physics & Astronomy

*Abstract*

Could any of the approximately 850 planets discovered around other stars host moons that possess an atmosphere, liquid water, and life? The goal of this project is to determine what parameters must be present for an exomoon to be considered habitable. These constraints on habitability include sufficient heating to maintain liquid surface water, enough mass to retain an Earth-like atmosphere, and a magnetic field with enough strength to prevent atmospheric sputtering. These constraints will be examined individually and in the context of hypothetical satellite systems orbiting several yet-to-be-chosen exoplanets.

**Political Science**

58. **Benjamin Algeo, Shannon Brenner, Alexandria Jesiolowksi, Joshua Morse, Victoria Schuyler, & Braden Sinclair**

*Building a Better Orono Together: Cultivating Organic Community Connection with University and Orono Stakeholders*

Faculty Mentor: Robert W. Glover

Departments: Political Science, Sociology, & Economics

*Abstract*

This project is part of a yearlong collaboration between students in the Engaged Policy Studies Practicum (Political Science) and the town of Orono. Utilizing survey research and focus groups with faculty, students, administrators, and the community, the researchers will assess stakeholders' satisfaction with Orono as a place to live and work. This research will utilize and respect the knowledge and strengths of both community and university partners in the framework of engaged, action research. In addition, researchers will develop possible steps UMaine and Orono can take together to address needs and concerns highlighted in the surveys and focus groups.

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59. **Alexandria Jesiolowski & Angela Gray**

Measuring Sense of Community (SoC) and Sense of Belonging (SoB) Amongst University of Maine Students and the Town of Orono

Faculty Mentor: Claire Sullivan

Department: Political Science and Communication & Journalism

Abstract

This project is the focus of a Communication Research course, CMJ 402, at the University of Maine. Utilizing survey research through online surveys using the program Qualtrics and statistical analysis using the program SPSS, researchers will analyze data measuring university students' sense of belonging and sense of community towards the town of Orono. There will be a potential minimum of a 100 students that will participate in the online survey. Researchers will use an adaptive scale that measures sense of community (SoC) and sense of belonging (SoB) of students towards the town of Orono. This research will help to understand students' perceptions of the town and provide insight as to how the town and the university can build a stronger sense of community between students and the town of Orono.

Psychology

60. **Andrew Bergeron**

The Effects of Different Levels of Co-Rumination on College Students: A Curvilinear Approach

Faculty Mentor: Douglas Nangle

Department: Psychology

Abstract

Co-rumination refers to a pattern of behavior involving repetitive discussion of personal problems with a focus on negative thoughts and feelings within a dyadic relationship. Studies have shown that individuals who engage in co-rumination tend to be at higher risk for depression but also tend to have closer relationships with the individuals they co-ruminate with. In order to account for this adjustment trade-off, this study will examine if the relationship between co-rumination and depression can be better expressed as a quadratic relationship rather than the linear one that is generally assumed in the literature.

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61. **Meagan Bossie**

*The Enhancing and Impairing Effects of Stress on Cognition*

Faculty Mentor: Shawn Ell

Department: Psychology

*Abstract*

Individual responses to stress can vary between individuals and greatly affect cognitive functioning; specifically, maladaptive stress responses have been found to negatively affect cognitive performance. However, we challenge this with the idea that the specific cognitive system responsible for task performance also has an essential role in the relationship between stress and cognition. In this study, we manipulate the stress response through the presence or absence of social support during a stress-provoking task. In doing so, we are investigating how variability of the stress response interacts with the cognitive system mediating task performance by means of psychophysiological and psychological measures.

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62. **Joshua Comins**

The Impact of Describing your Decision Strategy on Explicit and Implicit Category Learning Systems

Faculty Mentor: Shawn Ell

Department: Psychology

Abstract

Cognitive neuroscientists believe that people use different systems to learn. In particular, we use two competing systems to categorize things: an explicit system that employs logical rules and an implicit system that employs stimulus-response associations. We hypothesized that participants who describe their strategy will be more inclined to incorporate explicit rules in their learning. We expected that these participants would thereby impair their performance on stimulus-response tasks and enhance their performance on rule-based tasks. If changing mental strategy from implicit to explicit improves learning skills, this research could have important effects on job training for many tasks.

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63. **Marcus Dunham**

*Free play, social competence and problems of anxiety and aggression in preschool children*

Faculty Mentor: Peter J. Lafreniere

Department: Psychology

*Abstract*

The 50-year decline in free play in American children concerns developmental psychologists because play is considered vital to development. A lack of free play could negatively effect social competence and feed into problems of anxiety and aggression. To explore these issues, U-Maine's Child Study Center was the site for a direct observational study of play in 25 preschoolers over three-months. Using classic time-sampling methods frequencies of pretend play, exercise play and onlooking behavior and teach ratings of competence, aggression, and anxiety/withdrawal were collected for each child. Moderate negative correlations were found between pretend play and aggression, and anxiety/withdrawal. Results were discussed with respect to functional hypotheses of different types of play in early childhood.

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64. **Kelsey Hickey**

Effects of Induced Social-Evaluative Stress on Category Learning

Faculty Mentor: Shawn Ell

Department: Psychology

Abstract

The present study aims to elucidate the relationship between perceived stress and cognitive function. Using physiological measures (cardiovascular data, stress hormones), we measure how induced social-evaluative stress mediates performance on a categorization task. Stress is mediated by two systems - each operating on a different time scale. In order to clarify the time course of cognitive deficits relevant to stress, we manipulated the timing of the categorization task. We expect to see cognitive deficits (measured by reaction time and accuracy) immediately following the stressor when stress systems act in unison.

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65. **Morgan Kinney**

*Measuring Automatic Emotional Responses to Homosexuals*

Faculty Mentor: Jordan LaBouff

Department: Social Psychology

*Abstract*

The emotional bases of homosexual prejudice are not completely understood even by those who hold it. Because implicit biases can happen preconsciously, these attitudes may be best measured through physiological measures like startle eye-blink response. We investigate implicit attitudes toward homosexuals using psychophysiological measures and examine the influence of religious fundamentalism and authoritarianism on those attitudes. Facial Electromyography is used to detect startle response to a probe while viewing images of homosexual and heterosexual couples. I expect that participants high in external motivation to avoid prejudice, right-wing authoritarianism, and religious fundamentalism will have amplified startle responses when viewing homosexual stimuli.

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66. **Annie Ledoux**

Perceptions of a Dating Couple Conflict Resolution Interaction and Relationship Quality as Predictors of Depressive Symptoms in a College Student Sample

Faculty Mentor: Doug Nangle

Department: Psychology

Abstract

The present study examined the relationship between communication and depression in adolescent romantic partners. Participants completed questionnaires measuring depressive symptoms, positive and negative relationship qualities, and engaged in a recorded conflict-resolution task with their partner. Conversations were evaluated with a video-recall procedure on dimensions of positivity and negativity. Analyses revealed that depressive symptoms were significantly correlated with both low levels of positivity and high levels of negativity during interaction and in the relationship generally. Results indicate the importance of supportive communication skills in adolescent couples to prevent the onset of depressive symptoms.

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67. **Paige B. Martin**

*The Effect of Cataract Surgery on Depression and Vision-Related Quality of Life*

Faculty Mentor: K. Lira Yoon

Department: Psychology

*Abstract*

Cataracts, due to age, affect the ability to perform daily visual activities, therefore rendering independence, which can leave a person feeling depressed. This project is designed to study the relationships between cataract surgery, depression and vision-related quality of life in an elderly population. Two groups were studied; participants undergoing cataract surgery and those who did not; levels of depression and vision-related quality of life were assessed at baseline and at one-month post-surgery/baseline point. The findings show that depression is not alleviated with cataract removal surgery; however, vision-related quality of life and visual acuity are significantly increased with cataract removal surgery. Understanding the relationship between cataracts, depression and quality of life will help better understand the full risks and benefits of cataract surgery.

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68. **Victoria Pendleton**

Ethanol Consumption in Male and Female HAD and P rats over an Alternating Running Wheel Condition

Faculty Mentor: Alan M. Rosenwasser

Department: Psychology

Abstract

The purpose of the present study is to explore the differences between male and female, high ethanol preferring HAD and P rats ethanol consumption with alternating Unlocked and locked running wheel conditions. Animals were singly housed in standard rat cages with running wheels, alternating males and females in each cage. Animals had continuous free-choice access between a 10% ethanol solution and water and were maintained under constant darkness to elucidate ethanol consumption during their free-running circadian period. We hypothesize that ethanol preference will differ between males and females, HAD and P rats during the locking condition of running wheels.

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69. **Caroline Thibodeau**

*When We Talk About Our Problems: An Analysis of Social Anxiety and Co-Rumination in Romantic Relationships and Friendships*

Faculty Mentor: Douglas Nangle

Department: Psychology

*Abstract*

This project will further explore the relationship between social anxiety and the interpersonal process of co-rumination. The proposed study will utilize data already collected as part of a doctoral dissertation to examine the extent to which socially anxious adolescents in a late adolescent college sample engage in co-rumination within two separate relationship types: romantic relationships and friendships, along with possible contributing mechanisms. Data will be analyzed using the statistical software program SPSS. Results of this study will provide a clearer view of the interpersonal mechanisms of socially anxious adolescents that may put them at risk, helping to inform future interventions.

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70. **Elizabeth Tull**

Inequality and Health: Stress Mediates the Relationship Between Subjective SES and Wellbeing

Faculty Mentor: Shannon McCoy

Department: Psychology / Honors College

Abstract

Socio-economic disadvantage is linked to a variety of health problems ranging from obesity to mental illness. The size of the gap between the richest and the poorest people within societies is closely correlated with the prevalence of an array of social and health problems: the bigger the gap, the more of these problems exist within the population (Wilkinson & Pickett, 2009). In a community sample of women, we found that the subjective experience of status was a better predictor of negative health outcomes than objective markers of socio-economic status, and that stress mediated this relationship.

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71. **Christopher Young**

*The Relationship Between High Behavioral Inhibition and Cortisol Reactivity*

Faculty Mentor: Lira K. Yoon

Department: Psychology

*Abstract*

This study was designed to examine the relation between personality traits and stress response. More specifically, I am investigating the role of behavioral inhibition system (BIS), the process in which one actively avoids negative situations in changes in cortisol (a “stress hormone”) in response to psychosocial stressor. Individuals with high level of BIS will also exhibit significantly higher levels of cortisol present in the body compared to individuals with low levels of BIS. Findings will be discussed in relation to the onset and maintenance of anxiety disorders.

**Sociology**

72. **Mary Hunt**

*Sexual Orientation and Alcohol Abuse among Young Women*

Faculty Mentor: Steven Barkan

Department: Sociology

*Abstract*

Men are more likely to abuse alcohol than women. For this reason, alcoholism is stereotyped as a masculine disease, which results in the correlates of women's alcohol abuse being frequently neglected. Recent scholarship suggests that there are strong correlations between alcohol abuse and young women's sexual orientation. This study analyzes data from the National Longitudinal Study of Adolescent Health to investigate the relationship between young women's sexual orientation and alcohol abuse. The study concludes by discussing the major findings of existing correlations between young women's sexual orientation and alcohol abuse.

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73. **Shannon Jacobson**

Roller Derby: Challenging Gender or Reinforcing Norms?

Faculty Mentor: Amy Blackstone

Department: Sociology

Abstract

I will be interviewing ten females from local roller derby teams to understand how "roller girls" express their identities through derby. This study will address three questions: 1) Do participants' identities on the derby track conform to their identities outside of derby? 2) To what extent do participants conform to or challenge gender norms and why? By analyzing answers to these questions I seek to gain a better understanding of how derby participants' identities on the track differ from their identities off the track, and why those identities differ.

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74. **Linda Fogg & Mazie Pierce**

*UMaine Sociology Alumni Survey*

Faculty Mentor: Amy Blackstone & Michael Rocque

Department: Sociology

*Abstract*

We investigate the impact of a Sociology degree on life experiences and career trajectories by surveying University of Maine Sociology alumni. The survey was administered to 381 alumni who graduated between 1941 and 2011. Of the 381 alumni contacted, 84 completed the survey. 64 of those people identified as female and 20 of them identified as male. We found that 89.6% of all respondents were at least somewhat satisfied with their education at UMaine and their Sociology degree. Of that 89.6 percent, 28.6% were very satisfied with their education at the University of Maine. We also found that only 7 of the respondents had not found a job that fulfilled them. The majority of the 89.6% of respondents who were satisfied with their education from UMaine had found jobs following their graduation that fulfilled them. These findings, among others, paint a picture of Sociology alumni and their jobs and lifestyles after graduation. Findings also illustrate the effectiveness of the education received through the Sociology Department. As researchers we believe that this information is important not only to the University of Maine Sociology Department, but also to UMaine when recruiting prospective students.

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75. **Elizabeth Joy**
The Cultural Contradictions of Motherhood Revisited
Faculty Mentor: Kim Huisman
Department: Sociology

Abstract

Hays posits that mothers subscribe to “intensive mothering;” a child-centered, expert-guided, financially and emotionally intense childrearing method “best” performed by biological mothers that contradicts the individualistic, market-driven culture of the US. By analyzing 4 childrearing manuals, two blogs, and conducting 5-7 interviews and 10-20 surveys with mothers, I am examining discourses today compared to those found by Hays in 1996. My partial replication considers changes in society and feminist research during this time frame. Preliminary results suggest that gender neutral images and language as well as father involvement have increased, while the central tenets of intensive mothering have increased simultaneously.

Sustainability Solutions Initiative

76. **Christine Gilbert**
Bridging the Gap between Science and Policy
Faculty Mentor: Hollie Smith
Department: Sustainability Solutions Initiative (SSI)

Abstract

The relationship between policymakers and Maine scientists is one filled with miscommunication, difficult jargon, and failed opportunities. The University of Maine is a central player in this relationship, being responsible for much of the science produced in Maine. To study this relationship and its disconnects, this research explores the perceptions that policymakers have of science in general, and the University of Maine specifically. Through survey analysis, researchers assess perceptions and opportunities for engagement between the University of Maine and state legislators in an attempt to support informed decision-making.

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77. **Theodore Koboski**

*The Maine Tidal Power Initiative: Lessons Learned Through Collaborative Interdisciplinary Research*

Faculty Mentor: Teresa Johnson / Jessica Jansujwicz

Department: Sustainability Solutions Initiative

*Abstract*

The Maine Tidal Power Initiative (MTPI), a team of engineers, biologists, oceanographers, and social scientists, has been working closely with developers and regulators to understand how to best move forward with the responsible development of tidal power in Cobscook Bay, Maine. Drawing on observations from fifteen semi-structured interviews with MTPI researchers and stakeholders, we examine the process of collaborative interdisciplinary research. Our research aims to understand linkages between technical research and social science necessary for informing decisions about tidal power development. We identify barriers and opportunities to using a holistic interdisciplinary approach transferable to other sustainability issues.

# Oral Presentations & Performances

## Art

### 1. **Cody James Oliver**

*Digital Dialogues: Intersection of Fine Art in Technology*

Faculty Mentor: Aaron Boothroyd

Department: Art

#### *Abstract*

This project will focus on creating a deeper understanding of fine art in relation to digital art and technology. It is intended to examine the shared creative traits between the mediums while clarifying their uses and collaborative benefits. Moreover, it will use three-dimensional modeling programs to form the foundation for a sculptural shape. The structure will then be deconstructed digitally and reconstructed with tangible materials into physical surfaces. The sculptural element produced will then act as a surface for projected imagery. The multiple interactions between technological and analog usage of materials and concept form the basis for the research.

## Biology & Ecology

### 2. **Justin D. Lewin**

*What are They Talking About: Does Peer Discussion at the Middle School Level Lead to Learning?*

Faculty Mentor: Michelle Smith

Department: Biology & Ecology

#### *Abstract*

In recent years, clickers, a technology normally associated with university classrooms, have become common in the K-12 setting. Although it makes intuitive sense that clickers would promote peer discussion at the K-12 level, few studies have examined this. Therefore, I worked with local middle school teachers to integrate clicker questions into their science classrooms, measure student performance, and record student conversations. I found that students improved their performance on clicker questions during peer discussion and I am currently coding the student conversations to determine which of 25 features are most likely to correlate with improved performance.

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3. **Minna Mathiasson**

Impact of Invasive Plant Species on Maine Native Plant-Pollinator Interactions

Faculty Mentor: Frank Drummond

Department: Biology & Ecology

Abstract

This study expands upon the competitive exclusion demonstrated by invasive plant species and its effect on the pollination of co-flowering Maine native plants. Fieldwork was conducted during the summer and data was compiled and analyzed through the fall and spring semesters. Two species of goldenrod were paired with purple loostrife and, in the late summer, aster was paired with Japanese knotweed. Initial analysis of the compiled data suggests that there is indeed overlap between the insect communities visiting the respective plant populations; secondary analysis will reveal a more in-depth reasoning behind the invasive species' influence on pollinator diversity abundance and behavior, as well as the future ecological effects on native flora.

Chemical & Biological Engineering

4. **Barbara Bemis**

Red Blood Cell Lysis using Surface Acoustic Waves

Faculty Mentor: Paul Millard

Department: Chemical & Biological Engineering

Abstract

Experiments were performed to test whether a surface acoustic wave (SAW) device could be used to lyse red blood cells (RBCs) in whole blood. SAW devices could be used in microfluidic components of blood analysis instruments, replacing chemical agents for cell lysis. A range of SAW exposure times, input power and blood hematocrit were tested. Complete lysis of whole blood was achieved within four minutes and the extent of RBC lysis scaled with SAW input power. A decrease in hematocrit resulted in an increase in the percentage of cells lysed at shorter times.

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**5. Laura Duran**

*Fast Micropyrolysis of Muconic and Formic Acid Salts*

Faculty Mentor: Adriaan van Heiningen

Department: Chemical & Biological Engineering

*Abstract*

Alternative and renewable energy sources are needed to sustain fuel consumption as fossil fuel resources decrease. Liquid fuels can be produced from lignin, a component of lignocellulosic feedstocks. Muconic acid can be derived from lignin through oxidation, and is found in black liquor- a waste product of chemical wood pulping. Pyrolysis-gas chromatography/mass spectrometry is being used to analyze products of sodium and calcium muconate and muconate/formate mixtures. Products resulting from muconate and formate decomposition are being identified to characterize biofuels produced from black liquor.

**Chemistry**

**6. Joseph Dumont**

*Extraction and Isolation of Shikimic Acid from Maine Conifers*

Faculty Mentor: Barbara Cole

Department: Chemistry

*Abstract*

Tamiflu®, the major drug used for treating influenza, is made from shikimic acid, a compound extracted from star anise, a seasonal plant in China. Production of Tamiflu® is severely limited by the availability of shikimic acid. We are isolating shikimic acid from the foliage of Maine conifer trees. Extraction and separation of shikimic acid is a three-step process with the final step, separating shikimic and quinic acids, the focus of this research. In this work, I synthesized and characterized a modified silica resin that adsorbs quinic acid, but not shikimic acid which will allow for purification of the shikimic acid.

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7. Valerie Smith

Detection of Aqueous Hg(II) with Infrared Spectroscopy

Faculty Mentor: Carl Tripp

Department: Chemistry / LASST

Abstract

Mercury has been known as an environmental pollutant for several decades. The detection and monitoring of mercury in our rivers and lakes is important for the protection of our ecological habitat and human health. Effective monitoring of our water supplies for mercury, however, is challenging because current methods are time consuming and expensive. I am developing a screening method for detecting aqueous mercury through the use of a selective reaction of Hg(II) ions on a porous membrane coupled with infrared spectroscopy (FTIR). This method addresses the challenge of developing an effective, environmentally benign, and cost-efficient approach for detecting mercury.

Civil & Environmental Engineering

8. Alex Nash

Green Composites: From Under Foot to Under Hood

Faculty Mentor: Douglas Gardner

Department: Civil & Environmental Engineering

Abstract

This research is aimed at exploring the use of carpet waste, recycled nylon66, and natural fibers for certain 'under the hood' applications. The automobile industry has shown interest in the plastics that we can create that will withstand conditions far too severe for commodity plastics. Our research data on the mechanical and thermal properties of our composites will show that these plastics are very capable of handling the conditions in the engine compartment of a motorized vehicle. Recycled nylon 66 from carpet waste offers the necessary properties for the under-the-hood application as well as helping to improve environmental conditions.

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## Earth & Climate Sciences

### 9. Jillian Pelto

*Crevasse Research in the North Cascades*

Faculty Mentor: Gordon Hamilton

Department: Earth & Climate Sciences

#### *Abstract*

Alpine glaciers worldwide are retreating as our climate warms. In the summer of 2013 I will be measuring the characteristics and distribution of crevasses on North Cascade glaciers, Washington. The goal is to observe changes of the crevasses through time as a means of monitoring glacier velocity responses to climate change. My work will build on the crevasse monitoring that I completed last. The first step is a complete analysis of the 2012 data and aerial photographs with the assistance of Professor Gordon Hamilton.

## Education & Human Development

### 10. Crystal Burns

*Racial and Religious Bias in Maine*

Faculty Mentor: John Maddaus

Department: Education & Human Development

#### *Abstract*

The intention of this course project (Urban and Rural Education EDW 472) is to learn about those who have received bias based on religious or racial background in the past and present, and in what forms in the state of Maine. Maine is increasingly becoming more diverse in population, bringing rise in those that experience bias. Through historical research, legislation, newspapers, and other publications provide documented perspectives of the experiences of bias in Maine. Personal interviews of students and faculty at the University of Maine brings the reality of the bias that is and has been experienced in Maine.

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Electrical & Computer Engineering

11. Casey M. Clark

Lunar Module Sensor Monitoring

Faculty Mentor: Ali Abedi

Department: Electrical & Computer Engineering

Abstract

Wireless, low power sensors have unlimited applications, from home power monitoring to environmental monitoring. The goal of this project is to implement a wireless sensor monitoring system inside of a NASA funded mockup lunar habitat. Sensor devices will take readings of temperature, humidity, and light within the habitat. Sensor readings will then be transmitted through radio frequencies, read by a computer program, and displayed on a webpage.

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### 12. Kyle C. Nolan

*Carbon Thin Film Materials Study*

Faculty Mentor: Rosemary Smith

Department: Electrical & Computer Engineering

*Abstract*

The project investigates the correlation between deposition and annealing parameters of ultrathin graphitic carbon films and their electrical conductivity and molecular structure. The aim has been to optimize the thin film fabrication process for films less than 20nm in thickness; and to create the most conductive and transparent films possible. Our initial results are very competitive with recent literature, and an immediate application for these films is in nanopore gene sequencing, which could prove to be a faster, cheaper method of genetic sequencing than what is commercially available today. Other applications include next generation electronic devices, solar cells, and displays.

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English, Philosophy, & Sociology

13. Ezra Juskewitch

From Mythology to Ideology: The Misappropriation of Norse Culture by Modern Hate Groups

Faculty Mentor: Sarah Harlan-Haughey

Department: English, Philosophy, Sociology

Abstract

The influence of Norse mythology stretches from Wagner's operas to modern Death Metal. This project is an investigation of the manner in which the historico-cultural products of Scandinavian cultures have been systematically, and often intentionally, misinterpreted and repurposed over time to justify violent ideologies. Aryan hate groups have used and continue to use Norse literature, music, and the iconography of Norse mythology. This project investigates this ongoing narrative of violence through a comparative study of the music and visual products of these groups over time.

Food Science & Human Nutrition

14. Emily Hinkle

Cooking and varietal effects on potato in vitro bile acid binding capability

Faculty Mentor: Mary Ellen Camire

Department: Food Science & Human Nutrition

Abstract

Potatoes have received negative press about being unhealthy, but these vegetables contain many healthful components. Many compounds in food help reduce serum cholesterol levels by binding to bile acids in the digestive tract, causing the body to draw from serum cholesterol to create new bile acids. I will compare the bile acid binding capacity of potatoes prepared three different ways and of different varieties. The desired outcome is to find which method of cooking or variety of potato promotes the most bile acid binding. These findings could help aid the Maine potato industry in promoting potatoes as a healthful food.

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## Marine Sciences

### 15. Matthew Dzaugis

*Diet and Prey Availability of Shortnose and Atlantic Sturgeon in the Penobscot River*

Faculty Mentor: Gayle Zydlewski

Department: Marine Sciences

#### *Abstract*

This study characterized sturgeon diet and prey availability in the Penobscot River from Bangor to Winterport. A ponar grab was used to collect over 90 benthic samples from May to October 2012. Samples were broadly categorized by substrate and sorted. Stomach contents were collected from eight Atlantic sturgeon and sixteen shortnose sturgeon using gastric lavage. All organisms were identified to the family level. Preliminary results indicate that spionid polychaetes were not only the most available prey in substrate samples but also in stomachs. Sturgeon capture data and side scan sonar data will be used to further examine habitat preference.

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16. Alexander J. Jensen

Assessment of Sea Lice Infestations on Wild Fishes of Cobscook Bay

Faculty Mentor: Gayle Zydlewski

Department: Marine Sciences

Abstract

Sea lice are ectoparasitic copepods on fishes and a problem for aquaculture. Little research on lice, specifically *Lepeophtheirus salmonis* and *Caligus elongatus*, has occurred in the northwest Atlantic. This project characterized infestations on wild fishes in Cobscook Bay. Multiple netting techniques, from March to November 2012, were used to collect fish. Field and microscopic examinations were used to characterize infestation prevalences, intensities, and attachment locations. DNA sequencing was used to identify lice species. Early results confirm the presence of *C. elongatus* and 12 wild host species, and no *L. salmonis*. This establishes a baseline for lice dynamics in Cobscook Bay.

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**17. Benjamin Segee**

*Desiccation Resistance in Antarctic Yeasts*

Faculty Mentor: Laurie Connell

Department: Marine Sciences

*Abstract*

This project sought to learn the levels of desiccation resistance present in various species of Antarctic yeasts. Several species of yeasts were tested by placing filters with known numbers of cells into a desiccator. After set periods of time filters were removed from the desiccator, rehydrated and viable cells were determined by counting colony-forming units (CFUs). Several species of Antarctic yeast had high viability after desiccation (90-100% survival) as opposed to controls (0% survival). This experiment will give us a better understanding of the mechanisms used by these organisms to survive in one of the harshest habitats on Earth.

**Mathematics**

**18. Stuart Lathrop**

*Contributions to the Foundation of the Theory of Transcendental Numbers*

Faculty Mentor: Chip Snyder

Department: Mathematics

*Abstract*

This research project concerns investigations into the nature of certain transcendental numbers which do not appear as the solutions to polynomial equations. Though there are, in some rigorous sense, infinitely more of these numbers than their algebraic counterparts, the explicit demonstration of even a single example of one eluded mathematicians until well into the nineteenth century. The result of this research is a thorough expository paper on the methods, techniques, and early results in the theory of transcendental numbers accessible to motivated undergraduate majors in mathematics seeking an introduction to field of study often overlooked in the standard curriculum.

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19. Brian Toner

The Use of Artificial Intelligence in Image Analysis

Faculty Mentor: Andre Khalil

Department: Mathematics

Abstract

Image analysis can be an especially difficult area of study due to the organic nature of images. Traditional methods of image isolation and detection are hampered by variations in hue and intensity. For this reason, researchers often have to resort to manually isolating and segmenting biological imaging data. Artificial intelligence is able to see past these variations, providing researchers with the ability to isolate and analyze images in bulk. MLTrainer is a software package that provides researchers with an artificial intelligence system that can be easily trained, freeing researchers to produce more results and have these results analyzed quickly.

Molecular & Biomedical Sciences

20. Gwendolyn Beacham

Genetic Characterization of Plaque Morphology in the Cluster E Phage Ukulele

Faculty Mentor: Sally Molly

Department: Molecular & Biomedical Sciences

Abstract

Ukulele, a Cluster E mycobacteriophage, produces clear plaques typical of a lytic phage; however Ukulele forms lysogens and its genome encodes an integrase indicating that it is a temperate phage. Temperate bacteriophage usually produce turbid plaques. It is not understood how Cluster E mycobacteriophage regulate their life cycle, which influences plaque morphology. Ukulele's clear plaque morphology may be due to an unstable repressor. We have identified a potential repressor gene (gp89), specific to Cluster E phages. To learn more about the function of gp89 we will create a gp89-deletion mutant and observe changes in Ukulele plaque morphology.

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## 21. Jing “Jacky” Deng

*Clinical Trial Comparing the Use of Intravenous Tranexamic Acid with Aquamantys Bipolar Sealer for Blood Loss Reduction in Primary Total Knee Arthroplasty*

Faculty Mentor: Carol Kim

Department: Molecular & Biomedical Sciences

### *Abstract*

The intention of this clinical trial is to determine if the use of intravenous (iv) tranexamic acid (TXA) or Aquamantys bipolar sealer improve the postoperative hemoglobin (Hb) and hematocrit (Ht) after primary total knee arthroplasty and what is the effect of the simultaneous use of iv TXA and Aquamantys on the postoperative Hb and Ht. The assumption is that the combination of iv TXA and Aquamantys system will enable an improvement in Hb and Ht on postoperative day 3 equal or larger than the improvement generated by the use of Aquamantys system alone. From our preliminary data of 55 patients, using Aquamantys system alone, patients loss 24.6% of their blood volume, iv TXA alone, 17.8%, both TXA and Aquamantys simultaneously, 18.1%, and placebo, 25.4%. In conclusion, the combination of iv TXA and Aquamantys had a larger improvement than Aquamantys alone.

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22. Katrina Harris

Integration sites of the mycobacteriophages ChipMunk and Ukulele

Faculty Mentor: Keith Hutchison

Department: Molecular & Biomedical Sciences

Abstract

Bacteriophages (phages) play important roles including effects on bacterial evolution and virulence. Temperate phages integrate into the host genome using an *attP* sequence in the phage genome and *attB* sequence in the bacterial genome. Putative *attP* and *attB* sites have been found in the mycobacteriophage ChipMunk, an A2 cluster phage, and its host *Mycobacterium smegmatis*. PCR primers have been designed and used to confirm the predicted sites. The integration sites of the cluster E mycobacteriophage are not known. The DNA sequence of the cluster E mycobacteriophage Ukulele has been analyzed and potential *attP* sites located.

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### **23. Erica Hidu**

*Unmasking Candidiasis: A Mechanistic Model for Innate Immune-Fungal Cell Wall Dynamics*

Faculty Mentor: Robert Wheeler

Department: Molecular & Biomedical Sciences

#### *Abstract*

*Candida albicans* is an opportunistic fungal pathogen that causes a potentially lethal systemic infection in immunocompromised patients. It has been shown that  $\beta$ -glucan, a masked component of the fungal cell wall, becomes exposed in the mouse model. Our research suggests that neutrophils can cause damage to cell wall-associated proteins and unmask  $\beta$ -glucan and that proteases could be mediating this damage. We speculate exposed  $\beta$ -glucan may elicit a greater pro-inflammatory response from innate immune cells. Our research sheds light on the interactions between the fungal cell wall and the innate immune system, which could lead to better treatments for systemic candidiasis.

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24. Emily Lovejoy

Characterization of Neuromuscular Junctions in Developing SOD1 Mutant Zebrafish

Faculty Mentor: Roger Sher

Department: Molecular & Biomedical Sciences

Abstract

Mutations in the zebrafish SOD1 gene result in neuromuscular junction defects (NMJd) similar to those seen in mammalian models of Amyotrophic Lateral Sclerosis (ALS). Previous research has established NMJd at 11 days post-fertilization. The aim of this project is to determine the earliest time-point (<11d) at which NMJd can be detected. Using antibody staining with confocal microscopy, we have determined that zebrafish at both 3 and 4 days post-fertilization do not have detectable NMJd. Once we determine a time-point baseline, we will be testing environmental neurotoxins to determine if they act synergistically with the genetic mutation in these zebrafish.

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## 25. Gabriel Vachon

*Impacts of Arsenic on Zebrafish Innate Immune System*

Faculty Mentor: Carol Kim

Department: Molecular & Biomedical Sciences

### *Abstract*

Impacts of the environmental toxicant, arsenic, on the zebrafish innate immune system were examined. Selected candidate genes from a previously completed microarray analysis were characterized and some of the physiological consequences of arsenic exposure on zebrafish were identified. Specifically, the apoptotic gene *cdkn1a*, which encodes for the protein p21, appears to be induced by arsenic. There is now evidence suggesting that *cdkn1a*/p21 interact with the protein p53, as well as the genes *cse1L* and *tfaip8*, all of which have roles in apoptosis. RNA was extracted from fish injected with morpholino oligonucleotides and from fish exposed to specific environmental conditions such as dilute butyric acid, which induces *cdkn1a* activity. These studies should provide important information about the effects of arsenic exposure on the innate immune response, cell cycle and apoptosis.

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26. Dylan Wingfield

MDA5 Signaling in SHRV Infected Zebrafish

Faculty Mentor: Carol Kim

Department: Molecular & Biomedical Sciences

Abstract

The innate immune system has the ability to respond to viral infections by recognizing viral components that distinguish self from non-self. Melanoma-differentiation-associated gene 5 (MDA5) is a cytoplasmic helicase protein that functions as a cytosolic immune receptor. Here we use a dominant negative (DN)-MDA5 strain of Zebrafish (*Danio rerio*) as a model organism to study the effects of viral stimulation in an MDA5 deficient host. MDA5 is likely to play a crucial role in the innate immune response to specific viral infections. *Snakehead rhabdovirus* (SHRV) has successfully been used to stimulate MDA5 and elicit an immune response via interferon production. We are interested in testing the specificity of these results by injecting the DN fish with MDA5 mRNA, in an attempt to rescue the MDA5 deficient strain. Preliminary results have suggested this technique may be effective. Due to the conservation among vertebrate innate immunity, these studies may provide insight into the MDA5 pathway of the human host and lead to a better understanding of the human innate immune system.

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## Music Education

### 27. Aaron Waldman

*Methods of Piano Pedagogy: Aural vs. Optic*

Faculty Mentor: Ginger Hwalek

Department: Music Education

#### *Abstract*

My research project separates students into two groups: One group learns through visual methods, the other through aural methods. Students in the former group are taught the names of the keys, the names of notes on the staff, and how to read piano music. The second groups learns through aural methods: They focus on finding pitches on the piano, and on developing a sight-singing system. Results are measured through parental reports and evaluation by the UMO piano proficiency test. The test includes sight-reading, transposition, scales, harmonization, and performance of a piece. The parental evaluation sheet addresses practice habits and student enthusiasm. Young piano teachers often have no idea where to start with beginner students. My research may offer them an alternative to traditional method books.

## Political Science

### 28. Rex McKeon

*Prospects of a Renewed US-Russian Relationship: A look at what the past has to say about the future*

Faculty Mentor: James W. Warhola

Department: Political Science

#### *Abstract*

The purpose of this study is to examine the historical relationship between the United States and Russia. I've used a compilation of all of the US Presidential State of the Union Addresses that reference Russia and the Soviet Union and matched them up with world events to try and paint a picture of the pattern of our unique affiliation. I will use this information, along with research on current events; to propose what I believe will be the next logical step in our relationship. The final product will be a comprehensive research paper and oral presentation.

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Psychology

29. Hawk Cambron

Protecting Against Chemo Fog

Faculty Mentor: Thane Fremouw

Department: Psychology

Abstract

Some patients treated with chemotherapy experience cognitive decline known as "Chemo Fog". In some cases this cognitive impairment can lead to severe impairments in daily life. Recent animal studies have shown that some chemotherapy agents cause a decline in new brain cells and also cause damage to mature myelin. Based on previous results showing that oxidative stress is likely the underlying mechanism of the damage, we hypothesize that mice treated with 5-FU (a chemotherapy agent for breast cancer) and Melatonin (a potent antioxidant) will exhibit more new brain cells and less myelin damage than mice treated with just 5-FU.

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### 30. Henry Norwood

*Social Ostracism: Effects on Nuclear Weapons Attitudes*

Faculty Mentor: Jordan LaBouff

Department: Psychology

#### *Abstract*

Researchers have found that countries who are politically isolated from other countries tend to support nuclear weapon development (Quester, 1973, Rosen, 1975, Betts, 1977). In this experiment a psychological approach will be taken to understand why individuals might encourage nuclear weapon proliferation. I will expose participants to a social isolation manipulation, the game "Cyberball," and examine the effect of this isolation on their attitudes toward nuclear weapons. Afterwards they will take several self-report surveys including a survey used to measure attitudes toward nuclear weapons. I expect to find that feelings of isolation will increase favorable attitudes toward nuclear weapons.

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31. Christopher Paradis

Text Engagement in Honors

Faculty Mentor: Jordan LaBouff

Department: Psychology

Abstract

The Honors College requires large amounts of reading outside of the classroom of around nine texts per semester, and as a great books curriculum, it is very important that we know what kind of interactions the students are having with the texts. We want to know exactly how much of the reading is being done, what leads the students to either do it, or not, as well as what teaching strategies promote/discourage students' intrinsic motivation for preparing. Finally, we wanted to understand faculty perceptions of student engagement with one another, and with the texts. We plan to show survey data of students and faculty from UMaine at two different time points. We hope that this research will lead us to find ways to increase intrinsic motivation and increase engagement in the Honors College.

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### **32. Andrew Tomer**

*Attitudes and Beliefs About Modern Native Americans*

Faculty Mentor: Jordan Labouff

Department: Psychology

#### *Abstract*

Depictions of Native American culture can sometimes present information that may only reinforce stereotypes surrounding Native groups, excluding an accurate representation of this group. This study examines how media, educational experience, and intergroup-interactions influence attitudes and beliefs toward current Native American groups. 120 participants from the University of Maine will be randomly assigned to experience different kinds of information about Native American culture through stereotype-consistent media, and stereotype-inconsistent media; effects of these media messages will be examined. It is hypothesized that with more exposure to stereotype-inconsistent media, education, and positive intergroup-interactions, participants will have positive attitudes toward Native American groups.

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