OLD DOMINION
UNIVERSITY

IDEA FUSION

GRADUATE SCHOOL

GRADUATE RESEARCH ACHIEVEMENT DAY 2017

THURSDAY,
MARCH 23, 2017

9:00 A.M. - 11:30 A.M.
ORAL PRESENTATIONS
RIVER ROOMS

12:00 P.M. - 2:00 P.M.
POSTER PRESENTATIONS
NORTH MALL

OLD DOMINION
UNIVERSITY
IDEA FUSION

March 23, 2017

Dear Colleagues,

Welcome to the 2017 Annual Graduate Research Achievement Day. I am delighted that the Graduate School is once again hosting this event, which honors and celebrates the excellent research of our graduate students.

Graduate education is being recognized increasingly in the Commonwealth, across the nation, and around the world as a vital means of addressing many of society's complex challenges. Our graduate students, with the assistance of their advisors and other faculty, bring their interests, creativity, and hard work to bear on complex questions within and across a broad spectrum of disciplines. The high level of work that they produce underscores the quality of graduate education here at Old Dominion University.

Today, you will have the opportunity to hear our graduate students' presentations and to see their posters, which together deal with a wide range of research topics both within and across disciplines. I hope you enjoy your interactions with our graduate students. They contribute significantly to the teaching, research, and service mission of Old Dominion University, and I have no doubt you will be hearing more about them in the years to come.

Again, welcome and thank you for attending.

Sincerely,

Augustine O. Agho, Ph.D.
Provost and Vice President for Academic Affairs

Office of the Provost and Vice President for Academic Affairs
2022 Koch Hall, Norfolk, VA 23529-0011 • Phone: 757/683-3079 • Fax: 757/683-6888 • www.odu.edu/acadaffairs

OLD DOMINION UNIVERSITY

IDEA FUSION

March 23, 2017

Dear Colleagues:

Welcome to the 2017 Annual Graduate Research Achievement Day (GRAD) co-sponsored by the Graduate School and the Graduate Student Organization!

Today's event brings together more than eighty of the University's best and brightest graduate students to share their research-in-progress. The numerous topics covered in both the morning presentations and afternoon poster session address many of the world's most significant social, economic, and technological challenges, while offering an excellent view into current multi- and inter- disciplinary scholarship. As such, GRAD demonstrates the high quality of the University's master's and doctoral programs.

I commend all of today's participants for taking the time to prepare their presentations or posters, as well as their faculty advisors for their expert mentoring. You will enjoy interacting with these outstanding students. The problems they are researching today will lead to solutions tomorrow.

Again, welcome and thank you for attending GRAD 2017!

Sincerely,

Robert Wojtowicz, Dean
The Graduate School

The Graduate School
2019 Koch Hall, Norfolk, VA 23529
Phone: 757/683-4885 · Fax: 757/683-5499 · www.odu.edu/graduateschool

COLLEGE COLOR KEY

BATTEN COLLEGE OF ENGINEERING & TECHNOLOGY	BLUE
COLLEGE OF ARTS AND LETTERS	RED
COLLEGE OF HEALTH SCIENCES	GREY
COLLEGE OF SCIENCES	ORANGE
DARDEN COLLEGE OF EDUCATION	PURPLE
STROME COLLEGE OF BUSINESS	GREEN

Participants' name badges are color coded for the colleges they represent.

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OLD DOMINION
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Graduate Research Achievement Day

Oral Presentations

9:00 a.m. - 11:30 a.m.

River Rooms

Webb Center

Session 1: 9:00 a.m. - 10:00 a.m.

Session 2: 10:30 a.m. - 11:30 a.m.

Batten College of Engineering & Technology

Oral Presentations

Title of Presentation: Deep Recurrent Learning for Feature Extraction and Object Recognition

Presented By: *Mahbubul Alam*

Degree/Program: Ph.D. - Engineering - Electrical & Computer Engineering

Abstract: Deep neural networks (DNNs) have shown paramount success for solving complex computer vision tasks such as object recognition. The high level of accuracy is due to the DNNs inherent efficient feature extraction capability. However, conventional feed-forward based DNNs can get hefty and computationally intensive with increasing complexity of the task. Consequently, this work attempts to introduce an efficient feature extraction technique using a simultaneous recurrent network (SRN) architecture. Moreover, our proposed model effectively performs dimensionality reduction of input feature space which is otherwise useful for distance based classification techniques such as metric learning. Metric learning has been successful in distance based classification tasks. However, metric learning tends to become increasingly complex with the increase of input feature dimensionality. Therefore, application of our proposed deep SRN based efficient feature extraction and dimensionality reduction technique prior to metric learning is pursued in this work. The proposed deep SRN architecture with metric learning is tested in solving two complex classification tasks: facial expression and character recognition. Our results show that the proposed SRN feature extraction and metric learning classification pipeline achieves superior performance in comparison to a DNN-based feature reduction and metric learning pipeline. We also demonstrate that the proposed SRN manages to utilize far less trainable parameters than the comparable DNN model such as stacked autoencoders (SAEs) for the same set of tasks.

Title of Presentation: Virtual Substrates for Low-Cost High Efficiency III-V Photovoltaics

Presented By: *Sean Babcock*

Degree/Program: M.S. - Engineering - Electrical & Computer Engineering

Abstract: The use of the low-cost thin-film vapor-liquid-solid (TF-VLS) method in the manufacturing of III-V solar cell substrates has the potential to provide a lightweight, flexible, and cheaper alternative to traditional III-V substrates typical of state-of-the-art power generation technology. The TF-VLS process has recently been shown to produce high optoelectronic quality polycrystalline InP on lightweight flexible metal foils. In this work, the novel TF-VLS method is employed to grow InP and InAs using following the structures: Mo(foil)/InP, Si(wafer)/Mo/InP, and Mo(foil)/InAs. As a result of InP trials, XRD measurements have identified the presence of polycrystalline InP peaks and the absence of In peaks, signifying full conversion from In to InP for both Mo(foil) and Si(wafer)/Mo(sputtered) substrates. Photoluminescence measurements showed that both samples emit near single crystal InP bandedge of 1.34 eV with FWHM values in close agreement with each other. The TF-VLS method was expanded to InAs with initial trials indicating polycrystalline InAs XRD peaks and the absence of In peaks indicating full conversion from In to InAs.

Batten College of Engineering & Technology

Oral Presentations

Title of Presentation: Design of a High-Efficient Boost-Cascaded Buck Boost DC-DC Power Converter for Solar Power Integration

Presented By: *Yashwanth Bezawada*

Degree/Program: M.S. - Engineering - Electrical & Computer Engineering

Abstract: This research focuses on the design of a boost cascaded buck-boost (BoCBB) power converter with super high efficiency in energy and electric power conversion. The BoCBB power converter is based on emerging silicon-carbide (SiC) MOSFETs and schottky diodes, which has only 1/6 times the power loss of traditional silicon power semiconductor devices. The BoCBB power converter can be widely applied in solar harvesting for NASA, military base, and electric utility, as well as high-power dc motor drives in electric vehicles, robotics, and manufacturing and product lines. In this research, we analyzed the topology of the BoCBB power converter. The energy efficiency of the SiC-based BoCBB power converter was calculated under various switching frequencies and tested by a simulation study of solar power integration in a 400-Vdc distribution microgrid in Matlab/Simulink environmen. We found that a design of 50-kHz in switching frequency is optimal in overall system performance. This conclusion was further verified by experiment tests. We designed the printed circuit board of a 3-kW BoCBB prototype and established a hardware test-bed in the Power Research Lab of the ECE department at ODU. The experiment tests demonstrated a high energy efficiency above 97%.

Title of Presentation: Molecular Simulations of Lipid Bilayers in Electric Fields - The Model Matters!

Presented By: *Federica Castellani*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: Molecular dynamics simulations of lipid membranes have been widely used to better understand phenomena at the atomic and molecular level that cannot be observed with conventional experimental methods. With the tools of molecular dynamics, electric-field-induced pore formation in lipid bilayers can be studied and analyzed under a wide range of conditions. An additional defining characteristic of molecular dynamics simulations, often hidden or taken for granted, is the force field. In molecular dynamics, the force field is the set of functions and parameters that combine to express the potential energy of a system of particles. In this work, we compare systems based on GROMOS-OPLS and CHARMM36, two of the most widely used force fields over the past decade. To anticipate the importance of the force field in determining specific values for lipid electropore creation and annihilation and pore transport properties, we look at effects on area per lipid and pore initiation time. Although it is known that area per lipid depends on the force field used, no one has previously compared lipid electropore initiation times with different force fields. All systems contain 128 lipids 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphatidylcholine (POPC) and approximately 12,000 water molecules. Three bilayer systems were studied: one containing only POPC and water and two containing also chloride ions and either potassium ions or calcium ions. All systems were equilibrated for a constant area per lipid. Systems with ions were not considered equilibrated until the number of ions bound to POPC head groups reached a steady value. Electric fields of different amplitudes were applied along the axis normal to the bilayer plane to determine pore initiation time.

Batten College of Engineering & Technology

Oral Presentations

Title of Presentation: CSRN Neural Networks for Spatial Spectrum Prediction for Radio

Presented By: *Alexander Glandon*

Degree/Program: M.S. - Engineering - Electrical & Computer Engineering

Abstract: Machine learning tools such as artificial neural networks are used in the ODU Computer Vision Lab for image analysis. As images are 2D objects, and 2D spatial spectrum prediction is a relevant problem for radio networks, these tools were modified for this related task. the specific model applied is Cellular Simultaneous Recurrent Neural Network (CSRN) and it is shown as a useful prediction tool. This project is in collaboration with the ODU Cybersecurity, Communications, and Networking Innovation Lab.

Title of Presentation: Effects of Platelets Addition on the Microstructure and Uniaxial Compressive Response of Ice-Templated Porous Alumina

Presented By: *Banda Mahesh*

Degree/Program: Ph.D. - Engineering - Mechanical Engineering

Abstract: Bioinspired hierarchical porous ceramics are a new class of materials that have found potential applications in structural to energy storage. Processing of such hierarchical materials is of significant challenge, however, ice-templating is one potential technique that relies on the principles of unidirectional solidification of particulate suspensions. In spite of the significant developments on the process-microstructure correlations, very little is known about the structure-property relationships and the role of different length-scale components on the mechanical properties. In this presentation, we will show that grain-level anisotropy is an attractive approach to significantly improve the uniaxial compressive response of the freeze-cast ceramics, however, without modifying the porosity and overall material composition. To this end, a custom-made device is employed to develop a series of ice-templated cellular ceramics where the particle morphology and freezing kinetics are systematically varied to modify the lamella thickness, wavelength (interlamellae spacing), bridge density and grain-level morphology to understand the influence of those parameters on the stiffness, compressive strength, and energy absorption characteristics. Overall, this is a potential study to advance bioinspired materials design to develop mechanically robust cellular ceramics.

Batten College of Engineering & Technology

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Title of Presentation: Inertization, Utilization, and Safe Disposal of Incineration Residues

Presented By: *Anil Mehrotra*

Degree/Program: D. Eng. - Doctor of Engineering

Abstract: Combustion of conventional fuels as well as biofuels for thermal conversion to produce energy causes air pollution and also produces solid residues which contain concentrated levels of toxic elements. Toxic characteristics of residues generated from combustion of Municipal Solid Waste (MSW) in waste-to-energy plants are strictly controlled by Federal and State Waste Management Regulations before their disposal. According to Resource Conservation and Recovery Act (RCRA), solid waste may be considered hazardous if the waste leaches excessive heavy metals when tested with the Toxic Characteristics Leaching Procedure (TCLP) as per EPA Method 1311. Several agencies and businesses have conducted research and have developed methods to control leaching of heavy metals from combined ash (CA) generated from the MSW combustion process. Experiments with various treatment chemicals as primary independent variable had been conducted by several agencies and facilities. After carefully examining available techniques, the author has successfully demonstrated two cost-effective solutions of effectively stabilizing MSW residue combined ash (CA) to cover the gap between the leachability concentrations of toxic elements observed in residues from thermal conversion processes of municipal solid waste and the leachability toxicity limits as per EPA's regulatory threshold: (a) treating MSW residue fly ash (FA) with 2% dolomitic lime by weight of fly ash, or (b) treating the ash by injecting aqueous sodium sulfide 39% at rates of 12.5 gal/day, which is approximately 0.5% by weight of fly ash. The extensive experimental study carried out at the 240 t/day capacity Hampton/NASA waste-to-energy mass burn municipal solid waste incinerator has showed savings to the extent of $150,000 per year by use of the alternative (b) technology of treating the plant's combustion residues with aqueous sodium sulfide in place of the usage of dolomite technique (a) for ash treatment. the paper has also explored the best management practices for use and disposal of such wastes.

Batten College of Engineering & Technology

Oral Presentations

Title of Presentation: Physiology Informed Virtual Surgical Planning: a Case Study with a Virtual Airway Surgical Planner and BioGears

Presented By: *Lucas Potter*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: Stenosis of the upper airway affects approximately 1 in 200,000 adults per year, and occurs in neonates as well. Its treatment is often dictated by institutional factors, namely the clinician's experience or preference. Virtual Pediatric Airway Workbench (VPAW) is a surgical planner for upper airway stenosis. It incorporates CFD simulation and geometric authoring with objective metrics from both that help in informed evaluation and planning. However, this planner currently lacks physiological information which could impact the surgical planning outcomes. In this work we integrate a lumped parameter, model based physiological engine called BioGears with VPAW. It additionally offers some demonstrations of BioGears' functionality, and elucidates the uses of using patient-specific, systemic modeling software for clinical use.

Title of Presentation: A Bioprinting Method to Direct Branching Morphogenesis of Human Mammary Epithelial Cells in a 3D Hydrogel

Presented By: *John Reid*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: Here we provide a detailed account of the design and fabrication of a microextrusion based bioprinting platform capable of high-throughput, high resolution bioprinting. This investigation details how to use precision bioprinting techniques to successfully direct the branching morphogenesis of human mammary epithelial cells cultured in a 3D hydrogel. Printing process parameters were optimized to provide a robust method for the spatial control of deposited cellular aggregates ranging from 1 to 100 cells. Experimental results provided the minimum number of cells per aggregate to achieve organoid formation via 'self-organization'. Printing aggregates under these conditions enabled us to accurately predict the future structures generated by arrays of printed cells.

Batten College of Engineering & Technology

Oral Presentations

Title of Presentation: Initial in vitro Assessment of Sub-Cellular Effects of Nanosecond Pulsed Electric Fields in an HPV-Positive Cervical Carcinoma

Presented By: *Hollie Ryan*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: Millisecond or microsecond pulsed electric fields (PEFs) have been shown to aid in the delivery of drugs and genes into cells with limited thermal effects by inducing a temporary electric potential difference of approximately 200 mV across the cell membrane. Nanosecond pulsed electric fields (nsPEFs), by comparison, have high voltage electric field intensity (kV/cm) and high power (MW) capacity, and have shown some advantages over millisecond or microsecond PEFs. These ultra-short pulses can achieve similar membrane potentials with higher voltage differentials, lower energy and negligible thermal effects. They also generate pores in cell membranes smaller than those induced by traditional PEFs, making membrane transport more selective. While nsPEFs have been broadly studied for applications in tumor ablation, as a complement to wound treatment, and for viral gene transfer, there is a general lack of published research on the effects of nsPEF interaction with viruses pre- or post-infection. In this preliminary study, select exposure conditions for a 60 ns pulser were tested on cervical cancer cell line CaSki, which contains the complete viral genome of the human papillomavirus type 16 (HPV-16), to assess viability and expression of viral pre-cancer genes E6 and E7. Results from this study will be presented, as well as recommendations for further research. This is one of multiple studies being conducted by ODU Biomedical Engineering students at the Frank Reidy Research Center for Biolectrics, a collaborative body of researchers leading global efforts to investigate promising medical applications of electromagnetics.

College of Arts & Letters

Oral Presentations

Title of Presentation: Reaching Beyond the Ivory Tower: Writers in the Community

Presented By: *Amanda Gomez*

Degree/Program: M.F.A. - Creative Writing

Abstract: From its conception, Old Dominion's Writers in the Community organization has reached beyond the University and into the Hampton Roads Area. In the past year Writers in the Community has conducted workshops with various schools such as Park Place, Granby High, Crossroads and Norfolk Collegiate. In addition to collaborating with teachers, the Writers in the Community has also coordinated events with community organizations such as REACH, ForKids, Flourish and the Norfolk Jail's Humanities Behind Bars. The Writers in the Community Coordinator will discuss the challenges, successes, and processes of reaching out to our Hampton Roads Community, and how other graduate programs can implement our findings.

Title of Presentation: Creating a Local Placement Exam at a Community College

Presented By: *Nicole Hancock*

Degree/Program: Ph.D. - English

Abstract: Many community college students are under-prepared and must be placed into developmental courses before they can take classes for college credit. The concerns of the administration-- cost and efficiency-- should not overshadow the concerns of students and faculty regarding placement. Faculty at the community college being studied have created a new placement exam that asks questions pertaining to all of the English course's objectives, whereas the national test that is currently en vogue assesses surface level concerns. Aptitude tests do not merely measure a student's ability, they also send messages to students about what is valued by the institution. In (Re)Articulating Writing Assessment for Teaching and Learning, Brian Huot writes, "Instead of attempting to honor disparate claims of unequal influences, we need to build writing assessment practices that have a firm content-area theoretical basis and the potential to enhance teaching and learning" (54-55). TYCA's Assessment White Paper recommends that all reforms should "be grounded in disciplinary knowledge" and "be assessed and validated locally" (21). The new test is an attempt to do both. A faculty member has developed an exam called RADE: Rhetorical Analysis Diagnostic Exam. Its goal is to assess student ability to recognize rhetorical strategies. The course objectives for writing at this institution emphasize the five canons of rhetoric, and error is only a very small part of the overall objectives. The exam attempts to right what the faculty members have seen as a wrong: stop the placement of students based on one type of skill, and instead place them based on their ability to analyze pieces of writing similar to what they will have to write in class and analyze them for higher order concerns, not local, sentence-level skills.

College of Arts & Letters

Oral Presentations

Title of Presentation: Are Internet Memes the Scourge of Society? The Role that Internet Memes Play in Social and Political Change

Presented By: *Jeannine Owens*

Degree/Program: M.A. - Humanities

Abstract: An average of 84% of Americans consume online media every day and Facebook is emerging as the most used and influential platform. Facebook alone boasts over 1.01 billion daily active users worldwide and 30 billion pieces of content shared each month (Smith). While print and broadcast media have traditionally reflected a top-down model of communication, the Internet and social media's affective functions have become a venue for the masses and organic experts (Gramsci) to voice their viewpoints and shape social discourse. This mode of discourse has engaged the masses like never before and proven to mark a paradigmatic shift in the way we communicate, drive, and shape society. As the normative sphere of social discourse, user-generated content and the Internet meme have become dominant persuasive elements, because of their transmission of cultural and emotional information (Shifman). Social networks act as conduits for memetic success, where each interaction represents a personal connection (Maree) and widens its circle of affect (Ryan), influencing off-line discourse and action as well. Within this context, I will analyze environmental elements leading to memetic successes in meme campaigns such as Black Lives Matter, the rise of Donald Trump, and the recent Women's Rights Movement, as well as on and offline actions taken as a result. In tracing the cause and effect of these meme campaigns, this paper presents evidence that use of the Internet meme can result in specific social and political change (King) and that this new paradigm of social discourse and influence continues to fundamentally reshape social and political change, with transnational implications.

College of Health Sciences

Oral Presentations

Title of Presentation: Predictors of Hospitalization Cost in Infants with Hypoglycemia

Presented By: *Brook Alemu*

Degree/Program: Ph.D. - Health Services Research

Abstract: Background. This study sought to determine the overall hospital cost estimates in neonates with hypoglycemia, compare hospital cost in premature and non-premature neonates, and identify predictors of increased hospital cost. Methods. The study used the 2012 Kids' Inpatient Database. Groups were compared the $\chi 2$ test. Odds ratios (OR) for increased hospital cost estimates were determined by using bivariate and multivariate logistic regression. Results. In 2012 total hospital cost associated with hospital births were 7692 M$. Hospital cost in neonates with hypoglycemia represents 11% of this total and 1.5% of total discharges. The median (interquartile range) cost estimate in premature and non-premature neonates were $12,755 ($4,550-$30,339) and $2,360 ($1,153-$3,736), respectively. Increased cost was observed, when more than five procedures was performed during the same hospitalization (OR 10.13, 95 % CI 8.67-11.83, P < 0.0001), when hospital bed size was between100 and 300 (OR 1.37, 95 % CI 1.16-1.61, P =0.0002) or ≥ 400 (OR 1.65, 95 % CI 1.41-1.92, P < 0.0001), when hospital length of stay exceeded 15 days (OR 44.97, 95 % CI 41.49-48.73, P < 0.0001), in teaching hospitals (OR 1.97, 95 % CI 1.82-2.13, P < 0.0001), in the presence of chronic conditions (OR 2.46, 95 % CI 2.27-2.66, P < 0.0001), comorbidities (OR 2.11, 95 % CI 1.90-2.35, P < 0.0001), prematurity (OR 2.39, 95 % CI 2.20-2.60, P < 0.0001), and death (OR 2.95, 95 % CI 2.13-4.09, P < 0.0001). Conclusion. Neonates with hypoglycemia consumed 11% of resources associated with hospital births while accounting for only 1.5 % of hospitalization. This study identified factors associated with increased cost of premature and non-premature neonates with hypocalcemia.

Title of Presentation: Clinical Postural Control Measures Do Not Show Deficits in Postural Control in Individuals with a History of a Concussion

Presented By: *Nicole Curry*

Degree/Program: M.S.A.T. - Athletic Training

Abstract: Context: Concussions are common injuries that result in health-related quality of life (HRQL), neurocognitive and postural control deficits. Recent investigations have determined that individuals with a history of concussion (HxC) increase their risk of lower extremity injuries. Objective: To determine if physically active adults with a HxC exhibit postural control or HRQL deficits compared to individuals with no history of concussion (NHxC). Design: Secondary data analysis. Setting: Laboratory. Participants: Fifty-one physically active adults reported a HxC (age: 20.12±1.38 years, height:167.69±11.41cm, mass: 65.25±14.09 kg) while 121 physically active adults reported NHxC (age: 20.49±2.57 years, height: 167.13±14.77 cm, weight: 68.06±15.84 kg). All participants were free from current injury or a history of surgery. Interventions: Subjects completed an injury history form, the Disablement in the Physically Active Scale (DPA), and a series of clinical postural control assessments during a single session. Participants completed the modified Balance Error Scoring System (mBESS) and the anterior reach of the Y-Balance Test (YBT) barefoot on both limbs. Reach distances for the YBT were normalized to leg length and averaged for each participant. Main Outcome Measure: The independent variable was group (HxC,NHxC) and dependent variables were mBESS firm, mBESS Foam, YBT, and DPA. Average scores for each limb were pooled for the YBT, mBESS firm, and mBESS foam. Separate Mann-Whitney U tests examined group differences for each dependent variable. Alpha was set at $p \leq 0.05$. Results: No significant differences between groups for YBT (HxC: 62.20±6.56%, NHxC: 61.07±6.48%, Z=-1.43, p=0.15), mBESS firm (HxC:2.27±1.85,NHxC:2.63±1.90,Z=1.21,p=0.23), mBESS foam (HxC:6.80±1.98,NHxC:6.80±1.77,Z=-0.086, p=0.93), and DPA total scores (HxC:9.71±10.57, NHxC:8.05±9.29, Z=-1.15, p=0.15). Conclusion: HxC did not exhibit deficits on the YBT, mBESS firm, mBESS foam, or the DPA total compared to NHxC. Future research should investigate these variables prospectively when examining return to activity following concussion and subsequent risk of lower extremity injury.

College of Health Sciences

Oral Presentations

Title of Presentation: Student Perceptions of Standardized Patient Use in Athletic Training Education

Presented By: *Allison Gardiner*

Degree/Program: M.S.A.T. - Athletic Training

Abstract: Context: Though commonplace in medical education, only recently have standardized patients (SPs) been introduced into athletic training (AT) curricula. Limited research exists on student perceptions of SPs within AT education. Objective: To explore AT students' perceptions of SP experiences. Design: Consensual qualitative research (CQR). Setting: Individual phone interviews. Patients or Other Participants: Nine AT students (7 professional baccalaureate, 2 professional post-baccalaureate; 8 females, 1 male; 23.89 + 3.33 years of age) in the final semester of an AT program. Main Outcome Measure(s): Semistructured interviews were recorded, transcribed, and analyzed using CQR. To ensure trustworthiness, we used member checks and multiple analyst triangulation. Results: Two themes were identified: 1) encounter characteristics and 2) perceived value. Participants described typical SP encounter characteristics, including the environment where they occurred, and the format and content of the encounter. SPs were utilized to provide exposure to orthopedic evaluation, general medical conditions, and emergency situations. Students felt SPs were valuable for improving both clinical and professional skills. Most participants felt the encounters were authentic and that they were able to transfer skills learned into their clinical practice. Students expressed a desire to have more SP encounters throughout their curriculum to increase preparedness for clinical practice. Challenges associated with SP experiences included difficulty interacting with peers in group encounters and limitations in the accuracy of the portrayals. Overall, participants perceived the encounters to be positive and worthwhile. Conclusions: Programs should ensure that SP experiences are authentic, applicable, and emphasize the development of professional skills. Based on the demonstrated benefits of SP encounters for students, AT faculty should consider exploring ways to incorporate SPs into their curricula. Key Words: clinical education, simulated patients..

Title of Presentation: Difference in Ankle Function in Post-ACL Reconstruction Subjects

Presented By: *Claire Pointer*

Degree/Program: M.S.A.T. - Athletic Training

Abstract: Study Design: Cross-sectional. Objectives: to examine differences in ankle function between limbs in individuals with a history of ACL reconstruction (ACLR). Background: Anterior cruciate ligament injury is a debilitating lower extremity injury. Most individuals undergo ACLR to restore joint function. Rehabilitation protocols for post-ACLR patients are extensive and focus on restoration of knee range of motion, strength, balance and proprioception. These protocols often emphasize impairments and limitations specific to the knee and do not directly assess other regions of the lower extremity, particularly the ankle. Proper ankle function is an important factor in overall lower limb function and warrants further investigation in the post-ACLR population. Methods and Measures: a total of 11 physically active individuals (age:23.27Â±4.47, height:166.01Â±10.48cms, weight:72.24Â±15.28kgs) with a history of unilateral ACLR reported to the laboratory for one testing session. Self-reported ankle function was assessed via the Quick Foot and Ankle Ability Measure (Quick-FAAM). Ankle dorsiflexion range of motion (DROM) was measured by the weight bearing lunge test, and isokinetic plantarflexion and dorsiflexion strength was assessed with the isokinetic dynamometer. Light touch detection thresholds for the first-metatarsal and medial-malleolus were determined using Semmes-Weinstein Monofilaments. Median (interquartile range) are presented, differences between the uninjured (UN) and post-ACLR (INJ) limbs were examined with separate Wilcoxon signed-rank tests. Results: There were significant differences between the UN (100.00(0.00)) and INJ (91.66(16.67)) limb on the Quick-FAAM (p=0.037). No significant differences were observed between limbs for DROM (p=.859), dorsiflexion (p=.959) or plantarflexion (p=.859) isokinetic strength measures, nor light touch detection thresholds at either the first metatarsal (p=.720) or medial malleolus (p=0.237). Conclusion: Post-ACLR participants self-reported decreased ankle function in the INJ limb compared to the UN limb. No other differences in ankle function outcomes were identified. Clinicians should continue to evaluate ankle function during ACL rehabilitation and modified protocols as needed.

College of Health Sciences

Oral Presentations

Title of Presentation: Improvements in Y Balance Test Scores Following a Competitive Field Hockey Season

Presented By: *Lauren Welsch*

Degree/Program: Ph.D. - Health Services Research

Abstract: Context: the Y Balance Test (YBT) is a dynamic balance assessment which has demonstrated excellent inter and intra reliability. Because musculoskeletal injury risk screens are often performed prior to a competitive season, it is important to understand the effects of time and physical activity on performance. Objective: to determine the effects of an athletic season on YBT performance. Design: Pretest-posttest. Participants: Sixteen healthy women's field hockey players(age=19.38±1.31years; height: 154.78±138.07 cm; mass: 58.84±16.56 kg). for inclusion, subjects had to be injury free throughout the study period. Interventions: Subjects completed two data collection sessions (preseason and postseason). Between sessions, participants completed a competitive field hockey season. During each session, participants completed the YBT on each limb. Reach distances were averaged and normalized to leg length (%). Main Outcome Measures: the independent variable was time (preseason and postseason) and the dependent variables were YBT reach distances (anterior, posteromedial, posterolateral). Differences between preseason and postseason reach distances were examined using paired t-tests and Hedge's g effect sizes (ES). Alpha was set at $p \leq 0.05$ for all analyses. Results: Right and left measurements were pooled for analysis. There was no significant differences between preseason and postseason reach distances in the anterior (preseason: 63.14±3.81%, postseason: 62.86±4.34%, $t(15)=0.47$, ES=0.07, $p=0.64$), posteromedial (preseason: 102.00±8.16%, postseason: 102.96±8.11%, $t(15)=-0.52$, ES=-0.12 $p=0.61$) or posterolateral (preseason: 99.23±8.29%, postseason: 100.89±8.85%, $t(15)=-1.14$, ES=-0.19, $p=0.27$) reach directions. Conclusion: No significant changes in YBT reach distances were identified following a competitive field hockey season. Because YBT scores remain stable overtime and following training, these findings support the use of the YBT as a preseason screening measure that does not need to be repeated over the course of a season.

College of Sciences

Oral Presentations

Title of Presentation: Parallel Algorithms for Efficient Simulation of Electron Beam Dynamics on Heterogeneous Architectures

Presented By: *Kamesh Arumugam*

Degree/Program: Ph.D. - Computer Science

Abstract: Parallel computing architectures like GPUs and Xeon Phi have traditionally been used to accelerate applications with dense and highly-structured workloads; however, many important applications in scientific computing domain are unstructured and dynamic in nature, making their effective parallel implementation a daunting task. Moreover, these applications exhibit control-flow and memory access patterns that are not readily amenable to parallel architectures. Applications with these properties are said to be irregular, and pose problems for high performance parallel implementations, where equal distribution of work over processors and locality of reference are required within each processor. Numerical simulation of beam dynamics is one such irregular application where accurate simulation of collective effects in electron beam is one of the most challenging and computationally intractable problems in accelerator physics. Serial, or even naïvely parallel implementation of beam dynamics simulation is heavily data-intensive, and exhibits significant branch and memory divergence on GPUs which leads to severe performance bottlenecks. In this study, we use predictive analytics and forecasting techniques to minimize the branch and memory-access divergence in the parallel implementation of collective effects on GPUs. Furthermore, we analyze the possibility of maximizing the resource utilization while simulating the beam dynamics in heterogeneous systems, in particular, when using more than one kind of processor or co-processor. Besides designing high-performance, high-fidelity implementation for the aforementioned problem, our research efforts are oriented to abstract the problem solving approach where we explore the use of machine learning algorithms to develop prediction models that can forecast the control-flow and memory access patterns in other irregular applications. Such forecast aids in improving the applications performance on heterogeneous systems.

Title of Presentation: Linking Earth Observations and Models to Societal Information Needs: the Case of Coastal Flooding

Presented By: *Brett Buzzanga*

Degree/Program: M.S. - Ocean & Earth Sciences

Abstract: Coastal flooding is expected to increase due to sea level rise (SLR). Many societal applications such as land use planning depend on information on how the flooding spectrum may change as a result of SLR. A conceptual model is needed that identifies key stakeholders and information needs. In the context of the development of the Global Earth Observation System of Systems (GEOSS), the Socio-Economic and Environmental Information Needs Knowledge Base (SEE-IN KB) is developed as part of the GEOSS Knowledge Base. A core function of the SEE-IN KB is to facilitate the linkage of societal information needs to observations, models, information and knowledge. Comprehensive information concerning the interconnections between instances of these objects is used to establish a conceptual model as a network of networks. The captured connectivity can be used in searches to allow users to serve their information needs, and providers to search for users and applications benefiting from their products. It also allows to answer "what if" questions and supports knowledge creation. We have used the SEE-IN KB to develop a conceptual model capturing the stakeholders in coastal flooding and their information needs, and to link these elements to applications and processes. We show how the knowledge base facilitates the transition of scientific data to useable information by connecting individuals such as city managers and planners to flood maps and return probabilities. Within the knowledge base, these same users can request needed data that improve their ability to make such decisions as infrastructure development. These needs are linked to entities with the capabilities to meet them, effectively creating a bi-directional channel between science and society.

College of Sciences

Oral Presentations

Title of Presentation: Discovery and Characterization of Bacteriophages against Mycobacterium Marinum

Presented By: *Janis Doss*

Degree/Program: Ph.D. - Biomedical Sciences

Abstract: Bacteriophages are viruses that infect bacteria, either killing them immediately or remaining hidden on their chromosomes. Bacteriophages were discovered approximately a hundred years ago. They are now being used for a wide variety of applications, including disinfecting surfaces and food, investigating genetics and evolution, and many different molecular biology tools. One of the most interesting uses for bacteriophages is as an antibacterial therapy for humans and animals. My research involves discovering and characterizing bacteriophages that will infect Mycobacterium marinum, the causative agent of fish tuberculosis. This bacterium causes skin lesions in fish that progress to systemic infection and then death. Finding bacteriophages that infect this pathogen would provide a safe, effective, and inexpensive treatment for aquaria and fisheries. However, isolating bacteriophages for M. marinum is not as easy as it is for many bacterial species, even some very closely related ones. Traditional bacteriophage isolation techniques do not appear to be effective for M. marinum phages. The reasons for this remain unclear. Using a directed evolution technique, I am co-culturing M. marinum and M. smegmatis with M. smegmatis bacteriophages in an attempt to select for bacteriophages that can also infect M. marinum. Preliminary results have been promising; however, the ability of the isolated bacteriophages to infect M. marinum has been inconsistent. I will continue to try to expand the host range of M. smegmatis bacteriophages while also investigating the genetics of mycobacteria using bioinformatics techniques in order to more fully understand the interaction between mycobacteria and bacteriophages.

Title of Presentation: Bringing Feasibility to the Vehicular Cloud

Presented By: *Ryan Florin*

Degree/Program: Ph.D. - Computer Science

Abstract: In recent years, researchers have dreamed up the concept of Vehicular Cloud (VC) computing. In part, inspired by the success of conventional cloud computing and in part realizing the underutilized storage, processing, and sensing capabilities of vehicles on the roads, they combined the two ideas to form the concept of VCs. In VCs, the vehicles on the road share their resources much like that of servers in the conventional cloud. The most obvious difference between the two is that vehicles are mobile. In conventional clouds, servers leave the cloud only when they unexpectedly crash or when shut down for maintenance. In VCs, vehicles leave the cloud when they are no longer within range of the network. The original intention of VCs was not to use them as if they were conventional clouds on wheels; instead, it was to utilize the resources in a way that benefits from sharing with other vehicles on the road. Vehicles are unique in that they have plenty of power, storage, processing ability, and an array of sensing equipment. They are additionally unique in that they have some communication abilities, although much more limited than that of the conventional cloud. It is unfortunate that there is a good deal of recent research with impractical assumptions that are not being properly addressed by the community. It is the aim of our research to realign the VC community with a realistic vision for the future.

College of Sciences

Oral Presentations

Title of Presentation: Inlet Width Change Trends from 1999 to 2014 - Virginia Barrier Island Inlets, VA

Presented By: *James Haluska*

Degree/Program: Ph.D. - Oceanography

Abstract: Inlet width changes for ten inlets along the Virginia portion of the Delmarva Peninsula were measured from LANDSAT 7 and 8 images. The period of study was from 1999 to 2014. To determine common factors for the inlet changes, inlet measurements were combined and principal component analysis (PCA) and wavelet analysis were done on the combined data set. The first principle component (PC 1) explained 95 percent of the variation and was used to calculate correlations to the Arctic oscillation (AO), North Atlantic oscillation (NAO), the multivariate ENSO index (MEI), sea level change, and wave height. Sea level change had the highest significant correlation with the first principal component with r=0.77 (r2=0.59). This is unusually high for environmental data correlations and suggests continued inlet widening for this coastal area as sea level continues to rise. The wavelet analysis using Morlet and Ricker wavelets found annual and multi-year trends in the data with more intense correlations after 2009. This indicates the factors affecting these inlets are growing more intense.

Title of Presentation: Compact Free Electron Laser Design for Remote Asmospheric Survey

Presented By: *Erik Johnson*

Degree/Program: Ph.D. - Physics

Abstract: The Intergovernmental Panel on Climate Change has concluded that global industrialization has dramatically increased the production and subsequent emission into the atmosphere of carbon dioxide[1]. In 2007, the National Research Counsel recommended the support of the NASA ASCENDS mission to develop active remote atmospheric carbon sensing technologies[2]. The objective of this research has been to investigate the feasibility of implementing an accelerator based source of narrow bandwidth radiation to improve upon current lidar-based methods of remote atmospheric survey. The power gains necessary to overcome the shortfalls in both range and precision of contemporary atmospheric survey techniques may be achieved by abandoning the commonly used diode laser in lieu of a compact free-electron laser (FEL). A novel application of the powerful accelerator structure from SLAC at Stanford, the "Next Linear Collider," will allow the same laser system used in the Vanderbilt University Free-Electron Laser Center to be mobilized into a compact platform that may be installed into small air craft or satellites. Our research shows that this high-energy undulator, or wiggler, may be implemented to create monochromatic infrared pulses with the same general properties as the current leading lidar sources but with the advantage of a calculated three orders of magnitude gain in laser pulse intensity. References[1] J. L. Verkerke, D. J. Williams, and E. Thoma, "Remote sensing of {CO2} leakage from geological sequestration projects," International Journal of Applied Earth Observation and Geoinformation, no. 31, pp. 67-77, 2014.[2] NASA, "Science mission definition study & workshop," ASCENDS, 2015.

College of Sciences

Oral Presentations

Title of Presentation: Single Molecular Nanoparticle Optics for Real Time in Vivo Probing of Embryonic Neurological Development

Presented By: *Martha Johnson*

Degree/Program: Ph.D. - Biomedical Sciences

Abstract: Neurogenesis and neurological development have many dynamic processes, such as differentiation of neuronal precursors and correlation of communication of neurons, which still puzzles many in the neuroscience and developmental biology community. Understanding how the developing brain and all of its components are designed and function will aid in better design of molecular assays to further explore these and similar questions, leading to the increase of knowledge in the field of neuroscience. Our research group has developed in vivo assays and single nanoparticle imaging tools. We use these tools to study biocompatibility and toxicity of a mini-library of well-characterized, purified and stable (non-aggregated) silver nanoparticles on zebrafish embryonic development which allowed us to systematically address the effects of nanomaterials upon neurological development. In this study, we investigated the mechanisms of effects of purified, stable, and well-characterized silver nanoparticles (43 nm in diameter) on embryonic development, specifically neurological development in zebrafish embryos. We selected vital protein biomarkers that play important roles in neurological cell fate and development and is one of the early developmental proteins that is expressed during embryogenesis. We used transgenic zebrafish embryos that express the protein biomarkers fused with green fluorescence proteins as model organisms. We studied the effects of the nanoparticles on the expression of the biomarker, and embryonic development using fluorescence microscopy and plasmonic microscopy and spectroscopy. We found dose-dependent effects of nanoparticles upon the embryonic development. We also found the significant effects the nanoparticles have upon the cardiac function of single embryos and their behavioral response. We also characterized the uptake and accumulation of nanoparticles in embryos as they were exposed to the nanoparticles during their development, aiming to further probe their underlying molecular mechanisms. The detailed experimental designs and updated findings will be discussed in this presentation.

Title of Presentation: Study of Inhibitory Effects of Silver Nanoparticles on Liver Tumor Cells

Presented By: *Andrea Korell*

Degree/Program: Ph.D. - Chemistry

Abstract: Silver nanoparticles (Ag NPs) possess distinctive physicochemical properties, and exhibit a wide range of diverse potential applications including as therapeutic agents to treat cancer and as ultrasensitive and photostable optical probes for biological imaging. In this study, we have synthesized, characterized, and purified stable silver nanoparticles (43 nm in diameter) and then studied their effects on the growth of single liver cancer cells (HepG2). Liver cancer is increasingly becoming more common, especially in developing countries. To determine the inhibitory and therapeutic effects of Ag NPs on liver cancer cells, we treated the cells with six different concentrations of Ag NPs which were 0.1, 1, 2.5, 5, 10, and 40 pM. Cell growth was studied over time and nanoparticle stability studies were completed using a wide variety of bioanalytical methods and tools. We found that the inhibitory effects of NPs on the growth of liver cancer cells highly depended upon the dose of NPs, suggesting that the Ag NPs themselves could potentially serve as nanomedicine. The work is supported in part by NIH and NSF.

College of Sciences

Oral Presentations

Title of Presentation: The Unseen Role of Shrews in Transmission of Borrelia Burgdorferi

Presented By: *Rachel Matrenec*

Degree/Program: Undeclared

Abstract: Lyme disease remains a persistent threat to residents of Virginia. According to the CDC, there were nearly 1000 confirmed cases of Lyme disease in Virginia in 2014. Lyme disease is a vector borne illness caused by the spirochete Borrelia burgdorferi transmitted via ticks. Many of the host animals on which a tick feeds can function as reservoirs of this pathogen; this relationship is important in controlling human disease. An increase in B. burgdorferi infected reservoirs may manifest as an increase in Lyme disease incidence in humans. While the role of white-footed mice (Peromyscus leucopus) and blacklegged ticks (Ixodes scapularis) in the transmission of B. burgdorferi is well characterized, this study investigates the short-tailed shrew (Blarina spp.) and another blacklegged tick (Ixodes affinis) as additional potential reservoirs for B. burgdorferi. Blarina brevicauda tail snips (n=8) and Ixodes spp. ticks (n=31) collected from the shrews in Virginia during 2015-16 were tested for B. burgdorferi. Shrew tissue samples from Minnesota (n=41), Kansas (n=19), and North Dakota (n=4) were also tested. High prevalence rates of B. burgdorferi were detected in both ticks and shrews. In order to determine the temporal extent of shrew contribution to pathogen maintenance, preserved tissue samples collected between 1963-1993 (n=30) were tested for B. burgdorferi. Further investigation is necessary to fully explore this relationship.

Title of Presentation: Toxin-Antitoxin Pairs - a Novel Mechanism to Target Antibiotic Resistance

Presented By: *Ashley Molinaro*

Degree/Program: Ph.D. - Biomedical Sciences

Abstract: Acinetobacter baumannii is a multidrug and rapidly approaching pan-resistant bacterium causing nosocomial infections world-wide, and in 2009, it was designated one of the ESKAPE pathogens. A. baumannii's ability to evade antibiotics is an issue that needs immediate attention. Targeting metabolism via type II toxin-antitoxin loci is a novel way of treating antibiotic-resistant bacteria. Type II TA loci encode both a protein toxin and antitoxin that associate upon translation to form a nontoxic complex. I have cloned the gene that encodes the VapC toxin from the VapBC locus of A. baumannii into an expression vector so that I could overexpress and purify the enzyme. I determined that VapCAb has ribonuclease activity and affects bacteria metabolism. The antitoxin VapBAb only degrades and frees the toxin during times of stress, such as exposure to antibiotics or reactive oxygen species from the host immune response. This results in cleavage of bacterial mRNA by the ribonuclease toxin, allowing microorganisms to enter into a state of reversible growth arrest marked by nonspecific antibiotic tolerance and the ability to cause recurrent infections. I will test small molecules against VapCAb for their ability to regulate metabolism. Using a growth rescue assay will allow me to test the proteins from the VapBCAb locus in the background of E. coli. Upon validation of the small molecule inhibitors in the growth rescue assay, I will assess their effects in the Galleria mellonella model confirming the contribution of A. baumannii TA to pathogenesis during infection. The high rate of antibiotic resistance and long-term survival on hard surfaces of A. baumannii make it imperative that we determine a method to combat these prevalent infections quickly.

College of Sciences

Oral Presentations

Title of Presentation: Approach to Model Acoustic Wave Scattering Using Time Domain Boundary Integral Equations

Presented By: *Michelle Pizzo*

Degree/Program: Ph.D. - Computational and Applied Mathematics

Abstract: In aircraft design, there is a need to accurately predict the acoustic scattering by an aircraft body from a givennoise source. Numerical techniques for modeling acoustic wave scattering by complex geometries using time domain boundary integral equations will be discussed. Geometries investigated include spheres and flat plates. Scalability of high performance parallel computing will be discussed, and the use of acoustic liners will be considered as a method for absorbing sound of scattering bodies.

Title of Presentation: New Sensing and Imaging Methods for Study of Single Cancer Stem Cells

Presented By: *Asia Poudel*

Degree/Program: Ph.D. - Chemistry

Abstract: Cancer stem cells (CSCs) are rare subsets of undifferentiated cells within a tumor which could potentially attribute to formation and metastasis of tumors. A wide variety of types of tumors, such as pancreatic, lung, breast, colon, liver, brain, and ovary tumors contain rare subsets of CSCs that could be a major cause of cancer relapse and their resistance to conventional therapies (e.g., radiotherapy and chemotherapy). Therefore, it is highly significant to study individual CSCs in situ. Unfortunately, current methods are unable to identify and characterize rare subsets of CSCs in a highly heterogeneous tumor cell population. We have developed a set of new nanotechnology including photostable single molecule optical biosensors (SMNOBS) and photostable optical nanoscopy (PHOTON) for sensing and imaging of individuals' CSCs in a highly heterogeneous tumor cell population. The updated experimental design and findings will be discussed in this presentation. The work is supported in part by NIH and NSF. Co-authors: Preeyaporn Songkiatisak, Pavan Cherukuri, and X. Nancy Xu* Department of Chemistry and Biochemistry, Old Dominion University, Norfolk, VA 23529

Title of Presentation: Validation of Protein Structure Solved by Cryo-EM

Presented By: *Salim Sazzed*

Degree/Program: Ph.D. - Computer Science

Abstract: The accuracy of secondary structure element (SSE) detection from protein density map largely relies on the quality of volumetric density map. The validation of volumetric density map is the critical step for identifying secondary structures accurately. Structure determined from the Cryo-EM often produces low-quality data, in contrast to the high-quality data from the X-ray crystallography. Validating those structures derived from Cryo-Em image is very important. We present a validation tool that compares the conformations of residues of proteins from density map solved by Cryo-Em to X-ray. We have used phi, psi, chi angles and block distance to find the anomaly. We tested around 150 proteins solved by Cryo -EM from protein databank in the range 3.5 -4.0 Ã… and found long chains such as ARG, GLU, LYS show the anomalies most. The density maps solved by the Cryo-Em are still not as accurate as X-ray and contain errors that need further refinement. Our method for detecting anomalies in amino acids conformations will increase the accuracy in structure determination. Authors: Lin Chen, Assistant Professor, Elizabeth City University. Salim Sazzed, PhD Student, Old Dominion University. Jing He, Associate Professor, Old Dominion University.

Title of Presentation: Nitrogen Fixation Distribution and Magnitude in the Eastern Tropical North Pacific Oxygen Deficient Zone

Presented By: *Corday Selden*

Degree/Program: M.S. - Ocean & Earth Sciences

Abstract: The Eastern Tropical North Pacific Ocean (ETNP) hosts one of the world's three major pelagic oxygen deficient zones (ODZs), and is a hotspot for fixed nitrogen (N) loss. ODZs have classically been discounted as areas of significant dinitrogen (N2) fixation, the microbe-mediated reduction of N2 to ammonium (NH4+), which has historically been ascribed primarily to euphotic, nutrient-deplete tropical waters. Challenging this paradigm, active expression of nifH (the nitrogenase reductase gene) has recently been documented in the ETNP, Eastern Tropical South Pacific (ETSP), and Arabian Sea ODZs, implying a closer coupling of fixed N input and loss processes than previously thought. Furthermore, aphotic N2 fixation has been found in regions including the Mediterranean Sea, Red Sea, and ETSP ODZ, where it may account for a significant fraction of newly fixed N. Here, we report rates of N2 fixation measured in and around the ETNP ODZ along vertical gradients of oxygen, light, and dissolved N concentrations. Profiles of N2 fixation rates and dissolved N concentrations were compared inside and outside the ODZ, and in photic and aphotic waters. In addition, organic carbon sources were investigated as potential rate-limiting factors for heterotrophic N2 fixation. By establishing the magnitude and distribution of N2 fixation in the ETNP ODZ, this study contributes to the current understanding of N cycling in anoxic and aphotic waters, enabling more accurate biogeochemical modeling. Understanding these processes in present day ODZs is crucial for predicting how ongoing anthropogenic intensification of coastal ODZs may alter biogeochemical cycles in the future.

Title of Presentation: Single-Molecular and Nano Imaging of Single Cancer Stem Cells for Early Cancer Detection

Presented By: *Preeyaporn Songkiatisak*

Degree/Program: Ph.D. - Biomedical Sciences

Abstract: A tumor consists of a primary population of normal tumor cells (non CSCs) and rare subsets of cancer stem cells (CSCs). A distinct few CSCs in a tumor possess unique abilities to self-renew, differentiate, and indefinitely proliferate. These features enable them to resist chemotherapy and cause the recurrence, metastasis and malignancy of tumors. Conventional anticancer treatments, such as chemo- and radio therapy target proliferation of the bulk tumors rather than elimination of CSCs which show clear therapeutic complications and resistance, leading to tumor relapse. Furthermore, current detection methods can only identify cancerous cells at advanced stages. Thus, it is vital to selectively identify and study rare subsets of CSCs in the tumors at a single-cell resolution in order to understand their roles in cancers and to achieve early detection and effective treatment of cancer. Currently, CSCs have been observed in multiple neoplasms including brain, colorectal, pancreatic and ovarian cancers using a wide variety of techniques. Notably, none of these current methods can effectively identify and characterize single CSCs in situ in real-time and in their native environment. We have developed a set of powerful new tools, including photostable single molecule optical nanoparticle biosensors (SMNOBS) and photostable optical nanoscopy (PHOTON) to identify single CSCs in highly heterogeneous tumor cells at a single-cell resolution. The detailed experimental designs and results will be presented. Authors: P. Songkiatisak, P. Cherukuri, T. Huang, A. Poudel, S. Phan, and X. N. Xu*Department of Chemistry and Biochemistry, Old Dominion University, Norfolk, VA 23529

Darden College of Education

Oral Presentations

Title of Presentation: Factors Influencing High School Girls' Enrollment in Elective Physical Education

Presented By: *Summer Davis*

Degree/Program: Ph.D. - Education - Human Movement Sciences, Health and Sport Pedagogy

Abstract: Purpose: This study sought to gain an in-depth understanding of the factors influencing high school girls' enrollment in elective physical education (PE) by describing their meaning of PE, inquiring about the factors influencing their enrollment in elective PE, and exploring desired changes to elective PE. Methods: Focus group interviews were conducted with 16 high school girls to provide detailed accounts of factors influencing their decision to enroll in elective PE. Results: The high school girls interviewed mostly felt that PE was a means for being physically active with their friends, and the enrollment decision carried uncertainty. Additionally, the girls desired more educational and personal aspects of elective PE. Conclusion: For high school physical educators and curriculum developers, these findings provide meaningful implications to increasing high school girls' enrollment in elective PE, which could have positive impacts on the habits they form in late adolescence and carry into adulthood.

Title of Presentation: Reciprocal Teaching in an Online, Asynchronous Community College Course

Presented By: *Jenifer Marquis*

Degree/Program: Ph.D. - Education - Instructional Design & Technology

Abstract: Reciprocal teaching is an interactive instructional procedure that improves students' text comprehension skills through scaffolded instruction of four comprehension-fostering and comprehension-monitoring strategies (Palincsar & Brown, 1984; Rosenshine & Meister, 1994). The four reciprocal teaching strategies are predicting, questioning, clarifying, and summarizing (Palincsar & Brown, 1984, 1986; Palincsar, Brown, & Martin, 1987). Reciprocal teaching involves student-led instruction, modeling, practice, and feedback in metacognitive, self-monitoring and evaluating strategies (Brown, Campione, & Day, 1981). While reciprocal teaching is well accepted in K-12 and higher education, it has not yet been implemented in an online, asynchronous community college course. The purpose of this study was to determine the potential of reciprocal teaching to facilitate deeper cognitive processing and higher levels of thinking related to course texts in an online, asynchronous community college courses. The strategies and peer teaching were incorporated into an online asynchronous community college course using discussion forums for dialogue, strategy use, and peer teaching. Quasi-experimental, multiple methods were employed to compare the effects of traditional and reciprocal teaching methods when implemented in discussion forums for an online, community college course. A convenience sample of two sections of the same course was studied over 16 weeks. Outcome variables were level of thinking, understanding of course texts, online reciprocal teaching implementation, and students' reflections on the relationship between discussions, strategies, and learning. Results indicated that reciprocal strategies promoted significantly higher levels of thinking and deeper processing of course texts than traditional methods. Implications for implementation and future research are discussed.

Darden College of Education

Oral Presentations

Title of Presentation: The Impact of Student Involvement on Graduate Student Retention

Presented By: *Jessica McGee*

Degree/Program: M.S.Ed. - Educational Leadership - Higher Education

Abstract: I am conducting a survey for the graduate school at Old Dominion University to find more information on the way student involvement impacts graduate student retention. There is not a lot of literature out there that is directed toward graduate students. I will use what literature is available on undergraduate students to build a survey to then record whether student involvement is just as important in graduate school. The survey will go live at the end of February and the data and literature review will be collected and analyzed by mid-March.

Title of Presentation: "Missed Opportunities": Adults with Visual Impairments' Reflections of PE Experiences

Presented By: *Amanda Yessick*

Degree/Program: M.S.Ed. - Physical Education - Adapted Physical Education

Abstract: Background/Purpose: The most likely environment for youth with visual impairments to learn about and participate in physical activity is school-based physical education (PE) classes. Unfortunately, however, research suggests that adults with visual impairments tend to participate in inadequate amounts of physical activity and are at higher risk for developing health-related conditions. Little research exists examining the influence of school-based PE on physical activity for those with visual impairments in adulthood. Therefore, the purpose of this study was to explore the perspectives of adults with visual impairments toward the impact of physical education on their current physical activity participation. Method: Sixteen participants (7 male, 9 female) with visual impairments who attended integrated public schools voluntarily participated in this study. Data were collected through semi-structured, audio-taped telephone interviews and reflective field notes. A semi-structured interview guide was used to ensure that the same lines of inquiry were pursued across participants. Member checking, peer debriefing, and communicative validity were utilized to ensure trustworthiness. Analysis/Results: An inductive analysis was used to interpret the data and three meaningful themes were revealed. The first theme, ineffectual physical education experiences, described participants' beliefs that school-based physical education experiences had little impact on their current physical activity. The second theme, retrospective needs, revealed alternative approaches and modifications the participants believed would have improved their K-12 physical education experiences. The third theme, importance of extracurricular physical activities, demonstrates the participants' beliefs that other, outside of school opportunities were more impactful than school-based physical education. Conclusion: Upon completion of the study, most (13 of 16) participants indicated that they considered themselves to be physically active in adulthood. However, for most participants, this was attributed to meaningful experiences outside of their respective K-12 PE classes.

OLD DOMINION
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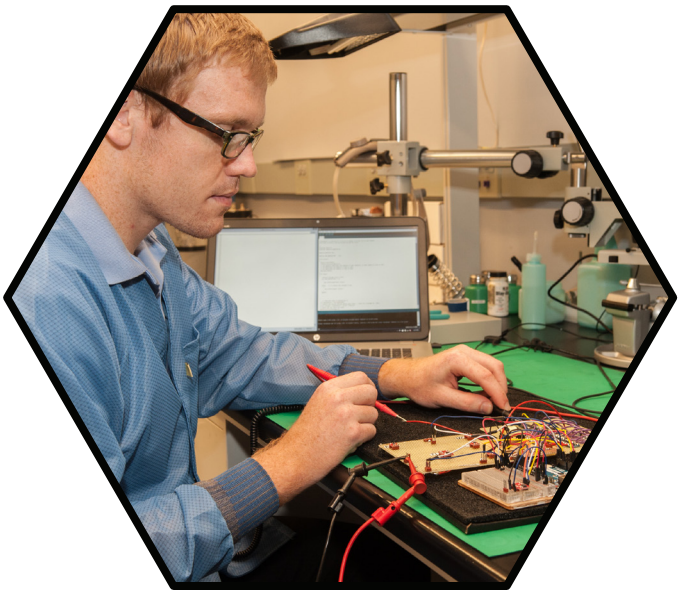
IDEA FUSION

Graduate Research Achievement Day



Poster Presentations

12:00 p.m. - 2:00 p.m.

North Mall

Webb Center

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: Integrated Processing of Municipal Solid Waste for Maximizing Carbon Recovery and Fuel Production

Presented By: *Kameron Adams*

Degree/Program: Ph.D. - Engineering - Civil & Environmental Engineering

Abstract: Studies are being conducted using the novel integration of hydrothermal carbonization (HTC) of municipal solid waste (MSW) and anaerobic digestions (AD) of the aqueous phase from HTC in order to increase overall carbon conversion of MSW to energy products (e.g. green coal and biogas) with aims to: (i) maximize energy and resource recovery from MSW; (ii) create higher heating value products due to increased carbonization and carbon recovery from both processes; and (iii) evaluate feasibility of using biogas from AD for providing heat for HTC process. Benefits of the proposed integrated method include capturing more carbon for energy conversion, resource recovery from AD, and waste reduction. HTC is observed as a scalable technique to convert wet biomass or organic waste (e.g. food waste and MSW) to carbon-rich solid fuels. Literature reports operating conditions of HTC ranging from 180-300°C based on different feedstocks which produces three main products: hydrochar green coal (75-80%), aqueous phase with total organic carbon (TOC) (15-20%), and gases which is mainly CO2 (5%). The aqueous phase of HTC contain high loads of organics and inorganics and without recovery would be lost and still be considered a waste product which would increase the load at wastewater treatment facilities and also a loss of organic carbon which could have been used for energy applications. MSW landfills are the third largest source of human-related methane emissions which have 23 times more greenhouse gas (GHG) trapping potential then CO2. Improvements in terms of waste management and energy production can be solved by integrating MSW processing with hydrothermal carbonization (HTC) and AD to maximize the organic carbon and resource recovery.

Title of Presentation: Multi Mode, Multi Resource, and Multi Constraint Project Scheduling Problems

Presented By: *Faisal Altarazi*

Degree/Program: Ph.D. - Engineering - Mechanical Engineering

Abstract: The study focuses on applying the differential evolution algorithm to multi mode, multi resource, and multi constraint project scheduling problems. Differential Evolution Algorithm (DEA) was applied to a 14-task network through different scenarios, which include Multi Mode Single Non Renewable Resource Constraint Project Scheduling Problem (MMSNRPSP) and Multi Mode Multiple Non Renewable Resource Constraint Project Scheduling Problem (MMMNRPSP), with each experiencing a weekly constraint. Projects experiencing changes in budget were also investigated. Simulation results through this DEA approach show promising results.

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: Aquathermolysis of Waste Triglyceride in a Continuous Flow Reactor for Jet Fuels Production

Presented By: *Alexander Asiedu*

Degree/Program: Ph.D. - Engineering - Civil & Environmental Engineering

Abstract: The unavoidable dwindling fossil fuel and its attendant climate change in our time have given impetus to researchers in the energy sector to delve into different sustainable energy sources. One such energy source is the abundant waste triglycerides whose long chain hydrocarbon can be separated from its short oxygen chain via hydrodeoxygenation, decarbonylation, and decarboxylation in the presence of a heterogeneous catalyst and hydrogen. However, the use of gaseous hydrogen causes a diffusion-limited process since it is not readily soluble in liquid (polar) components and requires an excess use of hydrogen. To address these challenges, a single-pot Formic Acid and 2-propanol Assisted Autotheromolysis to Jet-diesel fuel process is studied. The use of aqueous formic acid and 2-propanol serve as an in-situ source of H2 (hydrogen transfer agent) where the reactions in aqueous media (aquathermolysis) helps in reducing mass transfer resistances that results in significant increase in reaction rates in this process. The present study on aquathermolysis is focused on developing a metal oxide-based low cost catalyst (e.g. Fe-Ni-Co/Al2O3) system that is stable in aqueous media. The study is conducted in a packed bed continuous flow tubular reactor in the range of 300 to 400µ°C under hydrothermal conditions. To alleviate coke formation and evaluate the stability of the catalyst, the effects of reactants' flowrates, feedstock composition, pressure, temperature, and formic acid concentration are studied. GC-MS and elemental analyzer are used to analyze the product compositions. Thermal gravimetric analysis (TGA), energy dispersive X-ray, SEM, BET method, FT-IR, and XRD are used to characterize both fresh and used catalyst. The proposed novel approach has certain advantages over conventional commercial hydrotreating processes including no handling of hydrogen gas, faster reaction times, and use of renewable solvents as a hydrogen source.

Title of Presentation: Techno-Economic Analysis of an Integrated Approach towards Algae Cultivation for a Sustainable Biofuels Intermediate Production and Storage

Presented By: *Andrew Bessette*

Degree/Program: Ph.D. - Engineering - Civil & Environmental Engineering

Abstract: Some of the greatest challenges facing algae conversion into advanced biofuels are the cultivation, harvesting, and lipid extraction processes of the algae life cycle. It is energy intensive, has robust nutrient requirements, is expensive and is consequently deterring to potential investors. Old Dominion University has successfully utilized a Flash Hydrolysis (FH) process which has the potential to reduce cost in order to produce an effective business model. During the FH process proteins are solubilized into a liquid phase product and the remainder lipid-rich product is separated into a solid phase, biofuels intermediate (BI). The BI is then an ideal candidate for biofuel feedstock and the liquid phase hydrolysate can be utilized for a valuable co-product to be used as a nutrient source or to be used as slow-release fertilizer (e.g. struvite and hydroxyapatite) when nutrients are precipitated through hydrothermal mineralization. In order to ensure that the BI can be most economically upgraded into a sustainable drop-in biofuel product, cultivation, harvesting, and processing costs must be reduced for a sustainable business model. To reduce operating costs in this model, an integrated approach of 2 separate cultivation and harvesting methods (Freshwater Scendesmus Raceways and Marine Nannochloropsis) are utilized to produce the required biomass feedstock, then processed utilizing a mobile FH process, which then produces 2 sources of BI to achieve a target of 3,700 gal/acre/yr and fertilizer co-product. SuperPro Designer V9.0 was used to quantify the techno-economic cost analyses of the cultivation, harvesting, dewatering, extraction, and transportation processes. The utilization of a secondary low cost system, the mobile FH and HM processes, and an innovative integrated approach make this model a promising business strategy.

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: Design of a High-Efficient Boost-Cascaded Buck Boost DC-DC Power Converter for Solar Power Integration

Presented By: *Yashwanth Bezawada*

Degree/Program: M.S. - Engineering - Electrical & Computer Engineering

Abstract: This research focuses on the design of a boost cascaded buck-boost (BoCBB) power converter with super high efficiency in energy and electric power conversion. The BoCBB power converter is based on emerging silicon-carbide (SiC) MOSFETs and schottky diodes, which has only 1/6 times the power loss of traditional silicon power semiconductor devices. The BoCBB power converter can be widely applied in solar harvesting for NASA, military base, and electric utility, as well as high-power dc motor drives in electric vehicles, robotics, and manufacturing and product lines. In this research, we analyzed the topology of the BoCBB power converter. The energy efficiency of the SiC-based BoCBB power converter was calculated under various switching frequencies and tested by a simulation study of solar power integration in a 400-Vdc distribution microgrid in Matlab/Simulink environmen. We found that a design of 50-kHz in switching frequency is optimal in overall system performance. This conclusion was further verified by experiment tests. We designed the printed circuit board of a 3-kW BoCBB prototype and established a hardware test-bed in the Power Research Lab of the ECE department at ODU. The experiment tests demonstrated a high energy efficiency above 97%.

Title of Presentation: Molecular Simulations of Lipid Bilayers in Electric Fields - The Model Matters!

Presented By: *Federica Castellani*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: Molecular dynamics simulations of lipid membranes have been widely used to better understand phenomena at the atomic and molecular level that cannot be observed with conventional experimental methods. With the tools of molecular dynamics, electric-field-induced pore formation in lipid bilayers can be studied and analyzed under a wide range of conditions. An additional defining characteristic of molecular dynamics simulations, often hidden or taken for granted, is the force field. In molecular dynamics, the force field is the set of functions and parameters that combine to express the potential energy of a system of particles. In this work, we compare systems based on GROMOS-OPLS and CHARMM36, two of the most widely used force fields over the past decade. To anticipate the importance of the force field in determining specific values for lipid electropore creation and annihilation and pore transport properties, we look at effects on area per lipid and pore initiation time. Although it is known that area per lipid depends on the force field used, no one has previously compared lipid electropore initiation times with different force fields. All systems contain 128 lipids 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphatidylcholine (POPC) and approximately 12,000 water molecules. Three bilayer systems were studied: one containing only POPC and water and two containing also chloride ions and either potassium ions or calcium ions. All systems were equilibrated for a constant area per lipid. Systems with ions were not considered equilibrated until the number of ions bound to POPC head groups reached a steady value. Electric fields of different amplitudes were applied along the axis normal to the bilayer plane to determine pore initiation time.

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: From Thought to Sound: Toward a Brain-Actuated Musical Rhythm Synthesizer using Electrocorticography

Presented By: *Garett Johnson*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: A brain-computer interface (BCI) is a system which can transform brain activity into a series of device commands. The user conveys these device commands via changes in their brain signals, and the BCI decodes these signals and transforms them to some form of device output. The most promising and practical signals for BCI control are electrophysiological measurements, such as electrocorticography (ECoG). ECoG is the electrical activity of the brain recorded directly from the cortical surface. Recently these intracranial signals have been demonstrated to provide superior decoding capabilities for motor and language signals, as well as other BCI control. While previous neuroscience studies have examined various aspects of music using scalp recorded activity and functional magnetic resonance imaging, very little has been explored using the higher spatial and temporal resolution of ECoG due to its invasive nature. Here we present the resulting neural correlates and preliminary signal characterizations from 8 patients who underwent clinical epilepsy monitoring at the Mayo Clinic and participated in a simple rhythm task. Data analysis was based on the gamma band (70-170 Hz) activity that has been shown to bighly correlate with a wide variety of tasks and functions.

Title of Presentation: Electrocatalytic Hydrogenation of Acetone to Produce Isoproponal in a Polymer Electrolyte Membrane Reactor

Presented By: *Chen Li*

Degree/Program: Ph.D. - Engineering - Civil & Environmental Engineering

Abstract: Electrocatalytic hydrogenation of acetone is a relatively new method to produce isopropanol. It provides an alternative way of reducing biomass-derived oxygenates with less energy consumption and chemical waste as compared to conventional methods. In this paper, a Polymer Electrolyte Membrane Fuel Cell (PEMFC) hardware was used as an electrochemical reactor to hydrogenate acetone to isopropanol and diisopropyl ether as a byproduct. High current efficiency (59.7%) and selectivity (>90%) could be achieved. 16% propanol and 1% diisopropyl was identified in the final product using new membrane, holed bag collection method, reaction temperature 65ºC, and reaction relative humidity of 90%. Our results show that these experimental parameters strongly affect the overall ECH efficiency of acetone. Increase in humidity helped propanol yield and efficiency. High temperature does not have an obvious promotion function, since temperature oppositely affects H2 utilization percentage and current efficiency. Membrane effective work hours was also investigated in the paper.

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: Investigation of Direct MOCVD Epitaxial Growth Time of III-V Materials on Metal Foils

Presented By: *Marlene Lichty*

Degree/Program: Ph.D. - Engineering - Electrical & Computer Engineering

Abstract: In order to reduce the cost of manufacturing III-V solar cells, an investigation using the direct epitaxial growth process of III-V binaries on metal foils was performed. The Metal Organic Chemical Vapor Deposition (MOCVD) growth technique was used with a focus on analyzing growth time and the effect on surface coverage. Growth times of 49 minutes, 98 minutes, and 147 minutes were used in this research, utilizing the direct epitaxial growth process of III-V binaries on metal foils with a particular effort to make III-V devices practical outside of specialty applications. The samples studied consisted of Indium Phosphide and Indium Arsenide thin film deposition on molybdenum foils. Spatial coverage analysis was conducted in conjunction with various characterization methods, including SEM, EDS, PL, and XRD. Lattice constants of 5.94 Å, 5.87 Å, and 5.86 Å for InP and 6.04 Å for InAs are reported.

Title of Presentation: Ship Maintenance Scheduling Under Constraint Requirements

Presented By: *Vi Nguyen*

Degree/Program: Ph.D. - Engineering - Mechanical Engineering

Abstract: This poster highlights the need for optimal implementation of ship maintenance scheduling for navy ships. The rigorous ship maintenance cycle and the extremely important need to reduce maintenance cost in the Navy are reviewed. It then investigated the application of the differential evolution (DE) algorithm to the multi-mode resource-constrained ship maintenance scheduling problem in which the squadron availability for operations needs to be maximized and the total duration, called makespan, of a maintenance schedule and total maintenance cost needs to be minimized. The problem is subjected to minimum availability requirements and also resource constraints regarding labor availability. The performance of the DE-based optimization algorithm is evaluated via numerical simulations in two case studies with multi-objective optimization problems. The simulation results demonstrate that the proposed approach is both effective and efficient in addressing the multi-mode resource-constrained ship maintenance scheduling problem.

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: An Antenna Driven by Pulse Power for Biomedical Applications

Presented By: *Ross Petrella*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: High voltage electric pulses with picosecond durations have been known to stimulate biological tissue. In previous experiments cells were stimulated using electrodes separated by distances on the order of a millimeter. An antenna is an approach that could be used to stimulate an area large enough for clinical relevance. for this study the antenna was a dielectric rod constructed for stimulating biological tissues. The antenna consists of three sections (a conical wave launcher, a cylindrical waveguide, and a conical emitting section). To reach the electric field required for stimulating cells, a high voltage pulsed power system was designed and constructed to drive the antenna. The pulse power system consists of an ultrafast charge time dual resonance pulse transformer with a linearly integrated primary. It is capable of generating pulses with a rise time <50 ns. The load for the transformer was an oil-filled transmission line that was connected to the antenna. An oil peaking switch was used to switch the line to produce high voltage picosecond transients. The electric field was measured in the near field at a distance of 4 cm. A 500 ps pulse with an amplitude of 600 V/cm was recorded for a 25 kV input from the transformer. These results demonstrate the feasibility of the system and so future work will be focused on increasing the transformer voltage.

Title of Presentation: Physiology Informed Virtual Surgical Planning: a Case Study with a Virtual Airway Surgical Planner and BioGears

Presented By: *Lucas Potter*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: Stenosis of the upper airway affects approximately 1 in 200,000 adults per year, and occurs in neonates as well. Its treatment is often dictated by institutional factors, namely the clinician's experience or preference. Virtual Pediatric Airway Workbench (VPAW) is a surgical planner for upper airway stenosis. It incorporates CFD simulation and geometric authoring with objective metrics from both that help in informed evaluation and planning. However, this planner currently lacks physiological information which could impact the surgical planning outcomes. In this work we integrate a lumped parameter, model based physiological engine called BioGears with VPAW. It additionally offers some demonstrations of BioGears' functionality, and elucidates the uses of using patient-specific, systemic modeling software for clinical use.

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: A Bioprinting Method to Direct Branching Morphogenesis of Human Mammary Epithelial Cells in a 3D Hydrogel

Presented By: *John Reid*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: Here we provide a detailed account of the design and fabrication of a microextrusion based bioprinting platform capable of high-throughput, high resolution bioprinting. This investigation details how to use precision bioprinting techniques to successfully direct the branching morphogenesis of human mammary epithelial cells cultured in a 3D hydrogel. Printing process parameters were optimized to provide a robust method for the spatial control of deposited cellular aggregates ranging from 1 to 100 cells. Experimental results provided the minimum number of cells per aggregate to achieve organoid formation via 'self-organization'. Printing aggregates under these conditions enabled us to accurately predict the future structures generated by arrays of printed cells.

Title of Presentation: Recovery of Proteins and Carbohydrates from Flash Hydrolysate of Microalage

Presented By: *Ashani Samaratunga*

Degree/Program: Ph.D. - Engineering - Civil & Environmental Engineering

Abstract: Microalgae biomass mainly consists of lipids, proteins, carbohydrates, and several inorganic salts. Currently, microalgae lipids are being used for biofuel production. However, the production of these biofuels will be more economical if microalgae by-products are marketed as high value products. Microalgae proteins and their constituent peptides can be used for pharmaceuticals and neutraceuticals. Similarly, carbohydrates from microalgae can also be used as food additives or as feed for cellulosic biofuels and bio-plastics. Processing algal biomass with flash hydrolysis is non-toxic, environmentally friendly, and economic, compared to conventional pretreatment methods. The resulting hydrolysate contains these valuable proteins, carbohydrates, and other nutrients. Though various solvent separations are available for protein recovery, environmentally friendly and cost effective options are needed. Therefore, our ongoing research involves testing and comparing various protein and nutrient recovery techniques, including acid precipitation, ultrafiltration, and nanofiltration.

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: Single Trial Noxious Stimulus Identification as a First Step for the Assessment of Small Fibers Neuropathy

Presented By: *Fernando Sobreira*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: Contact Heat Evoked Potentials (CHEPs) is a noninvasive technique that can be used to evaluate small-fiber damage associated with Neuropathic Pain (NP). The CHEPs method consists of stimulating the subject with a rapidly-ramped heat pulse at a peripheral location. This pulse evokes late cerebral potentials in the EEG related to small-fiber activation. The protocol is based on two kind of stimuli, noxious and non-noxious, where only the noxious stimuli are taken into account for the assessment of the small-fibers. This study aims to contribute with the assessment small-fibers neuropathy using the CEPS protocol by identifying the noxious stimulus on a single trial. An artificial neural network was designed and evaluated with a 5-fold cross-validation technique using several features from 40 healthy subjects. The results demonstrate the feasibility of this technique to correctly classify 74.12% Â± 4.72% within a 95% CI.

Title of Presentation: Multi-Pathway Nutrient Recycling for Sustainable Algae to Biofuels Production

Presented By: *Caleb Talbot*

Degree/Program: Ph.D. - Engineering - Civil & Environmental Engineering

Abstract: Algae have the potential to provide a scalable source of renewable fuels. Recently, nutrients demand for algae cultivation and the limitation it presents has become a concern from a sustainability and economics perspective. This is particularly the case for phosphorous, an irreplaceable mined nutrient essential to agriculture that has been susceptible to price volatility in recent times. Old Dominion University (ODU) utilizes Flash Hydrolysis (FH), a type of rapid-hydrothermal liquefaction (HTL), to extract nutrients and preserve the lipids for biofuels production. Through multiple publications, direct recycle of the phosphorus recovered (~80%) in the FH aqueous phase (AP) has been shown to sustain algal growth for freshwater (Scenedesmus sp., Oocystis sp.), and salt water (Nannochloropsis sp.) species. Building on direct recycle, struvite was successfully precipitated from the FH AP to immobilize the phosphorous and ammonium into a slow release fertilizer suitable for transportation and storage purposes and was successfully used to cultivate algae (Scenedesmus sp.). Since the struvite precipitation process precipitates more than 65% of the phosphorus in the FH AP, approximately 35% of the phosphorus remains available for recycling. This phosphorus was successfully recycled to the algae (Scenedesmus sp.), further minimizing waste. To supplement nutrients in the cultivation pond, Scenedesmus sp. was also cultivated using secondary effluent from a rural and an urban wastewater treatment plant (WWTP). Through these studies, the authors have shown that phosphorus can be recycled and stored from waste streams using algal cultivation combined with FH technology, potentially addressing nutrient use concerns in algal biofuels and the bioecomony at large.

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: Mitochondrial Membrane Potential and Oxygen Consumption of Jurkat Cells Treated with Nano-Second Pulsed Electric Fields (nsPEFs)

Presented By: *Royena Tanaz*

Degree/Program: M.E. - Engineering - Biomedical Engineering

Abstract: The mitochondrial membrane potential (ΔΨm) of a cell can determine its energy production. The ΔΨm helps to create a proton motive force that is utilized by the mitochondria of a cell to generate ATP. Proton motive force is generated by the electron transport chain (ETC) on the inner mitochondrial membrane. In the ETC, electrons are transferred from electron donors to electron acceptors in coupled reduction/oxidation reactions, while H+ ions are pumped outside of the mitochondrial membrane against their concentration gradient. Protons outside then enter the mitochondria down their concentration gradient and produce ATP through ATP Synthase. In addition to ΔΨm, steps involved in energy production of a cell can be studied with its oxidative phosphorylation and oxygen consumption properties. An effective cancer treatment may involve disturbing cancerous energy production. As a potential therapy, nanosecond pulsed electric fields (nsPEFs) can be applied to porate the cell membrane and induce differential processes with pulse conditions specific to cell type. In our study, we apply a range of nsPEFs to a well characterized cell line of human T-cell leukemia and measure effects including ATP production cell viability, ΔΨm and oxygen consumption. Based on current data, nsPEFs induce a decrease in ΔΨm in a calcium-dependent manner. We seek to determine effects of nsPEFs on mitochondrial oxygen consumption, ATP levels and specific complexes of the ETC in the presence and absence of calcium.

Title of Presentation: Hydroxyapatite and Dittmarite Precipitation from Algal Hydrolyzate

Presented By: *Ali Teymouri*

Degree/Program: Ph.D. - Engineering - Civil & Environmental Engineering

Abstract: Several pathways and process developments have been initiated in order to accelerate the industrialization of algal-derived biofuels. However, in spite of improvements in algal productivity and downstream processing to drive down the costs, the barriers for commercialization has not yet been removed. Nutrients demand and availability, in particularly phosphorous (as a finite natural resource), has become one of the main concerns. In this study two pathways have been investigated to recover phosphate from microalgae hydrolyzate. In the first pathway, phosphate presented in the nutrients-rich algal hydrolyzate extracted via flash hydrolysis (FH), a hydrothermal process which consists in treating the wet biomass under subcritical water conditions and a very short residence time (10 s), were subjected to the hydrothermal mineralization (HTM). The concept of HTM has been driven from the earth-mimetic mineral precipitation phenomena. More than 97 wt% of phosphate recovered in the form hydroxyapatite (HAp), a high-value biomedical material, from experiment conducted at 280 ËšC and 1 h of residence time with the calcium addition of Ca/PO4 molar ratio of 1.67. In the second pathway, both phosphate and ammonium presented in the algal hydrolyzate were precipitated as dittmarite, a slow-release fertilizer, by the addition of MgCl2 in atmospheric pressure. The effect of seeding, temperature, Mg/PO4 molar ratio, and the retention time were investigated. Results confirmed that more than 66 wt% of phosphate and 30 wt% of ammonium in the aqueous phase recovered as dittmarite in the experiment performed at 20 ËšC, 2 h of residence time and the Mg/PO4 molar ratio of 2. Precipitates were fully characterized using TGA, SEM,XRD, FT-IR, and EA to determine the morphology, crystallinity and purity. Integrating these pathways would be an alternative option for maximum phosphate recovery applicable to any phosphate-rich aqueous media obtained from hydrothermal liquefaction (HTL) or wastewater streams.

Batten College of Engineering & Technology

Poster Presentations

Title of Presentation: Visual Neural Pathway Modeling for Stimulus Optimization for Brain-Computer-Interfaces

Presented By: *Christoph Tremmel*

Degree/Program: Ph.D. - Engineering - Biomedical Engineering

Abstract: The most common setup for brain-computer-interfaces (BCIs) consists of visual stimuli from screens or LEDs, an EEG measuring headset, and a processing unit for machine learning algorithms. Techniques like P300 and steady-state visual evoked potentials (SSVEP) use the brain response to visual stimuli to identify the user's focus and allow the control of different devices like prostheses or robots. These algorithms have already been researched for decades and are getting more and more sophisticated. In the last couple of years the idea of not only improving the algorithms and the hardware, but also optimizing the stimulus pattern has grown. The user of the maximum length sequence or the gold sequence are the result of this research. This study aims to create a model of the human visual pathway from stimulus, over eye, lateral geniculate nucleus (LGN) and visual cortex until the electrode in order to find additional and improved stimulus sequences. A sophisticated model, trained by machine learning algorithms with real-life data, will ease the search for optimized stimuli. Here we present our advances in the development of a real life visual pathway model.

College of Arts & Letters

Poster Presentations

Title of Presentation: Matthew Arnold's “Disinterestedness” and the Prevalence of Ideology Within Victorian Periodical Reviews

Presented By: *Anthony Garcia*

Degree/Program: Ph.D. - English

Abstract: Matthew Arnold’s seminal piece of cultural theory, “The Function of Criticism at the Present Time,” argues for the concept of disinterestedness, a deliberate neglect of political motivation in aesthetic and philosophical analysis. While scholars have made significant efforts in describing the political leanings of certain Victorian periodicals, studies have yet to tabulate the predominance of political bias within reviews. This dearth of information leaves scholars unsure of whether the biased review was a general trend or a series of isolated events when reviews depart from norms of objectivity. Moreover, as Arnold quotes himself to assert that these trends were not unique to literary reviews, stating that ‘It is the business of the critical power … ‘in all branches of knowledge, theology, philosophy, history, art, science, to see the object as it itself it really is’,” a statement which he supports by addressing a wide variety of political, theological, and religious texts within “The Function of Criticism.” Work in the field has yet to determine the proportion of reviews which actually adopted the mode which Arnold excoriates. Pursuing a general impression of the genre, this paper conducts a detailed analysis of the political imposition on popular criticism, adopting a quantified documentation of these phenomena within eight periodicals during the decade prior to “The Function of Criticism.” This data, derived from random numerical sampling, contextualizes Arnold’s essay within the dominant trends of the mid-Victorian periodical press to show that a majority of reviews did indeed foreground their ideologies in reviewing texts.

Title of Presentation: Effect of News Sources on Attitudes Towards President Trump

Presented By: *Amanda Haywood*

Degree/Program: M.A. - Applied Sociology

Abstract: The purpose of this research is to determine which news sources may influence students' attitudes towards President Trump. The goal is to reveal what news sources may influence positive or negative attitudes towards President Trump. This will be done through sending an online survey to a large sample of undergraduate and graduate students at a university in the southeast region of the United States. Results collected from the survey will reveal which news sources students follow and their effect on student's attitudes towards Trump. Understanding where positive and negative attitudes towards Trump originate from enlightens students to take a look at news sources that represent a side of the debate they feel they are against. The best way to form a perspective whether positive or negative is to look at both sides of the debate and researching through multiple news sources. Students can learn a new perspective from this research once it is completed.

College of Arts & Letters

Poster Presentations

Title of Presentation: Over There: Men of the 42nd Division Resting in Oise-Aisne Cemetery. For "Over Here, Over There: America's Homefront and Expeditionary Force in WWI." An Exhibit at the Douglas MacArthur Memorial, Norfolk

Presented By: *Maggie Kontra-Emmens*

Degree/Program: M.A. - History

Abstract: Some 377 men of the 42nd Rainbow Division are buried in the Oise-Aisne American Cemetery in France. In collaboration with the MacArthur Memorial, for their upcoming World War I exhibit, HIST 660:World War I researched the biographies of these men who lost their lives, to shed light on those who fought in World War I and to place the men in the context of American history in the United States and their experience of World War I abroad. The soldiers who lost their lives represented a cross-section of the United States. Hailing from Maine to Georgia and Virginia to Washington State, there were sheepherders from Utah and a silent film star from Philadelphia. A head cheerleader from Cornell fought and fell alongside a cotton mill worker. Some went to Harvard University; others were barely literate. Some were of old American families, but many were immigrants ---- from Ireland, Germany, Russia, Austria-Hungary, and Italy. Many were not even US citizens. Some were orphans; others enlisted with their brothers. Some served for months before they fell in the Marne offensive. Others died on the passage over. Some died in action, others of disease. They served in many capacities from horse shoers and stable sergeants to aerial photographs, from privates to officers. Their stories have been uncovered by the 11 students of History 660 --- working with archivists, librarians, private citizens, American legion representatives, and strangers across the country from Alabama to South Dakota. The biographies explore the lives of those soldiers who remain interred in France, buried in "alien earth."

College of Health Sciences

Poster Presentations

Title of Presentation: Socio-Demographic Risk Factors That Associated with an Increased Prevalence of Type 2 Diabetes Mellitus (T2DM) in Saudi Arabia: A Study Based on Saudi Health Interview Survey (SHIS)

Presented By: *Mohammed Alsuliman*

Degree/Program: Ph.D. - Health Services Research

Abstract: Introduction: In Saudi Arabia, the prevalence of T2DM significantly increased by 68% from 2010 to 2015, and was estimated to be 3.49 million diabetic patients for the age group 20 and above in 2015. The objective of this study was to explore the association between socio-demographic risk factors and the development of T2DM in the Saudi population. Method: This study was based on SHIS data for the year 2013. The statistical model used was hierarchal logistic regression. A total of 7,867 subjects were included in the study of which 8% have T2DM. Results: Males were more likely to exhibit T2DM than females (OR =1.9, 95% CI: 1.54, 2.35). Increasing age was associated with an increased likelihood of exhibiting T2DM (OR = 1.07, 95% CI: 1.06, 1.08). Furthermore, BMI was found to be a significant risk factor associated with increase in T2DM (OR = 1.09, 95% CI: 1.07, 1.11). Those who had a college degree or higher were less likely to develop T2DM compared with those who had a primary education or below (OR = 0.62, 95% CI: 0.45, 0.85). Additionally, those who never married were 2.2 and 3.1 times less likely to exhibit T2DM compared with married and separated, divorced, or widowed, respectively. Those with a monthly income $4,000 or more were 1.56 times at risk for T2DM compared to those with a monthly income of less than $1,333 (95% CI: 1.14, 2.13). Conclusion: Further studies are required to explore health behaviors among Saudis to be targeted in future health promotion programs.

Title of Presentation: Hospice and Theory of Planned Behavior

Presented By: *Darlene Brink*

Degree/Program: D.N.P. - Nursing Practice

Abstract: PROBLEM: Little was known about nurses' comfort level with hospice advocacy when treatment is no longer curative. Registered nurses may be uncomfortable advocating for hospice services, resulting in poorer outcomes for patients who are no longer responding to current treatments. PURPOSE: This study aimed to explore relationships between RN comfort level, subjective norms, beliefs, perceived behavioral controls, and hospice referrals for patients when treatment is no longer curative. EBP QUESTIONS: (1) Is there a relationship between personal characteristics, professional characteristics, knowledge level, barriers, comfort level, beliefs, and hospice referral pattern when treatment is no longer curative? (2) Are there differences in knowledge level, barriers, comfort level, and beliefs between RNs who do and those who do not refer patients for hospice services when treatment is no longer curative? METHODS: This study was conducted using a descriptive cross-sectional design, utilizing an anonymous on-line survey. OUTCOMES: Most participants (88.9%) reported they would refer patients to hospice if it was considered a component of their role. Participant comfort level initiating end of life discussions and beliefs regarding initiating end of life discussion and hospice referrals demonstrated a significant positive correlation with RN hospice referral pattern. Participants who referred patients for hospice services often reported higher comfort levels initiating end of life discussions and beliefs regarding initiating end of life discussion. SIGNIFICANCE: Results of this study contribute to knowledge of the nurses' behaviors and decisions regarding hospice advocacy. These findings may also be used to inform future orientation protocols and continuing education opportunities.

College of Health Sciences

Poster Presentations

Title of Presentation: Impact of Education on Depression Screening Rates of Care Manager Registered Nurses

Presented By: *MaryColette Carver*

Degree/Program: D.N.P. - Nursing Practice

Abstract: Depression is costly and impacts the quality of life for patients and families. Screening and timely diagnosis can positively impact patient outcomes. Primary care teams are well positioned to screen and connect depressed patients to needed resources. This pre-experimental pre-test/post-test designed study used Bandura's Social Cognitive Theory to guide the delivery of an educational program; focusing on the four domains of self-efficacy among a single group of ambulatory care manager registered nurses. The study participants demonstrated a statistically significant improvement in their perception of barriers to depression screening and their actual depression screening rates following participation.

Title of Presentation: Roles and Responsibilities of Individuals Within the Academic Setting who Hold the Doctor of Athletic Training Degree

Presented By: *Stephanie Clines*

Degree/Program: Ph.D. - Health Services Research

Abstract: Context: The Doctor of Athletic Training (DAT) is an advanced practice post-professional clinical doctorate focused on advancing knowledge and professional behaviors that serve to develop expert clinical leaders beyond the minimal entry-level competencies needed of a novice athletic trainer to enter the profession. Objective: To determine the roles and responsibilities that an individual who holds the DAT degree would perform within the academic setting. Design: Cross-sectional. Setting: Online Survey. Participants: 376 department chairs with oversight of professional athletic training programs were invited to participate. Access rate: 190/376 (50.5%). Completion rate: 151/376 (79.5%). Interventions: A web-based survey instrument, which included several demographic questions and 4-point Likert-scale items related to perceptions of the DAT degree, was completed. Main Outcome Measures: Roles and responsibilities that an individual holding a DAT degree would be expected to perform within the academic setting based on specific faculty lines available at institutions. Descriptive statistics were used to characterize all variables. Results: Teaching was identified as the primary role expected when hired within a lecturer, clinical faculty, or tenure-track line. The primary responsibility identified for individuals within a research faculty line was scholarship. The terminal research degree (PhD) was the most commonly chosen option for all faculty lines, however department chairs reported the DAT was a viable degree for hiring an individual into a lecturer/instructor line (n=69/131, 52.7%), clinical faculty line (n=37/69, 53.6%), research faculty line (n=8/32, 25%), and tenure-track line (n=63/139, 45.3%). Conclusion: The DAT degree is a viable option for individuals interested in pursuing a career in academe and would align with various faculty lines, particularly instructor or clinical faculty positions that place emphasis on the role and responsibility of teaching.

College of Health Sciences

Poster Presentations

Title of Presentation: Intentional Rounding by Nurse Managers and the Effect on Patient Satisfaction

Presented By: *Ruth Cody*

Degree/Program: D.N.P. - Nursing Practice

Abstract: Problem: the Center for Medicare and Medicaid Services believes that the patient experience is related to quality care and patient outcomes. CMS began a program linking reimbursement to patient satisfaction. Hospitals are implementing programs in an effort to improve patient satisfaction. Purpose: The purpose of this study is to determine if nurse manager rounding on patients improves the HCAHPS patient satisfaction scores. Evidence-Based Questions: Is there a difference in patient satisfaction scores from HCAPHS surveys following implementation of intentional rounding by nurse managers? Is there a differences in individual inpatient units scores? Is there a difference in the nursing bundle (nurses treated you with courtesy and respect, nurses listened carefully to you, nurses explained things in a way you could understand, nurse's response to the call bell) scores? Methods: A retrospective descriptive design was used to evaluate patient satisfaction scores before and after the intervention of intentional nurse manager rounding to determine this intervention impacted patient satisfaction scores. Outcomes. An independent t-test of the scores found no statically significant change to the Overall Hospital Scores or over the individual unit scores. Only two significant differences were noted in individual bundle questions on two different units. Significance: Methods positively impacting patient satisfaction could influence policies and protocols in hospitals. High scoring hospitals attract patients and competent staff and physicians. Though this study did not show an improvement in HCAHPS scores, managers were able to address immediate patient concerns. Combining nurse manager rounds with other interventions may impact the patient experience and improve patient satisfaction scores.

Title of Presentation: Creation and Implementation of Standardized Patient Cases Within Athletic Training

Presented By: *Jennifer Cuchna*

Degree/Program: Ph.D. - Health Services Research

Abstract: Context: Standardized patients (SPs) are being utilized by athletic training (AT) faculty to expose students to a variety of clinical situations. Case creation methods have been documented in the literature, however it is unclear how subsequent training of SPs occurs. Objective: To present SP training strategies and case creation methods utilized by AT faculty. Background: Ideally SP cases are created from real patient cases collaboratively with program staff and healthcare providers (e.g., physicians, nurses, physical therapists). SPs are trained in cases by program staff for anywhere from 2-10 hours. Description: Case development typically involves patient encounters that faculty or preceptors have themselves encountered or conditions found in published case studies. Case creation requires faculty to pre-identify patient characteristics, mannerisms, and the emotional state of the patient to be portrayed. Faculty may choose to incorporate SP use into the classroom prior to an evaluative SP encounter. Implementation of multiple cases within the classroom environment ensures students have exposure and practice with a variety of case scenarios. SP encounters can be used to prepare students for clinical education with conditions more commonly seen (i.e. acute ankle sprain) as well as less common conditions requiring efficient and accurate clinical decision making (i.e. anaphylaxis, spine boarding). Evaluative encounters can be used to provide objectivity and uniformity in evaluation of all students. Clinical Advantage(s): SP encounters provide students with group and/or individual experiences which can include IPE. Conclusion(s): Cases are developed based on real patient cases with their topics driven by student learning needs. Multiple sessions are needed to properly train SPs on a specific case, facilitate feedback as well as how to complete any evaluation methods.

College of Health Sciences

Poster Presentations

Title of Presentation: Balance Performance Differs Across Females from Different Physical Activity Concentrations

Presented By: *Emily Hartley*

Degree/Program: Ph.D. - Health Services Research

Abstract: Context: Static and dynamic balance assessments have been utilized to identify people at an increased risk of lower extremity injuries. However, there is a lack of normative data from individuals who participate in different forms of physical activity for these tests; particularly in females. Objective: Compare performance on the anterior reach of the Y-Balance test (YBT) and modified balance error scoring system (mBESS) across females who participate in collegiate athletics (CA), club sports (CS), spirit squad (SS), and dance studies (DS). Design: Cross-sectional. Setting: Laboratory. Patients or Other Participants: One hundred and forty-six females (Age: 20.21 ± 2.02 years; Height: 163.95 ± 5.76 cm; Mass: 63.45 ± 9.53 kg) who participated in CA (n=42), CS (n=37), SS (n=35), or DS (n=29) volunteered for the study. All participants were fully participating in their activity and free from current head and lower extremity injuries. Interventions: Participants completed the anterior reach of the YBT by maintaining balance on the stance limb while maximally reaching with the opposite limb in the anterior direction. For the mBESS, participants balanced on a single limb for 20s with their eyes closed on firm and foam surfaces. Errors were recorded for one practice trial and one test trial for each condition. Main Outcome Measures: A one-way ANOVA examined group differences for each dependent variable. Post hoc comparisons were completed in the presence of a significant group main effect. Alpha was set a-priori at $p \leq 0.05$ Results: There was a significant group main effect for the YBT ($F(3,146)=5.71$, $p=0.001$) and the mBESS foam ($F(3,146)=4.66$, $p=0.004$) but not the mBESS firm ($F(3,146)=0.38$, $p=0.77$). Conclusions: Females who participated in different forms of physical activity performed differently on static and dynamic balance measures.

Title of Presentation: Active Shooter Response in the Hospital Setting

Presented By: *Gail Landry*

Degree/Program: D.N.P. - Nursing Practice

Abstract: PROBLEM: Active shooter events are occurring frequently across the United States in a variety of locations, including hospitals. Hospital staff response to an active shooter event can mean the difference in life or death for self or others. Hospital staff response to an active shooter event can potentially be improved through an evidence-based educational program. PURPOSE: The purpose of this study was to explore differences in knowledge, response, and perceived barriers for active shooter events in hospitals following participation in an active shooter response program. The long-range goal is to standardize ongoing active shooter response education, policies, and protocols across the Bon Secours Health System. EBP QUESTIONS: (1) Is there a relationship between personal characteristics, professional characteristics, knowledge, self-efficacy, response, and perceived barriers for active shooter events in hospitals? (2) Is there a significant difference in knowledge, response, and perceived barriers following participation in an active shooter response program? METHODS: This study used a pre-experimental, one group pre-test/post-test design for a convenience sample of employees in acute care hospitals. The active shooter questionnaires were completed before and immediately following program participation. The study was conducted during the fall of 2016. OUTCOMES: Knowledge and response to an active shooter event and perception of barriers to effective implementation of an active shooter response program improved significantly following program participation. SIGNIFICANCE: Safety in the hospital setting is of the upmost importance. Regulatory agencies expect hospitals to have emergency plans in place, including how to respond to an active shooter event. Findings from this research study may inform education programs for hospital staff across the country and ultimately save lives.

College of Health Sciences

Poster Presentations

Title of Presentation: Quality of Systematic Reviews in Aphasia: Intervention for Word Retrieval

Presented By: *Jennifer Lehnen*

Degree/Program: Ph.D. - Kinesiology & Rehabilitation

Abstract: Because systematic reviews and meta-analyses (SRs/MAs) are essential to identifying evidence based clinical practice, reviews must be conducted with rigorous, unbiased methodologies to determine which research presents sound results. Two tools developed to evaluate the quality of SRs/MAs, the Critical Appraisal of Systematic Review or Meta-Analysis (Dollaghan, 2007) and Evidence in Augmentative and Alternative Communication (Schlosser et al., 2008), were used to compare the quality of SRs/MAs conducted for word retrieval treatments in aphasia. To 2016, 17 SRs/MAs have examined different word retrieval treatments. Although positive findings are reported, review quality undermines the conclusions that can be drawn from this extensive literature. By utilizing the CASRMA and the EVIDAAC, two treatment approaches were identified as leading to positive outcomes of word retrieval treatments in aphasia.

Title of Presentation: Community-Based Exercise Intervention for Depression in Diabetes

Presented By: *Molly Long*

Degree/Program: Ph.D. - Health Services Research

Abstract: Type 2 diabetes is a medical condition growing in prevalence among Americans. Among people who have type 2 diabetes, 1 in 4 will experience depression at some time in their life. The current study examines a combination treatment of cognitive behavioral therapy and exercise for the treatment of diagnosed depression in individuals with type 2 diabetes. The purpose of the current study is to examine the relationship between depression and type of exercise, duration of exercise, total number of times exercised, and level of fitness in participants with type 2 diabetes. This project represents a secondary analysis of data collected under Program ACTIVE (Appalachians Coming Together to Increase Vital Exercise). Participants were recruited from southeastern Ohio and western West Virginia from 2003 to 2005. Results suggest that average number of days exercised is negatively correlated with depression remission status at post treatment, indicating improved MDD. Changes in relative VO2 max levels were negatively correlated with remission status at post treatment and 3MFU, indicating increased remission rates for MDD. Exercise variables did not predict depressive outcomes. There were no significant difference in minutes exercised and change in fitness levels between remission statuses (current MDD, partial remission, full remission) at post intervention. However, participants who were in full remission from MDD at post intervention exercised significantly more days during the intervention than those with current MDD at post intervention. Results from this study suggest that exercise alone is not a sufficient treatment for MDD in those with T2DM, but should be used alongside other treatments.

College of Health Sciences

Poster Presentations

Title of Presentation: Intra and Interrater Reliability of Diagnostic Ultrasound Measurements

Presented By: *Michael Olson*

Degree/Program: M.S.A.T. - Athletic Training

Abstract: Context: Diagnostic ultrasound (DUS) is an imaging method with many potential benefits for use in clinical practice. Prior to utilization, the reliability of this modality should be determined to examine reproducibility within and between clinicians. Objective: To determine the intra and interrater reliability of ATs' ability to locate and measure three structures using DUS. Design: Reliability study. Setting: Research laboratory. Patients or Other Participants: Twenty healthy participants (11 women and 9 men, BMI = 24 ± 2.38,) volunteered as models. Three ATs credentialed = 5 years with = 5 hours total experience with DUS volunteered as raters (R1-R3). Interventions: Study procedures occurred over 4 sessions, each separated by 1-week. During session 1, raters participated in a training session which included instruction on how to use the DUS machines, videos describing how to locate the structures to be measured, and non-guided practice where the raters located and measured the structures until they felt comfortable. for sessions 2-4, each structure (patellar tendon (PT), acromioclavicular joint (AC), and median nerve (MN)), were measured twice on each model. a researcher recorded all measurements to blind the raters. Model order, as well as the order of the structures, were randomized. Each model reported to 2 consecutive data collection sessions. Results: the intrarater reliability for the PT ranged from moderate-good (ICC2,1=0.53-0.76), AC from moderate-good (ICC2,1=0.56-0.73) and MN from poor-moderate (ICC2,1=0.38-0.48). The overall interrater reliability was good for the PT (ICC= 0.73, 95%CI=0.42-0.88), excellent for the AC (ICC=0.81, 95%CI=0.60-0.92), and poor for the MN (ICC=0.23, 95%CI=-0.64-0.67). Conclusions: These results indicate the intrarater reliability of newly credentialed ATs with limited DUS experience is clinically acceptable. In addition, the interrater reliability of the PT and AC were clinically acceptable.

Title of Presentation: Improving Self-Management Behaviors for Patients with Diabetes through Health Promotion

Presented By: *Teresa Vance*

Degree/Program: D.N.P. - Nursing Practice

Abstract: PROBLEM: Type 2 diabetes (T2DM) is a nationwide epidemic and when left uncontrolled can cause serious complications, including death. Most patients with T2DM do not receive routine medical care, are uneducated about their disease process, and fail to maintain adequate glycemic control. PURPOSE: This study explored differences in knowledge of T2DM, perceived barriers to care, and healthy living behaviors between participants receiving APN-led self-management education and those receiving standard care. EBP QUESTIONS: (1) Is there a relationship between personal characteristics, knowledge of T2DM, barriers to care, healthy living behaviors, and healthcare services measured during the pre-education phase? (2) Is there a difference in knowledge of T2DM, barriers to care, and healthy living behaviors between participants receiving APN-led self-management education and those receiving standard care? (3) Is there a difference in HgbA1c levels in 3 months between participants receiving APN-led self-management education and those receiving standard care? METHODS: This study used an experimental pre-test/post-test design with two groups. Participants who agreed to participate were randomly assigned to groups.

College of Health Sciences

Poster Presentations

Title of Presentation: Zika Control & Surveillance Summer Service Learning Project

Presented By: *Angelica Walker*

Degree/Program: M.P.H. - Public Health

Abstract: Since the World Health Organization (WHO) declared the Zika Virus outbreak a public health emergency of international concern, health officials in the Commonwealth of Virginia have more closely monitored mosquitoes for Zika. Norfolk, Virginia is an area prone to flooding which can lead to an increase in mosquito habitats due to stagnant water. To reduce the risk of human transmission of the virus within Norfolk, VA, the Old Dominion University (ODU) Center for Global Health partnered with the Norfolk Department of Public Health (NDPH) and the Eastern Virginia Medical School (EVMS) Master of Public health (MPH) program to create a service learning opportunity for undergraduate and graduate students. The Zika Control & Surveillance Summer Service Learning Project was implemented mid-year 2017 in Norfolk, VA. Goals of the service learning project were to give students practical skills in vector control and provide outreach and education to local residents on the Zika Virus. Ten students participated in the project and engaged in mosquito identification, surveillance, control, community outreach and education, and laboratory work. The summer program was successful in teaching the students about vector control, the current state of Zika in their local community and what prevention efforts were being taken. Additionally, students were given an opportunity to present their summer work to faculty and staff from ODU, EVMS, NDPH and the local community. Due to positive reviews from students, the academic institutions involved in the project, and the local community, the Zika Control & Surveillance Summer Service Learning Project is expected to continue in 2017.

College of Sciences

Poster Presentations

Title of Presentation: Infrared Absorption Spectra of Hot Ammonia for Exoplanets

Presented By: *Christopher Beale*

Degree/Program: Ph.D. - Oceanography

Abstract: Infrared absorption spectra of NH3 have been obtained at high resolution (0.02 cm-1) at seven temperatures between 296 and 973 K. The spectra were recorded using a Bruker IFS 125 infrared Fourier transform spectrometer in the 2400-5500 cm-1 region and empirical lower state energies were obtained by comparison of line strengths at different temperatures. Using two reference line lists, quantum number assignments have been made for each temperature for between 1660 and 3020 transitions, with J up to 22. The line lists obtained provide accurate line positions as well as intensities and experimental lower state energies at temperatures relevant for modeling the atmospheres of brown dwarfs and exoplanets.

Title of Presentation: Global Extinction Risk of Forage Fishes of the Order Clupeiformes

Presented By: *Tiffany Birge*

Degree/Program: M.S. - Biology

Abstract: The order Clupeiformes encompasses small, schooling species such as herrings, sardines, shads, menhaden and anchovies, which exhibit natural boom-bust population cycles. Furthermore, they are ecologically important forage fishes serving as a vital trophic intermediate between zooplankton and higher order trophic predators, many of which are commercially important. The interconnected effects of these factors is thought to increase their susceptibility to environmental and anthropogenic stresses, particularly high fishing pressure. These species are commonly utilized on a global scale, however population information and conservation efforts are lacking. This knowledge gap in part is due to a tremendous overlap in distribution variance coupled with relatively indistinguishable physical characteristics. This project aims to assess the symptoms of extinction risk for clupeiform fishes using the widely accepted Categories and Criteria set forth by the IUCN Red List of Threatened Species. Prior to this study, up to date global conservation status was known for roughly 28% of this order. Using primary literature and expert knowledge, global species-specific assessments were completed for all valid clupeiform fishes (n=405), providing a comprehensive analysis of significant aspects such as: geographic distribution, habitat preference, life history traits, as well as past and present threats. The assessments can be applied to guide global and regional conservation initiatives and fishing practices.

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Poster Presentations

Title of Presentation: Global Measurements of Methane Isotopologues from ACE-FTS

Presented By: *Eric Buzan*

Degree/Program: Ph.D. - Chemistry

Abstract: We present an analysis of observations of methane and its two major isotopologues, CH3D and 13CH4 from the Atmospheric Chemistry Experiment (ACE) satellite between 2004 and 2013. Additionally, atmospheric methane chemistry is modeled using the Whole Atmospheric Community Climate Model (WACCM). ACE retrievals of methane extend from 6 km for all isotopologues to 75 km for 12CH4, 35 km for CH3D, and 50 km for 13CH4. While total methane concentrations retrieved from ACE agree well with the model, values of δD–CH4 and δ13C–CH4 show a bias toward higher δ compared to the model and balloon-based measurements. Errors in spectroscopic constants used during the retrieval process are the primary source of this disagreement. Calibrating δD and δ13C from ACE using WACCM in the troposphere gives improved agreement in δD in the stratosphere with the balloon measurements, but values of δ13C still disagree.

Title of Presentation: Linking Earth Observations and Models to Societal Information Needs: the Case of Coastal Flooding

Presented By: *Brett Buzzanga*

Degree/Program: M.S. - Ocean & Earth Sciences

Abstract: Coastal flooding is expected to increase due to sea level rise (SLR). Many societal applications such as land use planning depend on information on how the flooding spectrum may change as a result of SLR. A conceptual model is needed that identifies key stakeholders and information needs. In the context of the development of the Global Earth Observation System of Systems (GEOSS), the Socio-Economic and Environmental Information Needs Knowledge Base (SEE-IN KB) is developed as part of the GEOSS Knowledge Base. A core function of the SEE-IN KB is to facilitate the linkage of societal information needs to observations, models, information and knowledge. Comprehensive information concerning the interconnections between instances of these objects is used to establish a conceptual model as a network of networks. The captured connectivity can be used in searches to allow users to serve their information needs, and providers to search for users and applications benefiting from their products. It also allows to answer "what if" questions and supports knowledge creation. We have used the SEE-IN KB to develop a conceptual model capturing the stakeholders in coastal flooding and their information needs, and to link these elements to applications and processes. We show how the knowledge base facilitates the transition of scientific data to useable information by connecting individuals such as city managers and planners to flood maps and return probabilities. Within the knowledge base, these same users can request needed data that improve their ability to make such decisions as infrastructure development. These needs are linked to entities with the capabilities to meet them, effectively creating a bi-directional channel between science and society.

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Poster Presentations

Title of Presentation: Monte Carlo Investigation of Oceanographic Lidar Attenuation and Depolarization

Presented By: *Brian Collister*

Degree/Program: M.S. - Ocean & Earth Sciences

Abstract: Full-waveform lidar offers a technique for remotely mapping vertical distributions of optical properties and suspended particles in the ocean at temporal and spatial scales previously uncaptured by standard shipboard sampling methods. Oceanographic lidar measurements thus have the potential to improve our ability to model and interpret biogeochemical processes in the ocean, however the lack of a rigorous quantitative characterization of the lidar return signal has historically limited its usefulness to a few experimental investigations (Allocca et al. 2002; Churnside et al., 1998; Lee et al., 2013; Montes-Hugo et al., 2010). Furthermore, theory suggests that measurements of lidar depolarization have the potential to provide information on the bulk composition of scattering particles, an aspect of lidar which has been underexplored in the oceanographic lidar community (Churnside 2008; Sassen 1991; Twardowski et al., 2001). To address these shortcomings in our understanding of oceanographic lidar, a Monte Carlo radiative transfer model was developed to simulate the return signal of a profiling lidar system. Lidar signals were simulated for a range of detector field of views (FOVs), water column inherent optical properties (IOPs), and depolarization properties. Quantitative relationships were developed between the modeled return signal and the detector FOV, water column IOPs, and extent of multiple scattering contribution to the signal. The extent of signal depolarization was also investigated as a proxy for suspended particle composition and the contribution of multiple scattering to the signal. These results were then used to explore the capabilities of a prototype lidar system for remote sensing of particle composition and distribution in the ocean, as well as to consider design aspects that may improve these capabilities in future generation lidar systems.

Title of Presentation: Phenology of Ixodes Spp. Ticks on Birds in Southeastern Virginia and Implications for the Spread of Borrelia Burgdorferi

Presented By: *Alexandra Cumbie*

Degree/Program: M.S. - Biology

Abstract: Lyme disease is on the rise in Virginia; from 2005 to 2014 confirmed cases of Lyme disease per 100,000 population have increased from 274 cases to 976 cases (CDC, 2014). As the environment changes, new ecological niches and alternative hosts become available to tick populations. This set of expanded hosts and habitats contributes to the spread of the Lyme disease pathogen, Borrelia burgdorferi. One understudied area is the parasite-host interaction between birds and Ixodes ticks. Birds not only provide a host for black-legged ticks, but also serve as a reservoir for B. burgdorferi. The phenology of different Ixodes spp. during their juvenile stages (larvae and nymph) allows B. burgdorferi to be maintained in the bird and tick populations and serves to increase its spread.

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Poster Presentations

Title of Presentation: Proof of Concept: Optimizing Accelerator Design with a Genetic Algorithm

Presented By: *Dallan Duffin*

Degree/Program: Ph.D. - Physics

Abstract: A fundamental tool to the understanding of the subatomic realm is the particle accelerator. High energy accelerators are imperative to particle physics and synchrotron light sources are used in various other fields including medicine. The development of these machines can be costly and difficult; therefore, there is interest in modeling how a particular design of an accelerator will function. Radiated fields allow charged particles to self-interact as they are accelerated. When these fields have a wavelength comparable to the bunch length of the beam, CSR (Coherent Synchrotron Radiation) allows for systemic, non-linear effects that compromise the quality of the beam. Accurate modeling of these effects can be utilized in addition with a genetic algorithm to optimize accelerator design. We present an innovative two-dimensional particle tracking simulation of CSR effects at a feasible computational cost. By varying parameters for accelerator design and treating the CSR simulation as a function evaluator, a genetic algorithm can optimize the design parameters for the most ideal beam quality. A proof of concept will be shown that demonstrates how the dimensions of a simple bunch compressor can be optimized for emittance, longitudinal spread, and energy spread.

Title of Presentation: Trends in the Upper Atmospheric Molecules and the Temperature

Presented By: *Anton Fernando*

Degree/Program: Ph.D. - Physics

Abstract: In the atmosphere CO2 is an important agent as it acts as a greenhouse gas in the lower atmosphere and as a coolant in the mid and upper atmosphere. Carbon dioxide (CO2) has been constantly increasing due to human industrial activity, mainly due to fossil fuel combustion and deforestation. Because CO2 is chemically stable and can exist in the atmosphere for a very long time, it alters the Earth's climate leading to warming at the surface [IPCC, 2007]. Therefore the temperature of the Earth's atmosphere depends on the atmospheric CO2 concentrations. It is useful to monitor the global changes in the atmosphere from orbit; satellite observations give more extensive coverage than ground-based, airborne or balloon measurements. By using global CO2 and temperature profiles provided by the ACE satellite, trends in temperature and CO2 concentrations were obtained. The 11-year solar cycle, which is associated with a substantial change in the solar ultraviolet (UV) flux, affects the trends. Therefore the solar cycle effect was removed from the data by using the F10.7 solar index.

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Poster Presentations

Title of Presentation: Protein Secondary Structure Detection using Pattern Recognition and Modeling

Presented By: *Tunazzina Islam*

Degree/Program: Ph.D. - Computer Science

Abstract: Electron cryo-microscopy (Cryo-EM) technique produces density maps that are 3-dimensional (3D) images of molecules. In order to derive atomic structure of molecules, molecular features need to be identified from 3D images. Some molecular features of a protein show characteristic patterns in the image, and others show weak patterns or no pattern. We describe an approach that uses a combination of pattern recognition and geometrical modeling to recognize protein secondary features including α-helices and β-strands. We show the principle of modeling to distinguish the orientation of β-strands that are not visible in 3D images at medium resolution.

Title of Presentation: Uncovering the Anthropogenic Sea Level Change using an Improved Sea Level Reconstruction for the Indian Ocean

Presented By: *Praveen Kumar*

Degree/Program: Ph.D. - Oceanography

Abstract: Despite having some of the world's most densely populated and vulnerable coastal regions, sea level (SL) variability in the Indian Ocean (IO) has received considerably less attention than the Pacific Ocean. Differentiating the internal variability from the long-term trend in global mean sea level (GMSL) at decadal time-scales is vital for planning and mitigation efforts in the IO region. Understanding the dynamics of internal and anthropogenic SL change is essential for understanding the dynamic pathways that link the IO basin to terrestrial climates world-wide. With a sparse pre-satellite observational record of the IO, the Indo-Pacific internal climate variability is difficult to represent accurately. However, an improved representation of pre-satellite SL variability can be achieved by using a multivariate reconstruction technique. By using cyclostationary empirical orthogonal functions (CSEOFs) that can capture time-varying spatial patterns, gaps in the historical record when observations are sparse are filled using spatial relationships from time periods when the observational network is dense. This reconstruction method combines SL data and sea surface temperature (SST) to create a SL reconstruction that spans a period from 1900 to present, long enough to study climate signals over interannual to decadal time scales. This study aims at estimating the component of SL rise that relates to anthropogenic forcing by identifying and removing the fraction related to internal variability. An improved understanding of how the internal climate variability can affect the IO SL trend and variability, will provide an insight into the future SL changes. It is also important to study links between SL and climate variability in the past to understand how SL will respond to similar climatic events in the future and if this response will be influenced by the changing climate.

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Poster Presentations

Title of Presentation: Characterization of the Par-4 Tumor Suppressor

Presented By: *Dong Liu*

Degree/Program: Ph.D. - Chemistry

Abstract: Prostate apoptosis response-4 (Par-4) is a protein of interest for cancer therapy because it can trigger apoptosis in certain cancer cells, while not affecting the nearby healthy cells. Par-4 exists both in the cytoplasm and the nucleus of most, but not all, cancer cells. Nascent Par-4 is unable to induce apoptosis. Phosphorylation, proteolytic processing and nuclear translocation of Par-4 is essential for cancer cell apoptosis by Par-4. Previous research in our laboratory has uncovered the characteristic features of intrinsic disorder for racine Par-4, the most highly characterized form of Par-4. From bioinformatics analysis, we predict more order in human Par-4 than in the racine form. Preliminary experimental analysis will be presented supporting this conclusion. Also, Par-4 analysis is hampered by low expression levels in E. coli. We will present results showing improved expression via codon optimization. This will enable our structural studies. In addition, we are developing point mutants and truncation mutants that mimic the post-translationally modified forms of Par-4. These will be useful both for structural characterization of active Par-4 variants, and for identification of additional binding partners. Authors: Dong Liu, Komala Ponniah, Juhi Ramchandani, Waldon S. Chen, Meghan S. Warden, Amanda K. Swain, Steven M. Pascal

Title of Presentation: Gpu-Accelerated High-Fidelity Simulation of Beam-Beam Effects in Particle Colliders

Presented By: *Naga Sai Ravi Teja Majeti*

Degree/Program: M.S. - Computer Science

Abstract: Particle colliders are essential tools for understanding the fundamental structure of matter in physical science. In circular colliders, two counter-rotating beams with one or more bunches, each consisting of hundreds of millions of particles traveling nearly at speed of light are forced to collide at each turn. Design and optimal operation of these colliders critically depend on accurate and efficient numerical simulation of the underlying physical processes. Serial, or even naïvely parallel implementation of this simulation is prohibitively costly in terms of efficiency and computational requirements, necessitating simulation times on the order of months. In this study, we develop high-performance, high-fidelity simulation of beam-beam effects in particle colliders using GPUs. We analyze how memory intensive computations in beam tracking can take advantage of the GPUs memory model. We also examine how the collisions can be done efficiently on GPU by exploiting their inherent parallelism. Furthermore, we analyze how the parallel simulation scales on a cluster of GPUs. Our GPU-optimized implementation is nearly three orders of magnitude faster than the equivalent simulation executed on a CPU.

College of Sciences

Poster Presentations

Title of Presentation: Biogeochemical Cycling of Selenium in the Arctic Ocean

Presented By: *Kyle McQuiggan*

Degree/Program: M.S. - Ocean & Earth Sciences

Abstract: Dissolved selenium is a trace element in seawater that exists in several oxidation states (-II, selenide; IV, selenite; VI, selenate) and chemical forms within a given oxidation state (e.g., organic and inorganic). This chemical speciation is highly relevant given that its biotic and abiotic reactivity/bioavailability vary with the chemical form. Depending on the chemical form, dissolved Se is an essential element for many phytoplankton, but its toxicity is also affected by its chemical speciation. The known biogeochemical cycle of Se closely follows that of nitrogen (e.g., nutrient-like vertical profiles), but virtually nothing is known about selenium cycling in the Arctic Ocean. Thus, samples for dissolved and particulate Se were collected during the 2015 US GEOTRACES cruise from Dutch Harbor, Alaska to the North Pole and back, with extensive sampling in the Makarov and Canada Basins. In general, total diss. Se varied from 0.5 - 1.97 nM which is larger than concentrations observed in the Atlantic basin, but similar to concentrations found in the Pacific. This comparison between the Arctic and Pacific and Atlantic Ocean basins holds true for selenite (0.00 - 0.53 nM), selenate (0.01 - 0.80 nM), and selenide (0 - 1.46 nM). the nutrient-like behavior was not as pronounced in the Arctic Ocean compared to the Pacific and Atlantic, with higher concentrations in the upper water column. Whether this lack of depletion is due to lower uptake or increased inputs from the atmosphere or rivers is still being studied. We are still determining Se concentrations in suspended particles. The biogeochemical cycling of Se in the Arctic will be discussed in the context of its cycling in other ocean basins, specifically the North Pacific and North Atlantic.

Title of Presentation: The Fat's Where it's at: New Approaches to Track Intact Phospholipids and Triglycerides in Euphausiids via Tandem LC-MS

Presented By: *Rachel Pleuthner*

Degree/Program: M.S. - Ocean & Earth Sciences

Abstract: In the Eastern Bering and Chukchi Seas, Thysanoessa raschii are the most abundant krill species and a keystone trophic component that serves as both an important grazer and a link to upper level consumers, including whales. Krill also experience large variations in food resource during annual ice advance and retreat, and store multiple lipid classes for both reproduction and growth. Two shipboard feeding experiments tested specific lipid retention and turnover in adult T. raschii under food-limited conditions. Phospholipids represent the major structural lipid, but also serve as energy storage, and their retention as intact phospholipids (IPL), plus glycerides (i.e. di- and triacylglycerides; DG and TG), were followed over 19- and 31-day experiments. Recent analytical advances in tandem mass spectrometry allowed the complex suite of IPLs to be determined. The majority of IPL's contained phosphotidylcholine (PC) headgroups; smaller contributions were made by those with phosphatidylethanolamine (PE) and phosphatidylserine (PS). The fatty acids present were largely represented by seven compounds - C14:0c, C16:0n, C16:1(n-7), C18:1(n-7), C18:1(n-9), C20:5(n-3), and C22:6(n-3) - and were arranged as mixed acyl groups within each lipid class. IPL concentrations over time (umole/g wet weight) of IPL showed a decrease from 21% and 26%, respectively, suggesting that both are mobilized in times of food scarcity and during times of overwintering, with specific losses for several fatty acids. The more powerful set of analytical and software tools allows determination of the suite of intact lipids within euphausiids at unprecedented levels of detail to allow a comprehensive picture of krill lipids and their retention during times of varied food availability.

College of Sciences

Poster Presentations

Title of Presentation: The Role of Stringent Response in Clostridium Difficile Survival and Virulence

Presented By: *Astha Pokhrel*

Degree/Program: Ph.D. - Chemistry

Abstract: Clostridium difficile infection (CDI), caused by an intestinal pathogen, is a major cause of hospital-acquired diarrhea, contributing largely to morbidity and mortality on a global scale. C. difficile is tolerant of an array of antibiotics and that the public health impact of CDI is compounded by an extremely high recurrence rate. Studies have demonstrated that C. difficile spores germinate into vegetative cells and colonize the host colon, ultimately producing virulent toxins. However, the mechanisms of bacterial colonization and toxin production remain unclear. Here, we targeted the stringent response (SR) pathway mediated by the small signaling ribonucleotides guanosine tetraphosphate (ppGpp) and guanosine pentaphosphate (pppGpp) in response to starvation. Hydrolase and synthetase enzymes regulate the levels of (p)ppGpp in the bacterial cytoplasm. We have thus far identified functional C. difficile genes encoding enzymes with predicted roles in (p)ppGpp metabolism; the bifunctional Rel/Spo Homolog (RSH) and small alarmone synthetases RelC and RelQ. We have also shown impaired C. difficile Δrsh survival during stationary phase of growth and demonstrated reduced bacterial tolerance to ampicillin. We aim to molecularly and structurally characterize RSH so that compatible chemical inhibitors can be designed to target RSH synthetase activity. In that attempt, we have successfully cloned full length C. difficile RSH and four truncated synthetase domain constructs and expressed them in E.coli. Expression of the C. difficile (p)ppGpp synthetase domains impacts (p)ppGpp-regulated phenotypes, including, delayed growth and biofilm formation in nutrient rich conditions. Our goal is the development of inhibitors of (p)ppGpp synthesis, which can also be used in conjugation with the existing antibiotics to increase C. difficile susceptibility.

Title of Presentation: Machine Learning in Global Optimization

Presented By: *Sukesh Sangam*

Degree/Program: M.S. - Computer Science

Abstract: A main challenge in global non-linear optimization is how to optimize a system in the absence of its algebraic model. This is the focal point of our research. We conducted various experiments using machine learning. Initially, we used various machine learning algorithms to train the set of data of a known test function, so that we can quantify the learning rate. We then moved on to the real simulation of an unknown function. Next, we replaced the algebraic model with the machine learning model based on random points generated by the original function and coupled it with differential evolution and Bayesian optimization techniques. We present some encouraging results which suggest that using these techniques, an improved, more efficient optimization may be possible in situations where function evaluations are expensive. Keywords: Machine Learning, Global Optimization

College of Sciences

Poster Presentations

Title of Presentation: Identifying Decadal to Multi-Decadal Variability in the Pacific by Empirical Mode Decomposition

Presented By: *Lauren Sommers*

Degree/Program: M.S. - Ocean & Earth Sciences

Abstract: Large scale climate variability in the Pacific Ocean like that associated with ENSO and the Pacific Decadal Oscillation (PDO) has been shown to have a significant impact on climate and sea level across a range of timescales. The changes related to these climate signals have worldwide impacts on fisheries, weather, and precipitation patterns among others. Understanding these inter-annual to multi-decadal oscillations is imperative to longer term climate forecasts and understanding how climate will behave, and its effect on changes in sea level. With a 110-year reconstruction of sea level, we examine decadal to multi-decadal variability seen in the sea level fluctuations in the Pacific Ocean. Using empirical mode decomposition (EMD), we break down regional sea level into a series of intrinsic mode functions (IMFs) and attempt attribution of these IMFs to specific climate modes of variability. In particular, and not unexpectedly, we identify IMFs associated with the PDO, finding correlations between the PDO Index and IMFs in the Pacific Ocean upwards of 0.6-0.8 over the 110-year reconstructed record. Perhaps more significantly, we also find evidence of a longer multi-decadal signal (~50-60 years) in the higher order IMFs. This lower frequency variability has been suggested in previous literature as influencing GMSL, but here we find a regional pattern associated with this multi-decadal signal. By identifying and separating these periodic climate signals, we can gain a better understanding of how the sea level variability associated with these modes can impact sea level on short timescales and serve to exacerbate the effects of long-term sea level change.

Title of Presentation: Molecular Spectroscopy

Presented By: *Mahdi Yousefi Atashgah*

Degree/Program: Ph.D. - Physics

Abstract: The four most abundant isotopologues (N2O, 15NNO, N15NO, and NN18O) of nitrous oxide have been measured in the Earth's atmosphere by infrared remote sensing with the Atmospheric Chemistry Experiment (ACE) Fourier transform spectrometer. These satellite observations have provided a near global picture of N2O isotopic fractionation. The relative abundance of the heavier isotopologues increase with altitude and with latitude in the stratosphere as the air becomes older. These observations are in general agreement with model predictions made with the Whole Atmosphere Community Climate Model (WACCM).

Darden College of Education

Poster Presentations

Title of Presentation: Effects of Visual Cueing in the Training of Novice Welders

Presented By: *Sonya Bland-Williams*

Degree/Program: Ph.D. - Education - Instructional Design & Technology

Abstract: This experimental study investigated the effects of feedback on learning during a simulator-based welding task. The commercial simulator in this study is designed to allow practice of welding techniques in a simulated, mixed-reality environment where visual cues can be made available during practice. Visual cues represent weld concepts which describe a subcomponent movement of the overall body mechanics required for the welding process. Each of the visual cues can be toggled on or off during training. A total of 54 participants completed the study forming six treatment groups. The independent treatment, feedback, was manipulated as scheduling (absolute—every practice trial or relative—every third trial) and strategies (gradual decrease of visual cues within the interface, gradual increase of visual cues within the interface, or a single cue for each trial). Each group completed 12 training trials. No treatment showed significant difference among groups with regard to initial learning, retention, near transfer, and far transfer measures. However, statistical significance was found during initial learning and retention within each treatment group after trial six. Empirical findings support that a variability of practice paradigm promotes learning (Lee & Carnahan, 1990; Shea & Morgan, 1979). Novice learners perceived simulator fidelity as high, however, these perceptions dissipate with practice. Groups that received the greatest number of cues at the onset of practice or cues at every other trial reported the highest workload. All groups reported an increase in self-efficacy during simulator practice, but those perceptions decreased when welding on actual equipment.

Title of Presentation: Are Crossfitters Really Brand Evangelists

Presented By: *Timothy Campbell*

Degree/Program: Ph.D. - Education - Human Movement Sciences, Sport & Recreation Management

Abstract: Over the past fifteen years, the sport of CrossFit has grown from a niche community to a worldwide phenomenon (Alfonsi, 2015). CrossFit is known for their intense workouts combining Olympic lifting, powerlifting, and gymnastic movements with short, high-intensity cardiovascular sessions. They are also known for having a community of passionate members who are continually talking about the benefits of doing CrossFit (Mansfield, 2015). In the marketing community, this type of passion is referred to as brand evangelism. Brand evangelists are known for brand passion, brand loyalty, strong purchase intentions, positive brand referrals, and oppositional brand referrals, or trash-talking (McConnell & Huba, 2004). Brand evangelists are seen as loyal customers who work to convert other people into becoming loyal customers.Brand evangelism has been most widely studied in a variety of consumer settings including gaming system owners (Maricotte, Arcand, & Baudry, 2016), consumers of "cult-like" goods (Doss, 2014), and athletic shoes (Becerra & Badrinarayanan, 2013). It has also been examined in the context of communities such as web-based rose gardening community members (Scarpi, 2010), and fans of sports teams (Dwyer, Greenhalgh, & LeCrom, 2015). The concept of brand evangelism has never been examined in the context of individual sport participation. In our study, we will examine the expected outcomes of brand evangelism, using the sport eFANgelism scale (Dwyer, et al., 2015), with the Big Five personality traits as antecedents, as they apply to a group of CrossFitters in southeastern Virginia and determine whether the reputation for brand evangelism is deserved.

Darden College of Education

Poster Presentations

Title of Presentation: Does Career Development in College Associate with Employability in STEM?

Presented By: *Yi-Ching Lin*

Degree/Program: Ph.D. - Education - Occupational and Technical Studies

Abstract: There is increased concern for the potential impact of declining STEM candidates on the U.S. economy (Kelic & Zagnoel, 2009; Maltese & Tai, 2010). Some studies suggest that the gap between STEM higher education supply and workforce demand is not reflected merely in the number of STEM graduates but instead in the number of qualified STEM graduates who could satisfy STEM workforce demand (Kelic & Zagnoel, 2009; Lowell & Salzman, 2007). The current study uses Rae's employability theory (Rae, 2007) to assess five career development areas of new STEM graduates in order to predict their employability. Participants were 35 new STEM graduates (mean age = 23.08, SD=1.746, male=61%) from different STEM majors. Participants were new graduates recruited via the university's alumni association and were compensated with a gift card for participation. The college of health sciences (i.e. health sciences, dental hygiene, environmental health, medical technology, nuclear medicine technology, and nursing), military, veterans, and nonnative speakers were excluded. Data were collected via a 10-20 minute, online survey. Items measured satisfaction on a Likert-scale of 1 (strongly disagree) to 5 (strongly agree). Outcome measures were current employability status (i.e. employed, under or un-employed, or graduated student) in workforce and career development in college. One-way MANOVA was performed to test whether new STEM graduates career development in college associated with their current employability. Results show that new STEM employed graduates have the highest level of career development in college than new STEM graduated students and unemployed new graduates. Implications will be discussed.

Title of Presentation: Reciprocal Teaching in an Online, Asynchronous Community College Course

Presented By: *Jenifer Marquis*

Degree/Program: Ph.D. - Education - Instructional Design & Technology

Abstract: Reciprocal teaching is an interactive instructional procedure that improves students' text comprehension skills through scaffolded instruction of four comprehension-fostering and comprehension-monitoring strategies (Palincsar & Brown, 1984; Rosenshine & Meister, 1994). The four reciprocal teaching strategies are predicting, questioning, clarifying, and summarizing (Palincsar & Brown, 1984, 1986; Palincsar, Brown, & Martin, 1987). Reciprocal teaching involves student-led instruction, modeling, practice, and feedback in metacognitive, self-monitoring and evaluating strategies (Brown, Campione, & Day, 1981). While reciprocal teaching is well accepted in K-12 and higher education, it has not yet been implemented in an online, asynchronous community college course. The purpose of this study was to determine the potential of reciprocal teaching to facilitate deeper cognitive processing and higher levels of thinking related to course texts in an online, asynchronous community college courses. The strategies and peer teaching were incorporated into an online asynchronous community college course using discussion forums for dialogue, strategy use, and peer teaching. Quasi-experimental, multiple methods were employed to compare the effects of traditional and reciprocal teaching methods when implemented in discussion forums for an online, community college course. A convenience sample of two sections of the same course was studied over 16 weeks. Outcome variables were level of thinking, understanding of course texts, online reciprocal teaching implementation, and students' reflections on the relationship between discussions, strategies, and learning. Results indicated that reciprocal strategies promoted significantly higher levels of thinking and deeper processing of course texts than traditional methods. Implications for implementation and future research are discussed.

Darden College of Education

Poster Presentations

Title of Presentation: Measuring Visual and Written Spatial Bias in English and Arabic Languages using Eye Tracking

Presented By: *Arwa Mashat*

Degree/Program: Ph.D. - Education - Instructional Design & Technology

Abstract: This study investigated how language orientation influences the interaction with online pictures and words using a remote 3D eye tracking system. The purpose was to determine if spatial bias is associated with native language orientation of learners through completing three tasks (sentence forming, word/image recall, and sequence). The study addressed three research questions: 1. To what extent does native language text orientation influence learner's visual attention to on-screen pictures as measured by a sentence forming task? 2. To what extent does native language text orientation influence learner's visual attention to on-screen material as measured by word and image recall? 3. To what extent does native language text orientation influence learner's visual attention to on-screen images as measured by a cognitive writing task? A total of 40 participants completed this study, assigned to one of two treatment groups based on their native language. The (English) group were native English speakers that had never studied a language written from right to left. They received all materials in English. The (Arabic) group were native Arabic speakers who were currently studying English. They received all materials in Arabic. Results confirm that spatial bias is associated with native language orientation such that the English-oriented learners were more likely to demonstrate left bias on the screen while participants who were native Arabic speakers demonstrated right bias on the screen for both the sentence forming and recall tasks.

Title of Presentation: Investigating Parental Involvement and Event Satisfaction of Children's Running Event

Presented By: *Michelle Redmond*

Degree/Program: Ph.D. - Education - Human Movement Sciences, Sport & Recreation Management

Abstract: Parents are found to be a main source of influence on children in their activity choices. Emerging are school based running programs culminating with a community running event offering more than simply running in a race. In regard to a community running event coupled with a training program, it seems logical to assume the parental personal running values and behaviors would be salient factors influencing the choice of children to participate in this event. Event satisfaction has a positive relationship with behavioral intentions and therefore may increase purchase decisions. Consumers who are involved and satisfied with a product are likely to continue making similar purchase decisions. It is hypothesized, greater parental involvement with running and higher satisfaction with the event/training program will lead to an increased likelihood to continue to register their child for future community running events. A sample of 338 parents of children who participated in a children's community running event was used to investigate the influence of parental involvement on event satisfaction and event satisfaction on behavioral intentions for future participation in the event. Parental involvement, event satisfaction and behavioral intentions included an examination of group differences by parent gender, parent runner identification, child participation in a running program, and child participation in a fundraising activity associated with the event. Preliminary results indicate there are positive relationships among involvement and event satisfaction. Results also show a positive relationship between event satisfaction and intentions for future participation. Based on these results, it can be argued race directors should have a marketing component targeted toward parents that increases their level of involvement in order to contribute to an increased level of event satisfaction.

Darden College of Education

Poster Presentations

Title of Presentation: A Survey of Speech-Language Pathologists Regarding Attention-Deficit Hyperactivity Disorder

Presented By: *Jane Roitsch*

Degree/Program: Ph.D. - Education - Special Education

Abstract: The purpose of this research was to survey Speech-Language Pathologists (SLPs) who provide treatment to children with known attention deficits to determine; 1) the level of education and training they received prior to working with this population, and 2) their comfort level when working with children with attention disorders. As of 2011, 6.4 million, or 11 percent of children in the United States between the ages of 4-17 years of age and an average of 5 percent of children worldwide have been diagnosed with attention-deficit/hyperactivity disorder (ADHD) (Centers for Disease Control and Prevention, 2016). It has been shown that children with ADHD have a greater propensity to demonstrate deficits in receptive and expressive language and memory (DeParma, Geffner & Martin, 2011) and potentially 75% of children with ADHD may present with a language disorder that warrants clinical intervention (Walsh, Scullion, Burns, MacEvilly & Brosnan, 2014). Via anonymous online survey, 86 school SLPs whose clinical caseload includes students diagnosed with ADHD participated in this survey. More than half of SLPs reported little to no coursework in school related to working with students with ADHD, and comfort level working with this population was varied at best. These results support the need for increased training and may encourage graduate school programs to better educate student SLPs during graduate school to comfort level and understanding of this unique yet large population of students. Professional graduate school SLP programs play an integral role in preparing clinicians for entry-level practice, ultimately achieving clinical competence.

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