3rd Annual
PASSHE Undergraduate Research Conference in
Science, Technology, Engineering and Mathematics

Hosted by
Millersville University
November 5, 2016
A Message from the Provost

November 5, 2016

Welcome to Millersville University and the 3rd Annual PASSHE Undergraduate Research Conference in Science, Technology, Engineering, and Mathematics.

As a proud member of the Pennsylvania State System of Higher Education, we are pleased to host this year’s conference, which showcases the work of students from ten different State System universities. Over 140 people will be in attendance to observe and learn from the 77 presentations scheduled for this event.

Many of the issues facing the world and its inhabitants today can only be resolved through contributions made by members of the STEM community. Therefore, it is imperative that institutions of higher education promote engineering, science and technology programs which foster an environment of undergraduate research, creativity, and scholarship. Additionally, focusing on the education and preparation of professionals in these fields is paramount in allowing the United States to be competitive both domestically and abroad.

The mentoring relationship forged by faculty plays an integral part in a student’s academic, professional, and personal development. I would like to personally thank those who have dedicated their time and effort to our young scholars and helped to ensure the continued success of this STEM conference.

Congratulations to all our presenters!

Sincerely,

Vilas Prabhu

Vilas A. Prabhu, Ph.D.
Provost and Vice President
For Academic Affairs
### 3rd Annual
PASSHE Undergraduate Research Conference in Science, Technology, Engineering and Mathematics

#### AGENDA

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| 10:15 – 11:45 am | Oral Presentation Sessions                 | I: Student Memorial Center, Room 202  
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| 11:45 am – 1:15 pm | Lunch                                     | Lehr Room, Gordiner Hall & Bolger Conference Center |
| 1:15 – 2:30 pm | Poster Session II                          | Student Memorial Center, Room 114 |
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POSTER 1: Testing the effectiveness of small mammal identifiable markers in the field

Presenters: Tyler Bridgehouse and Grace Nussbaum, Millersville University of Pennsylvania
Mentor: Dr. Aaron Haines, Millersville University of Pennsylvania
Area: Biology

Abstract: The capture-recapture of wildlife is used to provide estimates of population density, survival, recruitment and movement. This information is important for guiding conservation management decisions. Capture-recapture involves placing an identifiable marker on a captured individual. Our objective was to test the effectiveness of small mammal identifiable markers. Ear-tag marking has been used successfully on small mammals, but can inhibit grooming and promote infection. For short term studies, non-toxic hair-dyes may be less invasive. We used three different marking techniques (ear tagging, Clairol hair-dye and The Muromachi Kikai hair-dye marker) on Peromyscus leucopus. This study was conducted within Millersville University and consisted of two transect lines, each with ten Sherman traps checked twice weekly. Data for different marking techniques were photo recorded to validate effectiveness. Tentative results suggest that the Muromachi Kikai hair-dye marker outlasts the Clairol hair-dye and can be used to distinguish individuals after two weeks in the field.

Keywords: capture-recapture, hair dye, marking, small mammals, wildlife

POSTER 2: KN223 Atlantic Eolian Dust as a Record of Paleoclimate

Presenter: Brennan Ferguson, Indiana University of Pennsylvania
Mentor: Dr. Steven Hovan, Indiana University of Pennsylvania
Area: Geosciences

Abstract: The eolian component of sediment samples taken from cores collected by the RV Knorr on its 223rd voyage provide a promising record of regional climate in the Mid-Atlantic. This portion of the sediment core represents dust aerosol transported across the Eastern Atlantic from the Sahara/Sahel region of Africa by the Trade Winds. Deposited eolian material’s grain size serves as a proxy for the relative strength of the Trade Winds and the mass flux represents the aridity of the source region. We hope to determine the climatic response to the onset of the ice ages at the beginning of the Pleistocene 2.65 Mya and to the subsequent glacial and interglacial periods. The results of our will reflect the effect of gaining and losing glacial ice and the resulting shift in the polar - equatorial temperature gradient, on the climate in the past.

Keywords: geology, paleoclimatology, oceanography
POSTER 3: How Diminished is the trophic role of invasive plants in supporting insect herbivory?

Presenters: Aaron Wolfe, Margaret Blaetz, and Christopher Pagan, Indiana University of Pennsylvania
Mentor: Dr. Ellen Yerger, Indiana University of Pennsylvania
Area: Biology

Abstract: When introduced to a new ecosystem, nonnative plant species often outcompete the native species for resources. This competition disrupts the ecosystem’s trophic structure as plants represent the base of the trophic levels. If native insects do not adapt to the nonnative plants, birds will have fewer insects to eat, thus the trophic structure of the ecosystem will collapse. Our research was designed to test this using invasive multiflora rose, Rosa multiflara, native Carolina rose, Rosa carolina, invasive Morrow’s honeysuckle, Lonicera morrowii, and native trumpet honeysuckle, Lonicera sempervirens. Using image analysis software, the herbivory patterns of the plants leaves were compared from three different plots. The software calculates missing portions of the leaves to determine the amount of herbivory. Nets were placed on plants to evaluate the relationship between herbivory of nonnative and native plants and bird presence. Insects found on the leaves were photographed and kept for future observations.

Keywords: Non-native plant species, native plant species, bird nets, trophic levels

POSTER 4: How insecticides affect behavior of maize weevils

Presenter: Shale’ Brown, California University of Pennsylvania
Mentor: Dr. Janie McClurkin, California University of Pennsylvania
Area: Biology

Abstract: By the year 2050 the world population is expected to reach 7 billion, presenting a need to protect our stored food supply from spoilage agents and pest. Pest management for the control of stored grain insects, such as Sitophilus zeamais (Maize weevils) will continually need to be evaluated, including alternative insecticidal treatment methods and products. Under these circumstances, the need to find a safe, convenient, and economically friendly insecticide is crucial. In this study, we evaluated how insecticides affect mortality and various behaviors of maize weevils such as repellency, cognitive abilities and food consumption rate. A control and chemical treatments of an organic insecticide and ammonium sulfate were assayed on grain to be fed to adult maize weevils. Maize weevils were then exposed to the corn samples for 48 hours before each test was evaluated.

Keywords: insecticides, repellency, cognitive behavior, and consumption rate, maize weevils
POSTER 5:  Isolation and comparative analysis of twitchin RNA sequences from distinct muscle types in the squid *Doryteuthis pealeii*

Presenter:  Victoria Coutts, Millersville University of Pennsylvania
Mentor:  Dr. Carol Ely Hepfer, Millersville University of Pennsylvania
Co-Authors:  Katherine Geating and Mervin Fansler, Millersville University of Pennsylvania
Area:  Biology

Abstract: Twitchin is a protein involved in regulating invertebrate muscle contraction. The twitchin gene has been well characterized in the nematode *C. elegans* and the mussel *M. galloprovincialis*, but it was not known if squid, *Doryteuthis pealeii*, express twitchin. Our goal was to determine if twitchin exists and if it plays a role in regulating the distinct activities observed in squid muscles. Messenger RNA isolated from funnel retractor and head retractor muscles was used to synthesize complementary DNAs (cDNA). Using this cDNA as template, primers with homology to twitchin-like sequences in *C. elegans*, *M. galloprovincialis*, and *O. bimaculoides* were designed and used successfully to generate PCR (polymerase chain reaction) products that were consistent with sizes expected for twitchin mRNA. Sequences of these products were determined and their homology to twitchin confirmed. This indicates that twitchin is expressed in squid muscles and that it may play a role in their regulation.

Keywords: twitchin, squid, genetics, muscle

POSTER 6:  Development of a lab exercise that utilizes live-cell imaging in drosophila cells to identify stressors that induce protein misfolding

Presenter:  Annette Choi, Slippery Rock University
Mentors:  Dr. Martin Buckley and Dr. Stacy Hrizo, Slippery Rock University of Pennsylvania
Co-Presenter:  Mengqi Wang, Slippery Rock University of Pennsylvania
Area:  Biology

Abstract: Exposure of cells to various environmental and chemical stresses can cause protein misfolding and aggregation. In turn, this can disrupt the functions of proteins, threatening the viability of an organism. To combat cellular stress, a battery of transcription factors, including the master activator HSF (heat shock factor) are recruited to the promoters of HS protein genes to induce gene transcription. This leads to the production of HSF proteins that function as molecular chaperones to facilitate refolding of proteins. Here we describe the development of a laboratory exercise in which students observe GFP-tagged HSF binding to the HS protein genes in living *Drosophila* salivary gland nuclei as an output of stress induced protein misfolding. Using this system, students will test if various known and putative stressors induce the HSF stress response pathway. This activity will be the foundation for future projects that examine how different stressors impact heat shock gene regulation.
POSTER 7: Enhancing destination memory in younger and older adults through the use of imagery
Presenter: Erika Fenstermacher, Indiana University of Pennsylvania
Mentor: Dr. Tara Johnson, Indiana University of Pennsylvania
Co-Author: Katie Stanko, Louisiana State University
Area: Psychology

Abstract: Destination memory is remembering to whom information was told, which is useful in facilitating social interactions but also for remembering if a doctor was told certain medical information. Gopie et al. (2010) found age differences in destination memory, and Jefferson (2013) found that using an associative imagery strategy improved destination memory accuracy, particularly for older adults. Our study will examine age differences (older vs. younger) in destination memory accuracy by comparing associative, contextual, and no imagery conditions. Using a computer program, participants will be presented with 50 facts to tell 50 celebrity faces and will follow their randomly assigned imagery condition. Item memory as well as destination memory will be assessed. We expect that the use of associative or contextual imagery will improve destination memory, resulting in minimized age differences in performance. Discussion will emphasize the importance of training older adults to use strategies to improve destination memory accuracy.

POSTER 8: Endangered Hawaii: Assessing threats that impact federally listed species in this biologically unique area
Presenter: Alexander Sandercock, Millersville University of Pennsylvania
Mentor: Dr. Aaron Haines, Millersville University of Pennsylvania
Co-Authors: Kayli Thomas, Delaney Costante, Kelsi Nagy, Amanda Dziedzie, Hannah Brown, Jessica Evans, Tyler Treakle, Isabel Ritrovato, Maggie Hollingsworth, Courtney Check, Ann Marie Rydberg, Rachel Caron, and Matthias Leu, Millersville University of Pennsylvania
Area: Biology

Abstract: Hawaii is one of the most biologically diverse regions in the world, and is part of the Polynesia-Micronesia biodiversity hotspot. It currently has the most federally listed threatened and endangered species out of any US state or territory. Our goal for this study is to provide valuable insight into the current threats impacting all federally listed Hawaiian species as well as the ability to view trends to predict future threats. This would help in learning how to better implement recovery strategies for these species. Additionally, we would like to compare the threats impacting federally listed species in Hawaii to the threats impacting the continental US, and compare how these threats have changed over time. Data for this research was collected by reviewing federal register documents to identify the threats that are impacting listed species. Preliminary results suggest that alien species and habitat degradation are the top threats to Hawaiian species.

Keywords: Endangered Species, Hawaii, Conservation, Policy
POSTER 9:  Ototoxic agents to the lateral line during zebrafish development
Presenters:  Moira Dougherty and Veronica Cadavid, Millersville University of Pennsylvania
Mentor:  Dr. Judith Cebra-Thomas, Millersville University of Pennsylvania
Co-Authors:  Colette Sweitzer, Sameeha Hossain, and Matthew Smith, Millersville University of Pennsylvania
Area:  Biology

Abstract:  When humans are exposed to chemicals linked to deafness (ototoxic), sensorineural hearing loss and balance disorders can occur as a result of hair cell death. Zebrafish Danio rerio lateral line hair cells are also susceptible to ototoxic agents, but unlike in mammals, they can regenerate. Zebrafish larva were exposed to four ototoxic chemicals—copper (an environmental toxin), neomycin and gentamicin (antibiotics), and Cisplatin (a chemotherapy drug)—and stained with a fluorescent vital dye that labels hair cells. The threshold level of copper, neomycin and gentamicin that resulted in complete hair cell death was determined. Regeneration of the hair cells was seen 48 hours after exposure. Hair cell death was observed after exposure of zebrafish larva to cisplatin, but the dose-response was more variable. Regeneration was also less consistent than with the other chemicals examined. These results support the use of zebrafish hair cell death as a model for human deafness.

Keywords:  ototoxic, deafness, lateral line, zebrafish, copper, neomycin, gentamicin, cisplatin

POSTER 10:  X-ray observations of SNR N63A
Presenter:  Dalton Patterson, Millersville University of Pennsylvania
Mentor:  Dr. Sean Hendrick, Millersville University of Pennsylvania
Area:  Astronomy

Abstract:  A supernova is the highly energetic explosion that signifies the death of a star. Supernovae can be the result of the gravitational core collapse of a massive star (Type II, or Type Ib/c), or due to the thermonuclear detonation of a white dwarf star that has exceeded the Chandrasekhar mass limit (Type Ia). In the wake of the explosion, a supernova remnant (SNR) will form. Stages of SNR evolution are the ejecta dominated phase, the Sedov phase, and the radiative phase. This project will examine SNR N63A in the Large Magellanic Cloud (LMC) using archival data from the Chandra X-ray Observatory. Spectral modeling is focused on non-equilibrium ionization models (vnei, vpshock, and sedov) in the analysis package which fit for parameters such as temperature, ionization timescale, elemental abundances, and emission measure. Initial results show that N63A is a young remnant in the ejecta dominated phase.

Keywords:  astronomy, x-ray, supernova remnants
POSTER 11: Modern threats that impact endangered species
Presenters: Delaney Cosante and Kayli Thomas, Millersville University of Pennsylvania
Mentor: Dr. Aaron Haines, Millersville University of Pennsylvania
Area: Environmental Science

Abstract: This project involves the review of Federal Register documents for threatened and endangered species from 1973-2015. Our goal is to quantify the threats that impact endangered species and to eventually compare the last 40+ years of documented threats to federally listed species. We will be reviewing all Federal Register documents, which justify the listing of species. Upon completion, we will be able to identify the top human impacts causing threatened and endangered species to become listed and quantify how these threats have changed over time. This research could provide valuable information regarding growing threats to species, and could be crucial when deciding how to mitigate the impacts of these threats. Preliminary results suggest that not only are alien species and habitat degradation still major threats to listed species, but that climate change has since emerged as the third leading threat to listed species in the last 20 years.

Keywords: endangered species, threats, federal register

POSTER 12: Structure and dynamics of ligated and un-ligated 5HT2C receptor in a molecular dynamics environment
Presenter: Claire Smathers, Indiana University of Pennsylvania
Mentors: Dr. Jeffry Madura, Duquesne University and Dr. Justin Fair, Indiana University of Pennsylvania
Area: Chemistry

Abstract: Dysfunction of the 5HT2C receptor has been implicated in schizophrenia and depression and thus has been the target of recent studies attempting to design novel therapies for such disorders. Before novel therapies can be developed, the binding pocket and conformations of binding states must be determined for 5HT2C. The aim of this project was to create a high accuracy homology model of 5HT2C from the D3 and Beta-2-adrenergic receptors and to use the homology model to computationally observe the conformational changes occurring in the binding pocket with agonists/antagonists bound. 5HT2C homology models were created using both Modeller and the ITASSER server and LowModeMD in MOE was used to find the most favorable intracellular loop conformation. HTMD was used to build, equilibrate, and run production of the homology model-bilayer membrane-water system. The system equilibration and production runs with agonists/antagonists bound were run on a local GPU.

Keywords: Computational Biochemistry, Drug Design, Molecular Modeling
POSTER 13: The synthesis and reactions of some 1,2-Diacyl diaziridines
Presenter: Ivanny Jacome Ottati, Millersville University of Pennsylvania
Mentor: Dr. Steven Bonser, Millersville University of Pennsylvania
Area: Chemistry

Abstract: Diaziridines are three-membered ring heterocycles that contain one carbon and two nitrogen atoms. They have demonstrated applicability in the following areas: synthesis of heterocyclic systems, photo-affinity labeling experiments, enzyme chemistry, and more. In 1975, Robert A. Izydore and Samuel McLean developed a method for synthesizing diaziridine derivatives via the addition of an alkyl diazoacetate to a cis-diacyldiimide; however, they did not propose possible N-N bond cleavage. This study investigates the bond-breaking selectivity of the three-membered diaziridine ring through the Quantitative Structure/Activity Relationship (QSAR) method. Bond breaking is monitored by systematically changing substituent electronic effects. Hence, we plan to exploit the use of carbene insertion chemistry with 4-phenyl-1,2,4-triazoline-3,5-diaone (PTAD) to give various 1,2-diacydiaziridines needed for this study. Thus far, various para-substituted diazoacetates have been synthesized. They will be reacted with PTAD, possibly shedding light on the effect that substituent electronics have on the reactivity of the diaziridine ring.

Keywords: 1,2-diacyl diaziridines, carbene insertion chemistry, QSAR method

POSTER 14: Antihistamine-induced weight gain: Are they all the same?
Presenter: Joshua Shaffer, Indiana University of Pennsylvania
Mentor: Dr. Daniel Widzowski, Indiana University of Pennsylvania
Co-Authors: Aubrey Keperling, Christina Maziarz, and Elisabeth Smith, Indiana University of Pennsylvania
Area: Biology

Abstract: An epidemiological study found a strong association of chronic H1 antihistamine usage and obesity. It is not clear if significant drug-induced weight gain occurs with all or only select H1 antihistamines. If there is a class-effect, then we would expect the anti-allergy medicine diphenhydramine to cause weight gain. Besides medicines, dietary fat level may also contribute to weight gain and obesity. The purpose of this study was to test the antihistamine class-effect hypothesis and determine if there was an interaction between drug and diet. C57BI/6J mice were placed on different diets (10% or 45% lard) and diphenhydramine (10 mg/kg) or vehicle. A selective antihistamine, triprolidine, induced significant weight gain with both diets. Diphenhydramine did not differ from vehicle control for either diet. Triprolidine but not diphenhydramine caused increased fat pad weight. These results do not support the class-effect hypothesis. There is no evidence of drug-induced weight gain with diphenhydramine.

Keywords: Diphenhydramine, chronic antihistamine usage, obesity, diet
POSTER 15: Large-scale production of three-dimensionally tailored nanofibrous carbon components using vapor-phase deposition
Presenter: Roger Welsh, Millersville University of Pennsylvania
Mentor: Dr. Mark Atwater, Millersville University of Pennsylvania
Area: Chemistry

Abstract: Carbon nanofibers (CNFs) have a multitude of applications, enabling advancements in composites, filtration, electrical devices, and much more. Previously, fiber synthesis techniques using vapor-phase deposition were unsuitable for producing a scalable bulk product in a single step. A new direct synthesis method has been developed using two unique approaches: i) the catalyst is rapidly produced using mechanical alloying, which is capable of creating, nonequilibrium, nanocrystalline alloys at low cost, ii) CNFs are directly synthesized in a constrained environment to form mechanically stable, nonwoven structures centimeters in size. These bulk fibrous structures are able to endure repeated bending and compression without any significant degradation to the structural properties, and they can be grown to replicate three-dimensional molds using a one-step process. The as-grown carbon can then be used as-is or modified for specific needs. The benefits and challenges of integrating these methods into commercial applications will be highlighted.

POSTER 16: Group differences in grief among estranged adult child relationships
Presenter: Gabriella Adair, Indiana University of Pennsylvania
Mentor: Dr. Tara Johnson, Indiana University of Pennsylvania
Co-Author: Nathalie Reider, Indiana University of Pennsylvania
Area: Psychology

Abstract: Multiple factors affect the nature of grief, which is often assessed after death occurs. However, grief may also result from a psychosocial loss, such as through familial estrangement (physical or emotional), where the person is still alive but psychologically absent. Qualitative research has shown that estrangement may occur for various reasons and may result in disenfranchised grief, which is grief that is not acknowledged by others. The goal of the current study is to quantify grief from the perspective of the adult child in estranged parent-child relationships. Differences in grief between males and females and across personality traits will be examined. Additionally, perceived social support will be assessed to determine if estrangement results in disenfranchised grief. This type of research could result in more effective individualized treatment plans, and it may also emphasize the importance of society recognizing the estrangement process as a significant loss for those involved.

Keywords: Grief, Familial Estrangement, Personality
**POSTER 17: Design and synthesis of L-Neplanocin analogues as antiviral agents**

Presenter: **Amber Davidson**, Slippery Rock University of Pennsylvania  
Co-Presenter: **Megan Stout**, Slippery Rock University of Pennsylvania  
Area: Chemistry

**Abstract:** Recent study has shown that both D- and L- like carbocyclic nucleoside enantiomers of neplanocin analogues possess broad spectrum antiviral activities, including Ebola, norovirus, vaccinia, HBV, HCMV, measles and Degue. It is noteworthy that placement of CH or a CBr at the N-3 position has significant effects on their biological properties. Previous studies have also found that D- 5’-nornorneplanocin (DHCDA) is effective against a series of viruses, which is likely due to its inhibition of SAH hydrolase. Its selectivity was even greater than that of neplanocin, particularly against vesicular stomatitis virus and rotavirus. Following the lead of these compounds, L- 3-deaza-5’-nornorneplanocin (1), L- truncated 3-deaza-5’-nor neplanocin (2), and their 3-Br analogues (3, 4), and L- 5’-isoneplanocin analogues (5,6) were synthesized in our laboratory. Their antiviral properties are under investigation.

**POSTER 18: Dual band antenna design**

Presenter: **Keith Coasey**, Millersville University of Pennsylvania  
Mentor: **Dr. Xin Li**, Millersville University of Pennsylvania  
Area: Physics

**Abstract:** Our research investigates the design of dual band micro-strip and patch antennas with operating frequencies at 2.4GHz and 5.2 GHz. The antennas are designed and simulated with the Ansys high frequency structure simulator (HFSS) using different substrate materials. The first step of our research is focused on the simulation and modification of the antenna designs to operate at desired frequencies. After completion of our initial designs, the second goal of our research is to study the impact of high permittivity substrate materials on the antenna dimensions, return loss, and radiation pattern. The antennas we studied includes: an ellipsoid antenna, a planar micro-strip antenna, a double rectangular antenna, and a planar F antenna. We found out that the use of higher permittivity materials in each design will have a negative effect on increasing reception attenuation, but will allow for the reduction and miniaturization of the antenna dimensions. And the energy return loss will decrease in two of the designs we studied.
POSTER 19: Reliability of eye witness testimony
Presenter: Jordyn Skaggs, California University of Pennsylvania
Mentor: Dr. Rebecca Regeth, California University of Pennsylvania
Area: Psychology

Abstract: This paper explores the reliability of eyewitness testimony identification of a Top Wanted FBI terrorist. During a criminal line up, the person (eye witness) who saw the crime happen must pick from a line-up of people to decide if the criminal they saw is in the line-up. This experiment had two different groups: an informed group and an uninformed group. The informed group was shown a picture of a Top Wanted terrorist for ten seconds and was told that they would be questioned about it a week later. The uninformed group was not told they would be questioned a week later about what they saw. The age and gender were also compared to memory. The results showed no significant difference between any of the conditions. Therefore, this showed that informed and uninformed groups had no differences in their reliability as eyewitnesses.

POSTER 20: Understanding spectroscopic and biological properties of mixed metal complexes
Presenter: Denali Davis, Indiana University of Pennsylvania
Mentor: Dr. Avijita Jain, Indiana University of Pennsylvania
Co-Authors: Kaitlyn Wyland and Ty Sampsell, Indiana University of Pennsylvania
Area: Chemistry

Abstract: Metal complexes consisting of a ruthenium based chromophore coupled to a cisplatin moiety have been shown to display multifunctional interactions with DNA. Cisplatin, a widely used anticancer drug covalently binds with DNA. Ruthenium(II) complexes have been shown to either covalently bind to DNA or cleave DNA upon photoirradiation. Herein, we report ligand exchange and DNA interaction properties of three mixed metal complexes with the general formula, $[\text{Ru} \left( \text{biq} \right)_2 \left( \text{BL} \right) \text{PtCl}_2]^{2+}$ (biq = 2,2'-biquinoline, BL = bridging ligand).

Keywords: photochemistry, ruthenium, cisplatin

POSTER 21: Using machine learning techniques for biosurveillance article classification
Presenter: Jamie Thorpe, Millersville University of Pennsylvania
Mentor: Dr. Lauren Charles-Smith, DMV, Pacific Northwest National Laboratory
Area: Computer & Information Sciences/Technologies

Abstract: With the amount of information published online today, it’s important to have a way to identify which articles are important and require attention without having to read every article. To address this need, my research focused on applying supervised machine learning models to news article text for classification of their importance to biosurveillance. I utilized natural language processing techniques in order to prepare the text of various online articles to be used to train a classification model. These articles were selected from online sources due to content related to diseases and other biosurveillance topics. The text data was then used to build and train a supervised classification model, using different machine learning techniques. Once trained, the model was used to classify new articles as biosurveillance-related or not. This process allows articles to be categorized without being read by human analysts, which expedites the analysis of large sets of incoming articles.
POSTER 22: The nature of the bridging anion controls the single-molecule magnetic properties of DYX₄M 12-METELLACROWN-4 complexes
Presenter: Jessica Reed, Slippery Rock University of Pennsylvania
Mentor: Dr. Thaddeus Boron, Slippery Rock University of Pennsylvania
Co-Authors: Jacob Lutter, Connor Daly, Chun Chow, Andrew Davis, Arunpatcha Nimthong-Roldan, Matthias Zeller, Jeff Kampf, Curtis Zaleski, and Vincent Pecoraro, Slippery Rock University of Pennsylvania
Area: Chemistry

Abstract: Metallacrowns are often thought of as inorganic analogs of crown-ethers. Metallacrowns have proven to be a useful synthetic pathway to produce single-molecule magnets because of their relatively facile synthesis and their ability to organize metal ions in a predictable geometry. We present a family of DyX₄M(12-MC₃M₃(N(Hsal)-4) compounds that were synthesized and magnetically characterized (X = salicylate, acetate, benzoate, trimethylacetate, M = Na⁺ or K⁺). The bridging ligands X, were systematically varied while keeping the remainder of the metallacrown geometry constant. The identity of monovalent cation, was also altered. The dc magnetization and susceptibility of all compounds were similar across the series. Regardless of the identity of the counter-cation, the Dy(Hsal)₄M 12-MC-4 compounds were the only compounds to show frequency-dependent ac magnetic susceptibility, a hallmark of single-molecule magnetism. This indicates that the nature of the bridging ligand in the 12-MC₃M₃(N(Hsal)-4) compounds strongly affects the out-of-phase magnetic properties.

Keywords: Metallacrowns, Single-Molecule Magnets, Coordination Chemistry

POSTER 23: Analyzing the effect of ZrO₂ surface absorption on the intermolecular isomerization of azobenzene molecules.
Presenter: Craig Pointer, Kutztown University of Pennsylvania
Mentor: Dr. Darren Achey, Kutztown University of Pennsylvania
Co-Author: Mallory Snook, Kutztown University of Pennsylvania
Area: Chemistry

Abstract: Upon light irradiation, azobenzene molecules undergo well-known intramolecular isomer changes from trans to cis isomers. The cis isomer then thermally returns back to the trans isomer following a first order decay. This reaction can be monitored via UV-Visible spectroscopy due to the unique spectral signatures of the cis and trans isomers. Furthermore, analysis of this reaction at a range of temperatures allows for an activation energy to be calculated under both fluid solution and ZrO₂ adsorption conditions. Preliminary results suggest that the surface adsorbed molecules have smaller first order rate constants for this intramolecular reaction when compared to the molecules in fluid solution opening up the intriguing possibility of steric hindrance at the ZrO₂ surface factoring into the reaction rate.
**POSTER 24: Performance of grapheme-color synesthetes on a color sorting task that employs graphemes**

**Presenter:** Faith McConnell, Millersville University of Pennsylvania  
**Mentor:** Dr. Shawn Gallagher and Dr. Mark Snyder, Millersville University of Pennsylvania  
**Area:** Psychology

**Abstract:** Grapheme-color synesthesia causes an individual to experience particular colors, or photisms, when viewing particular graphemes, usually letters or numbers, regardless of the object’s actual color. Synesthesia is associated with above-normal color discrimination ability but specific testing circumstances may compromise this ability. We developed and validated a sorting task based on the established Farnsworth-Munsell 100 Hue Test. Instead of asking participants to sort colored shapes, we asked them to sort colored graphemes, mostly letters. We wanted to see if a synesthete’s color discrimination skills could be confounded when the objects to be sorted were in the shape of graphemes that evoked photisms that did not match the actual color of the graphemes. The results suggest that those with grapheme-color synesthesia can suppress or ignore their photisms when performing color sorting tasks. Self-reports from our participants are consistent with this conclusion.

**Keywords:** Grapheme Color, Synesthesia, Farnsworth-Munsell 100 Hue Test, Photism

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**POSTER 25: Dielectric Anisotropy and Elastic Constants Near the Nematic-Smectic A Transition**

**Presenter:** Angelo Visco, Slippery Rock University of Pennsylvania  
**Mentors:** Dr. Rizwan Mahmood and Dr. Donald Zapien, Slippery Rock University of Pennsylvania  
**Area:** Physics

**Abstract:** The present work examines the behavior of dielectric anisotropy and the elastic constants associated with the deformation of liquid crystal molecules under the influence of an electric field. The systems investigated are of various concentrations composed of mixtures of 5CB (4-Cyano-4'-pentylbiphenyl) and 8CB (4-octyl-4'-cyanobiphenyl) liquid crystal as a function of temperature. These studies are important due to the complexity of coupling between the orientational order of nematic and one-dimensional density waves, or positional order of smectic A phase, which can drive this transition to be either continuous or discontinuous. Theoretically, NA transition is weakly first order due to nematic director fluctuations in smectic A phase. de Gennes found this transition to be analogous to normal to superconducting and normal to superfluid transitions. Thus, there may exist a triple point similar to He³/He⁴ mixtures. Our focus will be to understand this complex and interesting problem that has been understudy for more than four decades.

**Keywords:** Liquid Crystal, Nematic, Smectic, Phase Transition, Dielectric
POSTER 26: Reframing the gender gap in computer science as a solvable problem
Presenter: Emmali Montgomery, Millersville University of Pennsylvania
Mentor: Dr. Nazli Hardy, Millersville University of Pennsylvania
Area: Computer & Information Sciences/Technologies

Abstract: The alarmingly low numbers of women pursuing Computer Science degrees in the United States continues to be significant concern. Because of such low participation, related organizations have been considering potential ways to integrate more women; however, it is the underlying general causes and their sources of the decline that need to be considered methodically from various contexts. In understanding the causes, we can redirect the efforts as a solvable problem.

Keywords: Women in Computer Science, Gender Gap in Computer Science, Attracting Women to Computer Science

POSTER 27: Electrical Properties of Thin Films
Presenter: Cody Petsch, Millersville University of Pennsylvania
Mentor: Dr. Tariq Gilani, Millersville University of Pennsylvania
Area: Physics

Abstract: The purpose of this project is to study electrical properties of thin films, including resistivity and anisotropy, as a function of their growth. Several gold thin films of different thicknesses ranging from 15 nm – 66 nm were prepared. The properties were measured using the Montgomery Technique. It has been found that the electrical resistivity of the gold film varies with thickness and approaches the bulk gold value. This can be explained by considering mean free path of the charged carriers in gold. The electrical anisotropy has been found to decrease as film thickness increases. This is explained in terms of surface diffusion or coalescence of the deposited gold. This study will also aim to evaluate silver with the same criteria.
Oral Session I (10:15 – 11:45 am, Student Memorial Center, Room 202)
Session Chair: Dr. Krish Pillai, Lock Haven University of Pennsylvania

PRESENTATION 1 (10:15): Deconstructing Pacman
Presenter: Mitchel Myers, Lock Haven University of Pennsylvania
Mentor: Dr. Krish Pillai, Lock Haven University of Pennsylvania
Area: Computer & Information Sciences/Technologies

Abstract: The goal of this research project was to develop a game using the Java programming language. The game Pacman was selected to be recognizable and to provide insight into the development of older games. The game was deconstructed based on technical descriptions of the game and actual gameplay observation, and the project is meant to play similarly to the original, including most of the unintended side effects of the original design. This implementation makes use of enumerated classes representing states to guide the flow of logic throughout the game. The various behavioral patterns of the ghost actors were analyzed and implemented in this project. The personalities, as reflected in the original Japanese names: Oikake, Machibuse, Kimagure, and Otoboke, were faithfully recreated. The game was implemented based on a modified model-view-controller design pattern. The Swing library was used as the windowing toolkit.

Keywords: Pacman, 2d game programming, java, swing

PRESENTATION 2 (10:30): Effects of the medieval climate anomaly on the Great Plains region of North America
Presenter: Maraina Miles, Slippery Rock University of Pennsylvania
Mentor: Dr. Patrick Burkhart, Slippery Rock University of Pennsylvania
Area: Geosciences

Abstract: The goal of this study is to understand the effects of the Medieval Climate Anomaly (MCA) on the Great Plains region. Dr. Burkhart has accumulated findings that reveal slope incision in the White River Badlands by which sod tables form, dating to approximately 1000 to 1300 AD. We postulate that the MCA (950 AD – 1250 AD) forced this change in geomorphology. This time presented an arid climate in the Great Plains, which affected landscape, wildlife, and vegetation. In order to investigate, my objective is to complete a literature review of this event, including proxy records. Proxies located so far include lacustrine sediments and loess. Sedimentation rates in Elk Lake, MN increased in response to greater deposition of dust during drought. Whereas a drought in Moon Lake, ND has been reconstructed from diatom abundances. Studies of eolian deposits show active dunes in northeastern Colorado and Kansas during this time period.

Keywords: Geomorphology, climate
PRESENTATION 3 (10:45): Real time video scene classification for underwater applications
Presenter: Nicole Seese, Millersville University of Pennsylvania
Mentor: Dr. Anthony Smith, Florida Institute of Technology
Co-Authors: Andrew Myers and Kaleb Smith, Florida Institute of Technology
Area: Computer & Information Sciences/Technologies

Abstract: Despite recent advances made in the field of computer vision and the proliferation of applications related to tracking, image classification, and shape recognition, very little work has focused on applying existing techniques to the processing of underwater images. Video recorded underwater presents unique problems; for example, light spots and continually changing lighting, ripples in the water, inter-frame motion, and multitudes of small objects, including debris and bubbles, moving throughout the frame. These all greatly affect the quality of the video, yet few present-day systems exist that address these factors. In this research, we implemented several preprocessing techniques to stabilize and denoise images taken from underwater sources with the intent of transforming the media in such a way that classical approaches to tracking and image classification can be implemented in near real time. To accomplish this, algorithms were sped up by parallelizing them using CUDA.

Keywords: Background Estimation for Dynamic Backgrounds, CUDA, Gaussian Mixture Model, Kalman Filter, Scene Classification, Tensor Flow, Underwater Video

PRESENTATION 4 (11:00): A 65-year climatology of Philadelphia (PA) spatial synoptic classification frequency
Presenter: Aaron Haegele, California University of Pennsylvania
Mentor: Dr. Chad M. Kauffman, California University of Pennsylvania
Area: Geosciences

Abstract: In 2014, the U.S. Global Change Research Program (USGCRP) concluded that between 1895 and 2011, the Northeast Region temperatures increased by almost 2°F, and precipitation increased by approximately five inches, more than 10%. The Northeast has also experienced a greater recent increase in extreme precipitation than any other of the 8 U.S. regions. Air mass classifications can serve as powerful analytic tools for investigating various synoptic trends. While the USGCRP defines specific variable trends, it is unclear how air mass character and frequency is affected by these noted trends. This uncertainty is addressed in this investigation. Philadelphia, PA serves as a representative city for the Northeast Region. This study applied the Spatial Synoptic Classification (SSC), to examine surface variables (e.g., temperature, dew point, wind direction, pressure, and precipitation) that had been clustered into air mass categories for Philadelphia from 1951-2015. Air mass frequencies were then compared to findings from the USGCRP.

Keywords: Climatology, Philadelphia
PRESENTATION 5 (11:15):  Unwinding the runtime stack: Application runtime analysis for anomaly detection research

Presenter:  Kelsey Fulton, Millersville University of Pennsylvania
Mentor:  Dr. Mark Badger, National Institute of Standards and Technology
Area:  Computer & Information Sciences/Technologies

Abstract: Intrusion detection, the runtime monitoring of a computer system with the goal of detecting malicious activity, has become increasingly important in our modern world. This research, conducted while at the National Institute of Standards and Technology, focuses on applying anomaly detection techniques to detect potentially malicious software behavior. The model involves logging system calls and the program counter (PC) values where these calls were made. However, nearly all system calls are issued through a standard library. Since a PC value reflects the system call location in the library and not the calling context in the program, the runtime stack must be unwound to the call location in the actual program to find the PC values of the location just prior to the library call. The goal of this research was to create an efficient stack unwinding application that is independent of source code, debugging information, and program design.
Oral Session II (10:15 – 11:45 am, Student Memorial Center, Room 118)
Session Chair: Dr. Cassandra Kuba, California University of Pennsylvania

PRESENTATION 1 (10:15): Predicting cremation outcomes: An attempt to replicate previous studies on calculating the behavior of trauma in burned bone
Presenter: Edward Inman, California University of Pennsylvania
Mentor: Dr. Cassandra Kuba, California University of Pennsylvania
Area: Anthropology

Abstract: This study attempts to replicate the data produced in other studies on the behavior of traumatic lesions in bone after cremation. Six porcine ribs were inflicted with blunt force trauma, full-thickness holes from a drill, and gunshots. Each specimen was placed in a gas grill at 650 °F until fully carbonized. The study found that blunt force traumatic lesion increased in size, whereas the drill holes and gunshot wounds experienced shrinkage. This study showed how the behavior of antemortem and perimortem trauma in bone is somewhat predictable, but exhibits unexpected results.

PRESENTATION 2 (10:30): From storm water to stream: How will we keep our waterways clean and generous for ourselves and for our future generations?
Presenters: Patricia McEvoy, Bonita Lauer, and Timothy Murray, Millersville University of Pennsylvania
Mentor: Dr. Mehdi Khalighi, Millersville University of Pennsylvania
Area: Environmental Science

Abstract: Pennsylvania has nearly 4,000 lakes, reservoirs and ponds, all linked and fed by over 83,000 miles of streams and rivers. Lancaster County waterways and the surrounding areas are part of the watershed that feeds the Chesapeake Bay estuary. Environmental degradation caused by urban sprawl and deforestation has contributed to detrimental storm water runoff. This research explores published academic journals and scholarly articles that look at sustainable storm water management programs and their effectiveness in controlling storm water runoff. The goal is in identifying the best practices for catching and reducing the large quantities of storm water flow and in the exploration of whether low-impact development (LID) or other urban design models may offer more sustainable storm water management solutions for the watershed.
Keywords: sustainability, storm water management, runoff, planning, urban, watershed, Chesapeake Bay

Presenters: Kendall Seigworth and Elizabeth Quinn, Millersville University of Pennsylvania
Mentors: Dr. Carrie Smith, Dr. Laura Granruth, and Dr. Mary Glazier, Millersville University of Pennsylvania
Area: Sociology

Abstract: There is keen awareness that elder financial exploitation is a fast growing social problem. While we have some estimates of the problem at a national level, local level data are often incomplete and/or missing. In this paper, we present and discuss the results of a preliminary analysis of elder financial exploitation cases in Lancaster County, PA. We focus on cases prosecuted during the years of 2013-2015. Specifically, we examine the following factors to see if there are general trends: offender sex, statutes used in prosecution, length of time to case resolution, and amount of restitution. This study was a result of a request for research assistance from the county District Attorney’s Office. In addition to explicating a county level view of elder financial exploitation, we further discuss the benefits and difficulties of conducting applied research with local legal authorities.

Keywords: Elder Abuse; Elder Financial Exploitation; Crime; Aging and the Elderly; Applied Sociology

PRESENTATION 4 (11:00): A comparison of tombstones in two religiously diverse small populations in Mid Appalachia

Presenter: Katherine Hardesty, California University of Pennsylvania
Mentor: Dr. Cassandra Kuba, California University of Pennsylvania
Area: Anthropology

Abstract: The study of tombstones provides an insight into a society’s and individuals’ cultural values. This presentation is a comparison of tombstones in two religiously diverse small populations in Washington, Pennsylvania and Deer Park, Maryland. It explores how the occupants’ religious beliefs are demonstrated on their headstones, how symbols commemorate significant life achievements, such as military service and occupational status, and how each care for their children after burial. This presentation examines the place recreation holds in each respective community as it is communicated on their tombstones. Lastly, I will explore how changes in the larger society and in technology affect how we have commemorated our dead over the last one hundred twenty-five years.

Keywords: Anthropology, tombstones
Presenter: Senovia Roberts, Indiana University of Pennsylvania
Mentor: Dr. Nicole Clark, Indiana University of Pennsylvania
Area: Health Services

Abstract: Evolving research and scientific breakthroughs in the last four decades of the benefits of breastfeeding has given an old practice new breath of life (Thulier D., 2009). The goal of this study is to assess the knowledge of the benefits in breastfeeding in three key Indiana University of Pennsylvania Health and Human Services departments (HHS): Nursing, Nutrition, and Child Development and Family Relations. The study will investigate if students within these majors are being prepared to guide families in their decision to breastfeed or formula feed. This study will survey whether educational status (e.g. Junior 3rd year, Senior 4th year), or university major (i.e. Nursing, CDFR, or Nutrition) impacts the awareness of the benefits of breastfeeding. Using areas such as major, gender, and education level, this study will attempt to analyze these factors and if breastfeeding and its benefits are adequately taught to support pregnant women in making feeding decisions.

PRESENTATION 6 (11:30): Manly hands & dainty feet: Sex determination from hand and foot bone lengths
Presenter: Alexander Dawes, California University of Pennsylvania
Mentor: Dr. Cassandra Kuba, California University of Pennsylvania
Area: Anthropology

Abstract: The use of metric measurement to determine sex is not novel, but the specific application of the methods to the metacarpals, metatarsals, and phalanges is typically not used. While this study follows another very closely (see Case & Ross, 2007), it applies the methodology to a new population. This study will apply previously stated methods to an archaeological Native American population, excavated from Campbell Farm near Brownsville, PA. This method is highly appropriate given that sex may be impossible to determine from other methods in a population such as this, given its fragmentary nature. The sample, being experimental, consisted of 10 individuals, five female (n = 5), and five males (n = 5) all from the Campbell Farm collection available at California University of Pennsylvania. The study found that the methods were able to create specific ranges for the measurements of the bones of the two sexes.

Keywords: forensic science, forensic anthropology, sex estimation, metacarpals, metatarsals, phalanges
Oral Session III (10:15 – 11:45 am, Student Memorial Center, Room 18)
Session Chair: Dr. Francis Vasko, Kutztown University of Pennsylvania

PRESENTATION 1 (10:15): The socio-economic value of preserving land
Presenters: Elizabeth Malantonio, Robert Matson, and Jamie Reese, East Stroudsburg University of Pennsylvania
Mentor: Dr. Olivia Carducci, East Stroudsburg University of Pennsylvania
Area: Mathematics

Abstract: This study delves into the socio-economic value of preserving land compared to the market price. The model was created using research from government and environmental data. The model variables include: acreage, land and forest coverage percentages, water recreation availability, and crop percentages. To determine the value of the land, the user specifies: 1) what percent of their parcel is forest, crops and pasture, or water; 2) Whether or not they intend to harvest any timber and, if so, how frequently; 3) whether they intend to use bodies of water for recreation and, if so, what types of recreation are feasible; and 4) the types of crops to be planted. Using the model we are able to provide the value of the land, the future value, and the net present value in dollars. The findings indicate the socio-economic value is greater than the initial investment.

PRESENTATION 2 (10:30): Cluster analysis of pedagogical methods
Presenter: Kallie Simpson, Slippery Rock University of Pennsylvania
Mentor: Dr. Dil Singhabahu, Slippery Rock University of Pennsylvania
Area: Mathematics

Abstract: In recent years, there has been a debate in the education field regarding the success of using “flipped” classrooms as a new teaching pedagogy. Flipped learning is defined by flippedlearning.org to be, “a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment.” The lack of published literature regarding this topic is hindering the improvement of the learning process. The purpose of our study is to perform cluster analysis on the graded material from Elementary Statistics 1 taught in regular and flipped classroom settings at Slippery Rock University to identify clusters that might give insight into the two different teaching pedagogies. These classes include a variety of majors, class status’, genders, and evaluation methods. We are concentrating on Hierarchical and K-Means cluster analysis through the use of R software.

Keywords: cluster
PRESENTATION 3 (10:45): The Zariski Topology
Presenter: Bradley Wolfe, Edinboro University of Pennsylvania
Mentor: Dr. Richard White, Edinboro University of Pennsylvania
Area: Mathematics

Abstract: Let $P^n$ be the set of multi-variable polynomials in $\mathbb{R}^n$ and $Z(P)$ to be the set of zeros of a polynomial $P$. The compliments of each $Z(P)$ in $\mathbb{R}^n$ form a basis for a topology in $\mathbb{R}^n$, known as the Zariski Topology. In this presentation we examine the properties of the Zariski Topology.

Keywords: Topology

PRESENTATION 4 (11:00): Vertex coloring game on graphs
Presenter: Diego Manzano-Ruiz, Kutztown University of Pennsylvania
Mentor: Dr. Wing Hong Tony Wong, Kutztown University of Pennsylvania
Area: Mathematics

Abstract: This project focuses on a game related to combinatorics and graph theory. In this game, two players, Alice and Bob, color a vertex of a given graph by alternating turns: Alice uses color A and Bob uses color B. The only rule is that once a vertex is colored, no neighbors of that vertex can receive the same color. The first player who is unable to color a vertex loses the game. We determine which player has a winning strategy on several particular types of graphs, such as paths, cycles, and certain grids. We are also able to answer some questions for general graphs.

Keywords: Graphs, Vertex Coloring, Game, Strategy

PRESENTATION 5 (11:15): Properties of cut points in point-set topology
Presenter: Kevin Shuman, Edinboro University of Pennsylvania
Mentor: Dr. Richard White, Edinboro University of Pennsylvania
Area: Mathematics

Abstract: A cut point $y$ in a set $X$ is a point such that when $y$ is removed from $X$, the set $X$ without $y$ is disconnected. Using this definition and topological principles, it will be shown that every point in the real line is a cut point, cuts points are preserved under a homeomorphism between two sets, and every point in the subspace $((-1,0] \times \{0\}) \cup \{(x,y) \in \mathbb{R}^2: 0 < x < 1, y = \sin(1/x)\}$ of $\mathbb{R}^2$ is a cut point.

Keywords: Topology, Mathematics
PRESENTATION 6 (11:30): An empirical analysis of three population-based metaheuristics for solving the multidimensional knapsack problem

Presenter: Zachary Kern, Kutztown University of Pennsylvania
Mentors: Dr. Yun Lu and Dr. Francis Vasko, Kutztown University of Pennsylvania
Area: Mathematics

Abstract: The Multidimensional Knapsack Problem (MKP) is a computationally complex (NP-hard) combinatorial optimization problem with many real-world applications. In this study, we adapt two relatively new metaheuristics designed originally to solve continuous nonlinear problems to solve the binary Multidimensional Knapsack Problem. Specifically, we adapt the two-phase Teaching-Learning Based Optimization (TLBO) approach developed by Rao, Savsani and Vakharia (2011) and the recently introduced metaheuristic JAYA by Rao (2016) both designed for continuous nonlinear optimization problems to solve the binary MKP. Where other metaheuristics require parameter fine-tuning, TLBO and JAYA both only require determining population size and termination criteria—same as all other population-based metaheuristics. Using 270 test problems available in Beasley’s OR-Library, empirical results for TLBO and JAYA are compared to a well-known genetic algorithm (GA) approach to demonstrate the competitiveness of TLBO and JAYA for solving the MKP. The advantage of the TLBO and JAYA approaches are their relative simplicity.

Keywords: Multidimensional Knapsack Problem, Population-Based Metaheuristics
Oral Session IV (10:15 – 11:45 am, Student Memorial Center, Room 24)
Session Chair: Dr. Martin Buckley, Slippery Rock University of Pennsylvania

PRESENTATION 1 (10:15): The self-assembly of DNA nanostructures for use as organizing templates
Presenter: Timothy Samec, Slippery Rock University of Pennsylvania
Mentor: Dr. Arlene Ford, Slippery Rock University of Pennsylvania
Co-author: Mitchell Cholewinski, University of Pittsburgh
Area: Physics

Abstract: There is growing interest in the self-assembling capabilities of DNA to create functional nanodevices for use in cancer detection and treatment. One important reason for this interest is that DNA nanostructures are highly programmable molecules. This means that these structures allow for increased stability and control when designing biomacromolecules via adhesion of plasmonic nanoparticles and other similar materials. Our current work reports on the procedure and construction of hexagonal two-dimensional DNA lattice structures using three specific DNA single strands. We also reflect on several barriers that were presented during fabrication as well as the adaptations made to overcome the aforementioned barriers by improving the quality, reproducibility, and yield of the hexagonal two-dimensional DNA lattice as organizing templates.

Keywords: DNA Nanostructures, Bioengineering, nanoparticles

PRESENTATION 2 (10:30): Accurate thickness evaluation of ultrathin Cd_{1-x}Zn_{x}Te/GaAs (001) epifilms
Presenter: Adam Villanueva, Indiana University of Pennsylvania
Mentor: Dr. Devki N. Talwar, Indiana University of Pennsylvania
Area: Physics

Abstract: The results of a comprehensive experimental and theoretical study is reported to empathize the optical properties of GaAs, ZnTe, CdTe and Cd_{1-x}Zn_{x}Te alloys in the two energy regions: (i) far-infrared (FIR), and (ii) near-infrared (NIR) to ultraviolet (UV). A high resolution Fourier transform infrared (FTIR) spectrometer is employed to assess the FIR response of the binary GaAs, ZnTe, CdTe and ternary Cd_{1-x}Zn_{x}Te alloys in the entire composition 1.0 ≥ x ≥ 0.03 range. Accurate model dielectric functions are established appositely to extort the optical constants of all materials. The simulated dielectric functions ε(ω) and refractive indices n(ω) are meticulously appraised by comparing them against the existing spectroscopic ellipsometry and FTIR data. These outcomes are expended eloquently for evaluating the polarization dependent reflectivity R(l) and transmission T(l) spectra of ultrathin Cd_{1-x}Zn_{x}Te/GaAs (001) epifilms. A reasonably accurate assessment of film thickness by reflectivity study has offered a credible testimony of characterizing semiconducting epitaxially grown nanostructured materials of technological importance.
PRESENTATION 3 (10:45): Effects of variations of insulin levels on developing *Xenopus laevis* embryos

Presenter: Andrew Taylor, California University of Pennsylvania  
Mentor: Dr. Louise Nicholson, California University of Pennsylvania  
Area: Biology

**Abstract:** Insulin’s developmental impact is seen in diabetic fetal macrosomia, which is excessive fetal growth in response to insulin exposure, leading to several complications. The purpose of this study was to analyze the effects of modified insulin levels on developing *Xenopus* embryos. Many genes and signaling pathways are conserved between humans and *Xenopus*, including the insulin receptor pathway. Embryos were either exposed to increases in levels of insulin by addition of 10, 100, 1000 ug/ml insulin, or reduced amounts using anti-insulin antibody doses of 100, 1,000, and 10,000 ug/ml. The embryos’ subsequent development was quantified by measuring weight and size of tadpoles, and development of neural crest cell derivatives, with neural crest cell branching being used as a quantitative measure. The embryos exposed to smaller increases of insulin developed more quickly than controls, while those exposed to anti-insulin antibodies had slightly inhibited development.  
**Keywords:** embryo, insulin, antibody, fetal macrosomia, frog

PRESENTATION 4 (11:00): Determining area of leaf herbivory with use of software that computes missing leaf segments

Presenter: Jeannie Showers, Indiana University of Pennsylvania  
Mentor: Dr. Ellen Yerger, Indiana University of Pennsylvania  
Area: Biology

**Abstract:** This research is producing software to calculate the areas of missing portions of leaves that have been partially eaten by insects. It reconstructs images of both the missing and intact leaf regions. The leaves must be photographed which can be done on intact plants or detached leaves. The software works by matching the partially eaten leaf to a reference leaf supplied by the researcher, and in this way can be customized to many plant species. In an accompanying field experiment, this software is being used to accurately measure insect herbivory for several significant pairs of native versus non-native plants. This study compared locally abundant invasive honeysuckle leaves, *Lonicera morrowii*, to its native congener *L. sempervirens*, and also compared invasive multiflora rose leaves, *Rosa multiflora*, to its native congener *R. carolina*. This provides a quantitative measure of the diminished trophic role of invasive plants in supporting insect herbivores in ecosystems.  
**Keywords:** Invasive, herbivory, insects, methods
PRESENTATION 5 (11:15): A novel method for the hydrolysis of a nickel Schiff-base complex
Presenter: Cory Bontrager, Slippery Rock University of Pennsylvania
Mentor: Dr. George Lengyel, Slippery Rock University of Pennsylvania
Co-author: Tanner Geibel, Slippery Rock University of Pennsylvania
Area: Chemistry

Abstract: Polypeptides are sequences of amino acids that can fold into secondary structures such as α-helices and β-sheets. Incorporating unnatural amino acids into polypeptides can influence folding of the secondary structures. Many unnatural amino acids can be synthesized using a nickel Schiff-base complex. Standard decomposition techniques of this complex require refluxing with hydrochloric acid. These harshly acidic conditions can remove acid-labile protecting groups from the side chains of the desired amino acids. To circumvent this issue and to provide synthetic access to additional unnatural amino acids with side chain protecting groups, we have devised a novel method of hydrolysis using EDTA, a chemical chelating agent that can sequester metal ions. These conditions prevent the loss of side chain protecting groups while enabling facile hydrolysis of the nickel Schiff-base complex.

Presenter: Lewis Dominguez, Indiana University of Pennsylvania
Mentor: Dr. Jana Villemain, Indiana University of Pennsylvania
Area: Chemistry

Abstract: 3D physical models of complex biological molecules are well established as valuable tools for connecting introductory biochemical concepts of macromolecule structure with hands-on learning. Now that 3D printers are more widely accessible to undergraduate students in the life sciences, students often are capable of generating a 3D molecule model in conjunction with a class or research project. Free, well-established resources such as the NIH Print Exchange and UCSF Chimera are available for obtaining and working with the information required for 3D printing a protein or biomolecule model. However, many students start with a limited knowledge of 3D printers and protein structures and need a practical guide to more easily take advantage of opportunities to 3D print molecules. Thus, we outline the process of 3D printing a protein starting with a digital model followed by conversion of the structural information into a file useable by a 3D printer to produce a useful 3D plastic model.

Keywords: protein structure modeling, 3D printing biomolecules
POSTER 1:  Spectroelectrochemical determination of lead and zinc through attenuated total internal reflectance stripping voltammetry
Presenter:  Rachel Shaffer, Shippensburg University of Pennsylvania
Mentor:  Dr. John Richardson, Shippensburg University of Pennsylvania
Area:  Chemistry
Abstract:  The pH-dependent electrodeposition and subsequent stripping of lead and zinc were conducted on an indium tin oxide (ITO) optically transparent electrode in order to monitor these processes by attenuated total internal reflectance spectroscopy. Zinc deposition and stripping were determined to occur at potentials of –0.85 V and –0.68 V versus Ag/AgCl reference, respectively, while optimal wavelength for spectroscopic detection of zinc was found to be 430 nm. An intense peak corresponding to the absorbance of the deposited zinc suggests a potentially larger molar extinction coefficient for the metal in comparison to that of the deposited lead and other previously reported metal ions.
Keywords:  Electrodeposition, Zinc, Lead, Spectroscopy

POSTER 2:  Dielectric anisotropy, elastic constants, and threshold voltage measurements of gold-nanoparticle colloids in nematic 5CB
Presenter:  Angelo Visco, Slippery Rock University of Pennsylvania
Mentors:  Dr. Rizwan Mahmood and Dr. Donald Zapien, Slippery Rock University of Pennsylvania
Co-Author:  Jon Faust, Slippery Rock University of Pennsylvania
Area:  Physics
Abstract:  We have explored electro-optical and thermal properties of gold nanoparticle (GNP) colloids in 4-cyano-4′-pentylbiphenyl(5CB) liquid crystals (LCs). GNPs do not readily disperse in a LC host and, so, have been treated with either 1-hexane-thiol or 1-dodecane-thiol. This treatment suppresses the aggregation of GNPs within the 5CB host to a threshold of approximately 0.7% GNP by wt. Our repeated measurements on dodecanethiol and hexanethiol treated GNPs showed a sudden drop in dielectric anisotropy and elastic constants at some critical concentration of wt. % GNPs in 5CB. Further increase in concentration of GNPs resulted in the increase of these parameters, finally leveling off to a new value within experimental uncertainty. At this critical concentration, a sudden rise in nematic to isotropic transition temperature was also observed. Additionally, we will discuss the effect of increasing the number of carbons in coating compounds on these parameters. Acknowledgements: The funding for the project was provided by Slippery Rock University (2015-2016).
Keywords:  Liquid Crystal, Nematic, Phase Transition, Dielectric
POSTER 3:  Manipulating dyadic collaborative learning to improve individual cognitive performance among undergraduates

Presenter:  Heather Kwolek, Indiana University of Pennsylvania
Mentor:  Dr. Tara Johnson, Indiana University of Pennsylvania
Area:  Psychology

Abstract:  Piagetian and Vygotskian theories suggest that collaborative learning is beneficial for cognitive development. However, the educational system emphasizes individual performance, and teachers strive to find ways to improve student outcomes. Therefore, the goal of the current study is to maximize individual performance through creating effective collaborative learning environments. Partner familiarity (i.e., whether partners know each other), informing students how to effectively collaborate, and assigning students roles are three aspects of the collaborative process whose effects on subsequent individual task performance need further investigation. College students will individually read a psychology journal article for understanding and then discuss the journal article in a randomly assigned collaborative learning environment. Subsequently, they will complete a collaborative experience questionnaire and comprehension test. The results could better inform teachers about effective collaborative learning environments to improve individual student performance.

Keywords:  collaboration, learning, partner familiarity, psychology, students, roles, lesson

POSTER 4:  Quantitative analysis of tartrazine in vitamin supplements and food products

Presenter:  Elizabeth Higgins, Edinboro University of Pennsylvania
Mentor:  Dr. Qun Gu, Edinboro University of Pennsylvania
Area:  Chemistry

Abstract:  Tartrazine, also known as FD&C Yellow #5, is used in many supplements, food products, cosmetics, soaps, and medications. It is a bright yellow dye used in these products both alone and mixed with blue dyes in order to create green. Tartrazine is linked to asthma, migraines, thyroid cancer, anxiety, clinical depression, blurred vision, purple spots on the skin, and unexplained itchy skin. There are several alternative coloring agents both organic, and inorganic readily available for manufacturers to use including: beta carotene and annatto. This project focuses on determination of tartrazine content in selected vitamins supplements and food products by solid phase extraction, HPLC and GC-MS. Using these quantitative techniques, the relative concentrations of tartrazine used by multiple brands and manufacturer’s vitamins will be compared.

Keywords:  tatrazine
**POSTER 5:** The effect of salinity on oxygen metabolism of larval crabs  
**Presenter:** Tammy Weidman, Kutztown University of Pennsylvania  
**Mentor:** Dr. Wendy Ryan, Kutztown University of Pennsylvania  
**Area:** Biology  

**Abstract:** Crab larvae experience a range of salinities due to currents and tidal flow. Salinities below the range observed in Chincoteague Bay, VA were used to simulate the potential impact of climate change on these larvae. It was hypothesized that low salinities would result in an increase in metabolic rate or even death. Megalopae of the Blue Crab (*Callinectes sapidus*) and Fiddler Crabs (*Uca spp.*.) were collected from shore in Queen’s Sound, VA and held for minimum of 12h prior to experimentation. Individual megalopae were placed in 1 ml glass vials fitted with PreSens Optical DO sensors filled with artificial seawater ranging from 10 to 31 ppt. Oxygen consumption was measured throughout a 3-hour incubation period. The Blue Crab larvae had higher rates of respiration at low salinities, while the respiration of Fiddler Crab remained fairly stable. The response of the Blue Crab larvae is concerning from both ecological and economic perspectives.  
**Keywords:** Crab larvae, Climate Change, Salinity, Oxygen Metabolism, Blue Crab, *Callinectes sapidus*

**POSTER 6:** Measurement of attenuation in a fiber optic cable  
**Presenter:** Brianna Beasley, Millersville University of Pennsylvania  
**Mentor:** Dr. Natalia Dushkina, Millersville University of Pennsylvania  
**Area:** Physics  

**Abstract:** This project is being carried out to study the attenuation, or gradual loss of power over a distance, of a fiber optical cable. Fiber optic cables work by sending light down a cable made out of glass/plastic to transmit data. When that light is sent down the fiber, it gets distorted and can eventually become unreadable at the other end. The reason for this distortion can be one of multiple reasons, but attenuation is going to be the one studied. In this experiment a laser will be used to measure the attenuation of a fiber. First, the power of the laser will be measured. Then laser will be coupled into the input of a fiber, and the power from the output end will be measure. Lastly, the fiber will be cut to a smaller length and then the shortened fiber will be retested.  
**Keywords:** Attenuation, Fiber, Optics, Cable
POSTER 7: Analysis of acrylamide in carbohydrate-containing foods using GC-MS
Presenter: Ha Vo, Edinboro University of Pennsylvania
Mentor: Dr. Qun Gu, Edinboro University of Pennsylvania
Co-Author: Miguel Montes De Oca, Edinboro University of Pennsylvania
Area: Chemistry

Abstract: Acrylamide is a carcinogen and a neurotoxin, found in many carbohydrate-rich foods, such as potato chips, French fries, cereal, and rice. These foods are known to contain an abundant amount of amino acid asparagine. When they are cooked in high temperature (>120°C), asparagine and other free amino acids react with sugars to form acrylamide. The purpose of this study is to determine the level of acrylamide present in these starchy foods. The process involves sample preparation and cleanup using SPE (solid phase extraction) and quantification using GC-MS. This project is an extension of the project “Analysis of Acrylamide in Starchy Food by HPLC” performed by Miguel Montes De Oca and Daniel Goetz. GC-MS and HPLC will both be used for analysis of the same food sample in order to compare the results of these two methods.

POSTER 8: Examining the effects of natural dietary supplements on fat metabolism in the fruit fly, drosophila melanogaster
Presenter: Anne Groover, California University of Pennsylvania
Mentor: Dr. Louise Nicholson, California University of Pennsylvania
Area: Biology

Abstract: A sedentary lifestyle and calorie-dense diet has made obesity a prevalent problem with many supplements attempting to counteract it. Drosophila melanogaster can be used as a model to study obesity due to the conservation of many genes and pathways involved in fat metabolism. Different compounds will be tested on both wild-type flies and flies with mutations in the Drosophila adipokinetic hormone (dAkh) and mir-14 genes. DAkh, an ortholog of glucagon, reduces triglyceride levels in flies; conversely, mutations in mir-14 increase triglyceride levels. Fly food was made using each of four different supplements - garcinia cambogia, raspberry ketones, cayenne and B12 – at varying concentrations. Flies were separated by gender to observe any differences. Fat metabolism is currently being assayed using thin layer chromatography to measure different triglyceride levels. This will help determine whether these compounds do in fact increase fat metabolism, and identify possible side-effects such as mortality and behavioral changes.
Keywords: fat metabolism, Drosophila melanogaster, obesity, Drosophila adipokinetic hormone, mir-14, triglyceride
POSTER 9:  Using CRISPR-Cas9 to create a yeast strain for genetic screens
Presenters:  Elizabeth Stackhouse and Michael Belko, Indiana University of Pennsylvania
Mentor:  Dr. Cuong Diep, Indiana University of Pennsylvania
Area:  Biology

Abstract: Chronic Kidney Disease (CKD) is a major health problem due to increasing rates of diabetes, and current treatments have major limitations. Therefore, finding new therapies for CKD is essential. Unlike humans, zebrafish regenerate their kidneys using stem cells that express the lhx1a gene. We recently showed that lhx1a dimerizes and hypothesize that this is important for its activation in stem cells to regenerate kidney tissue. Therefore, identifying the dimerization domain is important for understanding the molecular mechanism of lhx1a. We will use CRISPR-Cas9 to create a new yeast strain by inserting the LexA(op)-URA3 reporter. The new strain will then be used for a genetic screen to identify the dimerization domain. Understanding how lhx1a works to activate stem cells and regenerate the kidney will provide insights into future regenerative therapies for treating CKD.

POSTER 10:  Therapeutic Hypothermia
Presenters:  David Zook and Robin Droll, Millersville University of Pennsylvania
Mentor:  Dr. Teresa Hartmann, Millersville University of Pennsylvania
Area:  Nursing

Abstract: Cardiac arrest (CA) causes devastating neurologic morbidity and mortality. The preservation of neurologic function is the final goal of resuscitation. The average survival to hospital discharge in the United States in 2013 was 10.6% following a CA and average survival with good neurologic function was 8.3% (AHA, 2015a). A review of the literature was conducted to answer the question: Does Therapeutic Hypothermia (TH) with a target range of 32-34˚, versus standard supportive care without TH, have a favorable neurological outcome in adult patients who were resuscitated following a CA? Evidence suggests that TH has been associated with improved survival, decreased neurological impairment, and better overall outcomes in patients following a CA. TH is a beneficial treatment and implementation in all adult patients with return of spontaneous circulation following CA is consistent with current best medical practice as recommended by the AHA and International Liaison Committee on Resuscitation (ILCOR).
Keywords: therapeutic hypothermia, targeted temperature management, hypothermia, induced hypothermia, TH, TTM, adults, neuroprotection, neurologic outcome, neurological recovery, cardiac arrest, post-cardiac arrest, cardiac resuscitation, resuscitated
POSTER 11: Preparation of quasicrystalline nanoparticles
Presenter: Christopher Allemang, Clarion University of Pennsylvania
Mentor: Dr. Chunfei Li, Clarion University of Pennsylvania
Area: Physics

Abstract: This study is part of another larger project of preparing icosahedral quasicrystalline nanoparticles. Icosahedral quasicrystalline phase has unique atomic configurations, different from regular metals and glasses. The goal of this project is to create icosahedral quasicrystalline grains on the millimeter scale. These grains would be large enough to be seen by the unaided eye and handled by hand. The alloy used for this study has a composition of Al\textsubscript{75}Pd\textsubscript{20}Re\textsubscript{5} which has been found to form icosahedral quasicrystalline phases on the centimeter scale in previous studies. The alloy is prepared by arc melting pure elements. Then, the alloy vacuum sealed in a quartz tube with an argon atmosphere, then placed in a furnace. The furnace goes through a program of changing temperatures to anneal the metal and grow the crystals. Toward this goal, significant progress has been made.

POSTER 12: Inactivation of pathogenic bacteria on media containing fruit juices and spices using radiant catalytic ionization
Presenters: Brittany Benjamin, Adrian Babel, Michael Sweeney, Oladapo Afolabi, Ryan Clark, and Alysia Ryan, Edinboro University of Pennsylvania
Mentors: Dr. David E Fulford, Dr. William Mackay, and Dr. Craig Steele, Edinboro University of Pennsylvania
Area: Biology

Abstract: The World Health Organization (WHO) estimates that 2 billion people worldwide are affected by food-borne illnesses yearly. In order to combat this problem, new sanitizing techniques have emerged which are being used to decontaminate contact surfaces. By generating activated oxygen species such as hydrogen peroxide, superoxide anion, hydroxyl radical, and ozone, Radiant Catalytic Ionization (RCI) has come to the forefront of potential solutions for this issue with its countless applications for reducing bacterial counts. Previous research has shown that RCI causes a 90% killing of food-borne pathogens during a 20 minute exposure. The focus of this study is the examination of the effects of RCI on Escherichia coli and Listeria innocua grown on different types of media to simulate common food products. The media that were used for this study include Tryptic Soy Agar (TSA) and TSA infused with organic apple juice, organic ground turmeric, or organic ground cinnamon. The turmeric and cinnamon, both of which are natural antimicrobial agents, were chosen to explore the possibilities of a synergistic effect between the spices and the food product in the presence of RCI. The results of the apple juice plates indicated a 95% killing of E. coli in 3 hours.

Keywords: pathogens, bacteria, food safety, inactivation, spices
POSTER 13: Exercise, anxiety, and grade point average
Presenter: Amy Fahnestock, California University of Pennsylvania
Mentor: Dr. Rebecca Regeth, California University of Pennsylvania
Area: Psychology

Abstract: This study explored the relationship that exists between a student’s exercise habits, their self-reported anxiety, and grade point average (GPA). Forty college students, both from the undergraduate and the graduate level, were used as participants in this study. Participants answered questions pertaining to their level of anxiety and their exercise habits. This information was utilized to determine the relationship that existed between these factors. The results from this study showed that neither the amount of exercise a student participated in nor their level of anxiety had any significant relation to that student’s GPA. The smaller sample size used in this study may be a contributing factor as to why the results of this study show no relation. The results of this study suggest that students’ various levels of exercise have no impact of the grades they earn in school, and the results further suggest that a student's anxiety level will also not affect his or her grade point average in school.

Keywords: exercise, anxiety, grade point average (GPA)

POSTER 14: DNA binding and cleavage studies using aryl sulfoxides
Presenter: Megan Doleschal, Shippensburg University of Pennsylvania
Mentor: Dr. Allison Predecki, Shippensburg University of Pennsylvania
Area: Chemistry

Abstract: The identification of organic molecules capable of producing free radicals that lead to DNA damage is an important pursuit in the field of bioorganic chemistry. Free radical induced DNA damage is a significant mechanism in many cancer therapies. Aryl sulfoxides have been identified as a class of simple molecules capable of damaging DNA in the presence of ultraviolet light. Recently, molecular features capable of binding to DNA have been incorporated into these compounds. DNA cleavage and binding data for two aryl sulfoxides will be presented.

Keywords: aryl sulfoxides, DNA

POSTER 15: Contributions Made to The Fermilab Test Beam Facility
Presenter: Kevin Shuman, Edinboro University of Pennsylvania
Mentor: Dr. Mandy Romanisky, Edinboro University of Pennsylvania
Area: Physics

Abstract: This poster presentation will focus on three projects done at the Fermilab Test Beam Facility at Fermi National Accelerator Laboratory. The projects are: integrating MIDAS into the test beam computer system, initiating designing of a time of flight system for the Test Beam Facility, and calibrating a lead glass calorimeter. MIDAS was integrated into the test beam computer system with an additional data analyzer, ROME, by adapting the MIDAS framework code to work at the test beam facility. Quartz and micro-channel plate photo-detectors we chosen for the time of flight system. Lastly, a method was used to calibrate a lead glass calorimeter, data was gathered using said method, and modifications to the method were proposed.

Keywords: Particle Physics, Data Acquisition, Instrumentation
POSTER 16: Investigating the impact of substituent position on spectroscopic and biological properties of bimetallic complexes.

Presenters: Alexis Hagelgans and Kiera Estes, Indiana University of Pennsylvania
Mentor: Dr. Avijita Jain, Indiana University of Pennsylvania
Co-Authors: Ty Sampsell and Katie Wyland, Indiana University of Pennsylvania
Area: Chemistry

Abstract: The position and identity of substituents have been shown to play an important role in photochemistry and photophysics of ruthenium based chromophores. The impact of the position of the methyl group on spectroscopic, redox, and DNA interaction properties of designed Ru(II) based monometallic complexes and Ru(II)Pt(II) based bimetallic complexes, containing bipyridine ligands were investigated. Herein, we report synthesis, characterization, photochemical, electrochemical, and DNA interaction properties of four new metal complexes.

POSTER 17: Evaluating the influence of forest herbicides on offspring sex ratio in an early successional forest songbird

Presenter: Jennifer Houtz, Millersville University of Pennsylvania
Mentor: Dr. Brent Horton, Millersville University of Pennsylvania
Area: Biology

Abstract: We examined if forest herbicide intensity is linked to shifts in the offspring sex ratio of the White-crowned Sparrow (Zonotrichia leucophrys). We applied four herbicide treatments (e.g., light, moderate, intensive, and a no-spray control) to recently harvested Douglas-fir stands (12-16 ha) in the Oregon Coast Mountains. We obtained genetic samples from 1,011 nestlings near fledging. Nestlings were genotyped via Direct PCR from whole blood stored in Queen’s lysis buffer (i.e., no DNA extractions). Sex was determined via PCR amplification of fragments from the Z and W alleles of the CHD-1 gene using P2/P8 primers. This approach worked successfully on 99.9% of blood samples and was 100% accurate for known-sex adults. We found no effect of herbicide intensity on offspring sex ratio in White-crowned Sparrows, a novel result when compared with recent work that has shown forest management intensity is positively correlated with the degree of male sex bias in songbirds.

Keywords: Direct PCR, White-crowned Sparrow, Herbicides, Offspring Sex Ratio
POSTER 18:  Learning to starve in America
Presenter:  Kristen Hall, Edinboro University of Pennsylvania
Mentor:  Dr. Patricia Claster, Edinboro University of Pennsylvania
Area:  Sociology

Abstract: It’s no secret that childhood obesity has been on the rise in the last two decades. My research has been focused on the causes of this epidemic, and the other health related consequences. With the highest rates of obesity occurring among children in poverty, we need to look at their food consumption in school as well as at home. Obese children demonstrate increased impulsivity, decreased executive control, and increased difficulty delaying gratification relative to their lean peers. Obesity also impacts the neurofunctional reactivity of children to food stimuli with obese children exhibiting increased reactivity to food cues in limbic and para limbic cortical regions. Children’s food choices are influenced by their early eating experiences that cause internal factors. External factors include parents, marketing, peers, and food availability.

Keywords: child obesity, health, nutrition

POSTER 19:  Moral elevation and disgust: A comparative study
Presenter:  Derick DeCamp, Millersville University of Pennsylvania
Mentor:  Dr. Frederick Foster-Clark, Millersville University of Pennsylvania
Area:  Psychology

Abstract: Past research has found that experiencing the emotions disgust or moral elevation can influence one’s moral judgments, but no know research has been done to empirically test and compare both emotions’ influence on moral judgments in the same study. Two individual differences were also examined, Private Body Consciousness (PBC) and Moral Identity, both of which have been shown in past research to influence one’s ability to experience disgust and moral elevation. Participants completed an online survey that measured their level of PBC and moral identity. Participants who scored either high or low on one of these variables were then randomly assigned to watch either a disgust inducing video, an elevation inducing video, or a control video. After watching one of the three videos participants then made moral judgments in response to reading six vignettes. The data are still in the process of being collected and analyzed.

Keywords: moral elevation, disgust, moral judgments, individual differences
POSTER 20: **Comparison of Metric and Nonmetric Traits for Ancestry Determination of Known Native American Remains**

Presenter: **Rebekah Quickel**, California University of Pennsylvania  
Mentor: **Dr. Cassandra Kuba**, California University of Pennsylvania  
Area: Anthropology

**Abstract:** This research aimed to determine if multiple ancestry traits on the femur and cervical vertebrae could be combined to increase accuracy of ancestry determination. Combining multiple ancestry traits could help identify individuals of mixed ancestry or poor preservation. Three metric femoral traits were investigated: femoral neck axis length (Christensen et al., 2014); intercondylar notch angle (Craig, 1995); and femoral subtrochanteric shape (McIlvaine and Scheperz, 2015; Wescott, 2005). The one nonmetric trait (variation in tooth/bone) assessed was bifidity of the cervical vertebral spinous process (Duray et al., 1999). This research also aimed to determine applicability of these four ancestry determination techniques on remains of ancestral origin different from the original studies. Twelve adult males and females had sufficient preservation for data collection. Results showed all four traits agreed on the correct ancestry. The successful identification of ancestry shows that multiple traits working together will result in a more accurate ancestry determination.

**Keywords:** forensic science, forensic anthropology, ancestry determination, femur, cervical vertebrae

POSTER 21: **Characterization of alanine racemase from mycobacterium tuberculosis.**

Presenter: **Ryan Barnhart**, Indiana University of Pennsylvania  
Mentor: **Dr. Sudipta Majumdar**, Indiana University of Pennsylvania  
Area: Chemistry

**Abstract:** The bacterium *M. tuberculosis*, the responsible agent for tuberculosis, is a major human pathogen and is responsible for over 3 million deaths worldwide each year. The severity of many tuberculosis infections in further worsened by the increasing emergence of multi-drug resistance mycobacterial strains. Therefore, there is a continuing need for new antibacterial targets and drugs to fight this infectious disease. In *M. tuberculosis*, one such target is alanine racemase, a pyridoxal 5′-phosphate (PLP)-containing enzyme required for bacterial growth. This enzyme catalyzes the racemization of L-alanine to D-alanine, which is an essential building block for bacterial cell wall biosynthesis. Due to its essential nature, coupled with the absence of a human homolog, alanine racemase has long been an attractive drug target. The alanine racemase from *M. tuberculosis* was cloned and overexpressed as His-tagged recombinant protein in the *E. coli* BL21 system. The protein was purified by affinity chromatography and analyzed biochemically.
POSTER 22: A comparison of facial reconstruction methods
Presenter: Megan Kunst, Edinboro University of Pennsylvania
Mentor: Dr. Michelle Vitali, Edinboro University of Pennsylvania
Area: Engineering & Engineering Technology

Abstract: Forensic Facial Reconstruction involves creating an approximation of a person’s face based on their skull metrics. I created two facial reconstructions by adding clay to two 3D-printed copies of a human skull. A CT scan was provided by the Smithsonian Institution with cadaver photographs to assess the final reconstructions. The Smithsonian scan needed processing with imaging software to prepare it for printing. Then, I completed each reconstruction using a different traditional method. My faculty advisor and I developed a list of aspects of each method that were more reliable and considered the advantages/disadvantages of using a 3D-printed skull instead of the actual skull (traditionally used). This allowed us to cultivate a best practices protocol. The field of facial reconstruction lacks methodological standardization. The best practices protocol we developed can aid in that standardization and improve the facial reconstructions done by forensic artists, improving the likelihood of identification of unknown individuals.

Keywords: 3D-Printing, Facial Reconstruction, Forensics

POSTER 23: Concentrated animal feeding operations and their impacts on rural communities
Presenter: Beth LeFevre, Millersville University of Pennsylvania
Mentor: Dr. Charles Geiger, Millersville University of Pennsylvania
Area: Geography

Abstract: Concentrated animal feeding operations are believed to inflict detrimental effects upon the communities in which they are located. The purpose of this study is to determine how the presence of the concentrated animal feeding operation in Codorus Township, York County—owned and operated by Hillandale Farms—has affected the quality of life of the residents of surrounding community. The questions that will be addressed are: has the presence of the CAFO in the community had any positive or detrimental effect on residents’ economic status (either by creating jobs or influencing the value of any property they might own); have residents had trouble with pest management in the form of house flies; have residents had any experience with traffic, smells, or noises associated with the operation of the facility; have the residents experienced any problems with private wells; and whether or not residents believe the existing facility impacts the local environment.

Keywords: CAFO, layer hens, agriculture
POSTER 24: Analyzing the relationship between religiosity and open-mindedness
Presenter: Lily Meiss, California University of Pennsylvania
Mentor: Dr. Rebecca Regeth, California University of Pennsylvania
Area: Psychology

Abstract: The present study analyzed the relationship between religiosity and open-mindedness. Sixty undergraduate students (38 females, 22 males) were given a questionnaire consisting of demographic questions, a 16-item open-mindedness scale, and a 5-item religiosity scale. The results concluded that there was a significant negative correlation between religiosity and open-mindedness, meaning that participants with higher religiosity scores had lower open-mindedness scores. Males and females did not have significantly different open-mindedness scores. Males and females were not significantly different in terms of religiosity, participants with high open-mindedness scores had lower religiosity scores than participants with low-open-mindedness scores, and there was no significant interaction between religiosity and open-mindedness in terms of religiosity. In interpreting these results, high religiosity was associated with low open-mindedness and low religiosity was associated with high open-mindedness. People who are more religious are less open-minded than those who are less religious.

Keywords: open-mindedness, religiosity, religion, spirituality, dogmatism

POSTER 25: Chemical and frictional properties of single and mixed monolayers of nonadecanoic acid and octacosanoic acid self-organized on sapphire surface
Presenter: Rebekah Thomas, Slippery Rock University of Pennsylvania
Mentor: Dr. Min Soo Lim, Slippery Rock University of Pennsylvania
Co-Author: Dr. Ellen Gawalt, Duquesne University
Area: Chemistry

Abstract: Self-assembled monolayers are two dimensional molecular arrays that are self-organized onto surfaces of metals or metal oxides. The present study focuses on the chemical and nano-tribological nature of single and mixed monolayers of nonadecanoic acid (C19) and octacosanoic acid (C28) that were formed on crystalline sapphire surfaces. Mixed monolayers of C19 and C28 were formed with ratios of 75%-25%, 50%-50%, and 25%-75%. Diffuse reflectance infrared Fourier transform spectroscopy (DRIFT) confirmed the formation of highly ordered single and mixed monolayers. Water contact angle measurements indicated hydrophobic surfaces, and the degree of hydrophobicity increased with composition of C28. Atomic force microscopy (AFM) investigated the frictional properties of the monolayers in addition to acquisition of surface topography. Single and mixed monolayers exhibited substantially higher friction than uncoated sapphire surface.
POSTER 26: Staying healthy in America: Ensuring healthy behaviors in Chinese students while they study abroad
Presenter: Kelsey Durham, Indiana University of Pennsylvania
Mentors: Dr. Michele Papakie and Dr. Idamarie Laquatara, Indiana University of Pennsylvania
Area: Health Services

Abstract: The purpose of this study is to examine how international students from China at Indiana University of Pennsylvania ensure their physical wellbeing while studying abroad in America. It has been observed that foreign food has an effect on the health of international students when they travel abroad for their education (Byram & Feng, 2006; Alakaam, Castellanos, Bodzio, & Harrison, 2015; Lang & Heasman, 2015). This research will explore the amount of physical and dietary change that international students endure when studying abroad in America and how the food they are eating affects their bodies due to its chemical and nutritional differences. The survey method will be implemented to collect data, including their height and weight on both their first and final days of their semester abroad at IUP to determine the amount of change their body experienced while in America. The goal behind this research is to raise awareness of the challenges international students face concerning their health when studying abroad. Furthermore, the research aims to make the transition from China to America as smooth as possible by educating international students on the differences in foods that they will consume and understand different nutritional facts.

Keywords: study abroad, health, international, education, nutrition

POSTER 27: Investigating the possibilities of using lithium copper (II) germanate as a possible dilute magnetic semiconductor compound
Presenter: Jakyra Simpson, Indiana University of Pennsylvania
Mentor: Dr. Charles Lake, Indiana University of Pennsylvania
Area: Chemistry

Abstract: Currently there is a lack of operative dilute magnetic semi-conductor (DMS) materials with magnetic transition temperatures above that which is technologically feasible. Methods to “tune” the physical and electronic properties of these materials is of interest to better utilize these materials. The primary purpose of this research is to synthesize and characterize the possible DMS compound Li₂CuGeO₄. The questions to be investigated include, synthetic methods to produce a phase pure product, the crystal structure of the resulting quaternary adamantine-like compound, the electronic bad gap associated with the compound, and the possibility of forming the sold-solution Li₂(Zn,Cu)GeO₄. Many methods will be utilized to characterize the compound including: powder X-ray diffraction, diffused reflection spectroscopy and differential scanning calorimetry. The crystal structure will be investigated through powder diffraction methods. The results will be compared previously synthesized compounds to determine the changes in properties upon substituting various cations into the adamantine-like quaternary crystal structure.

Keywords: X-ray diffraction, Germanates, DMS (Dilute Magnetic Semiconductor)
Acknowledgements

Thank you for attending the 3rd Annual PASSHE Undergraduate Research Conference in Science, Technology, Engineering, and Mathematics. I hope you enjoyed your trip to Millersville University and your conversations with colleagues across the State System.

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Congratulations again to all our presenters!

Sincerely,

Michael Jackson, Ph.D.
Dean, College of Science and Technology