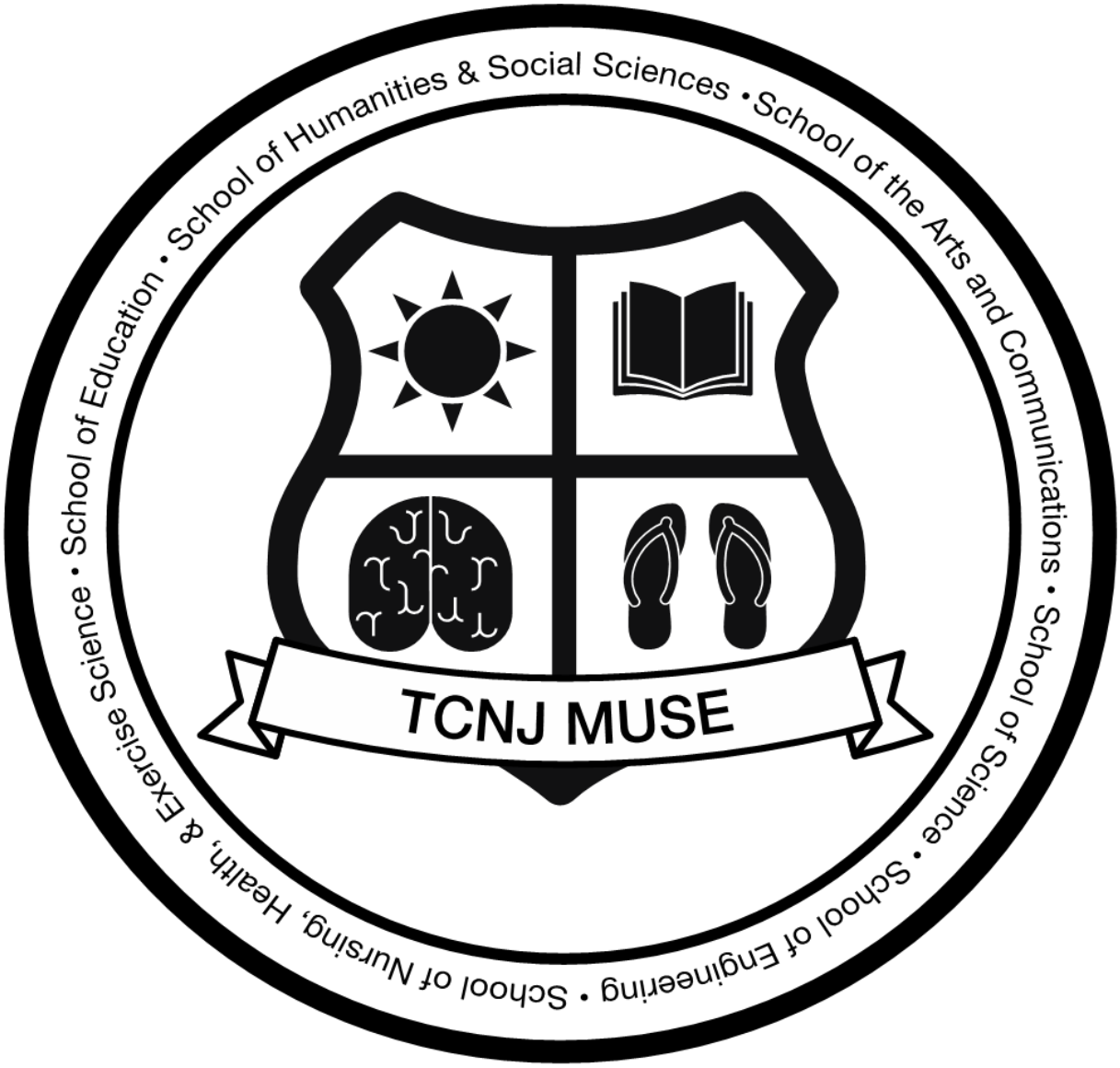

MUSE 2018

The College of New Jersey


FRIDAY


The Ted Stiles Preserve at
BALDPATE MOUNTAIN
MERCER COUNTY PARK COMMISSION
BRIAN M. HUGHES, COUNTY EXECUTIVE

TCNJ prides itself on the teacher scholar model where faculty are not only excellent instructors to our students, but also generate new knowledge or creative projects in their disciplines. TCNJ's 2016 MUSE (Mentored Undergraduate Summer Experience) is the apex of the teacher scholar model by fully integrating faculty scholarship/creative projects with student learning and training. The program brought together 51 faculty members and 81 students from across campus over the course of 8 weeks in the summer where faculty mentors created a transformative educational experience for students while pushing their scholarly agendas forward.

The key to the success of MUSE is that students study at the cutting edge of their faculty member's discipline to generate new knowledge without the confines of student class schedules. Students develop the scholarly questions and the processes to answer the scholarly questions with their mentor. Students learn the importance of the background and context of their mentor's project when pushing the boundaries of current knowledge. They quickly learn that big scholarly questions must be broken into achievable outcomes by limiting the scope based on their current resources. TCNJ's MUSE students are ready to continue to tackle world problems through their disciplines by finding smaller steps towards the overall goal.

This training to think like a scholar is important to the future workforce. These skills are critical to the workforce so that MUSE students can become leaders and problem solvers in their careers. The MUSE students learn excellent resilience and alternate strategies when projects do not proceed as planned. Students solve problems where the solution may never have been done before and many find out they may be the only person to ever try to solve this problem. Graduates will be ready to solve critical problems in their careers because they have already tried to solve a major problem.

This strategic priority to enrich our scholarly community on campus could not have been done without the financial and personnel support of many groups and people. The Director and all the students and faculty of MUSE thank the Office of Academic Affairs with leadership from Provost Jaqueline Taylor and Associate Provost Kit Murphy and invaluable administrative support from Norma Garza, as well as assistance from student worker Rebekah Silva. We thank the Offices of Residential Education and Housing, Conferences and Meeting Services, Catering Services, Finance and Business Services, and every School and Department office and Chair with MUSE students for their administrative support. We thank the faculty of the MUSE Review Committee for reviewing proposals and recommending funding: Anthony Deese, Constance Kartoz, Curt Elderkin, David Mazeika, Dimitris Papamichail, Elizabeth Mackie, Jerry Petroff, Jessica Barnack-Tavlaris, and Maria Domingo.

The development of our students would not be possible without the generous support of TCNJ and external organizations. We would like to thank the following organizations: Bristol-Myers Squibb, The National Science Foundation, NASA Space Grant Consortium, TCNJ Academic Affairs, TCNJ Foundation, TCNJ School of Science, TCNJ School of Arts & Communication, TCNJ School of Humanities and Social Sciences, TCNJ School of Nursing & Health and Exercise Science, and TCNJ School of Engineering.

—Dr. Jarret Crawford, Director of Faculty-Student Scholarly and Creative Collaborative Activity

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In and Out of Frame; Questioning Framing through Art

Adam Khalifa

Faculty Mentor: Professor Liselot van der Heijden (Art and Art History)

We are working on video and photography projects that explore the role of framing and how context influences the way we interpret what we see. One of our focus points is the Columbus statue on Columbus Circle in New York City. A small shift of the camera, or point of view, situates the statue against the sky or against the International Trump Hotel or Time Warner Center. Looking from above we see that the statue intersects with Broadway, an originally Native American trail. Along with this, we are researching the historical and cultural significance of this Columbus statue and surrounding controversies.

Ortler Kettles Handmade Paper / Experimental Projection and Laser Technology

Irene Yoon

Michele Cheng

Faculty Mentor: Professor Elizabeth Mackie (Art and Art History)

The primary vision for this project encompasses the artistic representation of glacier regression. The effects of global warming are evidenced on the Ortler mountain range located in northern Italy. Through video and photography, this has been recorded by Elizabeth Mackie and became the foundation for our MUSE project. Our process includes beating Abaca bark, dying pulp, spraying pulp, and handcutting kettle shapes out of the resulting sheets of paper (approx. 5 x 4 feet). The kettle shapes are derived from photographs of shapes produced by melting ice. Once sheets are completed, they are installed vertically in trios. Shadows produced by the negative kettle shapes become progressively smaller as light passes through each successive sheet. Secondary projects focus on experimentation with projection and laser technology. Main questions surrounding the projection projects involve the behavior of images and fiber when used together. Fabric skirts 8.5 - 11 feet long as well as sheets of handmade Abaca paper are hung and used as canvases for various video projections of natural settings. We also experiment with laser engraving scanned images of hair and Barbie dolls onto smaller handmade sheets of paper.

Understanding the perspectives and experiences of fathers of children with disabilities in school partnerships

Joshuah Carlan

Faculty Mentor: Dr. Nadya Pancsofar (Special Education, Language, and Literacy)

Our MUSE project is focused on fathers of children with disabilities in order to uncover practices which would promote fathers involvement in professional partnerships. This work will include the completion of a literature review and the coding of father interviews to gain a deeper understanding of fathers' perspectives in school partnerships as well as recommendations for practice.

Fairy tales across the African Diaspora: A Critical Content Analysis

Daliah Ouedraogo

Faculty Mentor: Dr. Lina Richardson (Elementary and Early Childhood Education)

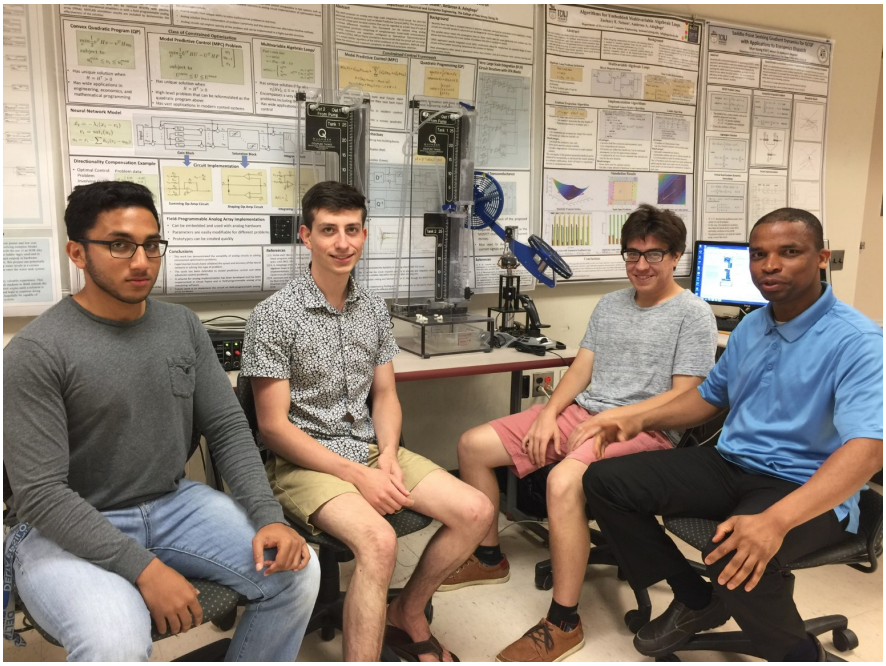
The purpose of our project was to examine how female protagonists were depicted in African and African American fairy tales compared to more popular princess stories. To investigate this, we conducted a content analysis of four fairy tales representing the African diaspora and compared our findings to how female protagonists were portrayed in the more well-known Disney stories featuring European princesses. In pursuing this project, we wondered about the extent to which Black fairy tales could appropriately serve as windows and mirrors for and of Black girls, especially when used in the classroom setting. Through our analysis, we found that the Black female protagonists differed from the more popular European fairy tales in three distinctive ways. We argue that while the Black fairy tales in our study could be a valuable asset in the classroom, they also contain underlying messages that may reinforce negative conceptions of Black culture in general and Black girls in particular.

School of Education/School of Engineering

Teaching Academic Language to Deaf Students: Does Research Offer Evidence for Practice?
Knar Marashian
Zahra Memon
Faculty Mentor: Dr. Barbara Strassman (Special Education, Language, & Literacy)

We conducted research pertaining to deafness and academic language is extremely limited. Using the Qualitative Similarity Hypothesis as a framework, our MUSE project was to write a synthetic review of the researched-based practices for developing academic language in English Language Learners and to review the research which extends those research-based practices to students who are d/Deaf or hard of hearing.

School of Engineering



Neuromorphic Computing Architectures and Technologies for Optimization and Control
Joseph Bruno
Hussain Khajanchi
Terrence Skibik
Faculty Mentor: Dr. Ambrose Adegbege (Electrical and Computer Engineering)
This work concerns the development of real-time and fast computing hardware for online optimization and control of systems with inherent nonlinearities and significant interactions. Such systems are widely encountered in safety-critical infrastructures such as power networks and in cyberphysical networks such as satellite-communication systems. This summer, the research focuses on the implementation and circuit realization of an optimization-based control strategy, generally known as model predictive control (MPC), using both a digital platform (Field Programmable Gate Array, FPGA) and an analog platform (Field Programmable Analog Array, FPAA). The efficiency and performance of the implementations are benchmarked using a widely employed classical control algorithm, the Proportional-Integral-Derivative control (PID). For proof of concept, the control implementation is targeted to a quadruple water-tank system resident within the Laboratory for Embedded Control and Optimization (LECO).

Effect of Anisotropic Material Properties on the Design of Composite Bridge Fender Systems

Ashley Hyde

Anthony LaRegina

Faculty Mentor: Dr. Bechtel (Civil Engineering)

In this study, a P-y analysis of currently available polymer based pile products was implemented in the Finite Element software STRAND7. Analyses accounting for shear deformation were compared to those which neglected shear deformation. The different polymer pile materials were evaluated using P-y curves representing different types of soil. The goal of this work is to provide geotechnical engineers with a reference they can use to determine if and how they will consider shear deformations.

Performance Measures for Characterizing Regional Congestion using Aggregated Multi-Year Probe Vehicle Data

Ryan Gurriell

Faculty Mentor: Dr. Thomas Brennan (Civil Engineering)

We conducted an analysis of the congestion characteristics before, during, and after the closure of the bridge connecting I-276 in Pennsylvania to the New Jersey Turnpike in order to better understand the impact on the regional transportation network.

Design and Testing of a Five-Fingered Assistive Exoskeleton for the Human Hand School

Emily Triolo

Faculty Mentor: Dr. Brett BuSha (Biomedical Engineering)

Over 50 million Americans suffer from arthritis and other debilitative disorders, or traumatic injuries, which result in a reduced ability to grasp and hold objects, such as a water glass or a handbag. For almost ten years, TCNJ student researchers in this lab have been designing, building, and testing powered exoskeletons for the human hand. Using a 3D printed plastic structure (designed during MUSE 2017), electric motors, movement sensors, and a mini-computer, the current design provides flexible mechanical support and assistive forces to each of the four fingers and the thumb. The primary goal of the project this summer was to perform TCNJ IRB approved human testing on healthy, college-aged subjects to record grasping efforts, pinching efforts, and various functionality tests. These tests were then analyzed to determine how effectively wearing the devices reduces the amount of muscle activation needed to perform these tasks. A secondary goal was to produce a second exoskeleton device to be used for demonstration purposes.

Remediation of Complex Metal Ion Solutions and Real-World Water Samples by Alginate Nanofiber Membranes

Keith Wojciechowicz

Faculty Mentor: Dr. Matthew Cathell (Integrative STEM Education)

We are continuing research into the natural biopolymer alginate, derived from brown algae. We have further refined our method for manufacturing nanofibers from alginate, using a high voltage electric field in the process of electrospinning. Using a scanning electron microscope, we can confirm that we are producing dense meshes of uniform fibers, with fiber diameters of about 100 nm (1,000 times thinner than a sheet of paper). Our experiments this summer have focused on measuring the ability of the nanofibers to uptake dissolved cadmium, a toxic metal of environmental and health concern. We are studying the rate of cadmium binding over time, as well as the maximal binding capacity, and are comparing the results with previous experiments we have completed with the toxic metal lead. We are preparing a manuscript detailing our findings.

Human Centered Design- Effect on College Students' Attitudes Towards the Vision Impaired

Samantha Moorzitz

Faculty Mentor: Dr. Figueroa (Integrative STEM Education)

This project is an ongoing study on the effect of human centered design on college students' attitudes about people with vision impairments. Data was previously collected from four sections of the College's Creative Design course. Reflections and survey results were analyzed qualitatively and quantitatively to see how student's attitudes about people with a vision impairment change- before the experience, after a simulation, and after a design activity. Due to limitations of our original survey we have started working on a new survey that would produce more subject participation. This summer we have also explored a new application, involving tactile graphics in math education for students with a vision impairment. Using the laser engraver with various materials, prototypes were created of tactile graphs that can be useful to teach Cartesian coordinates and linear graphing.

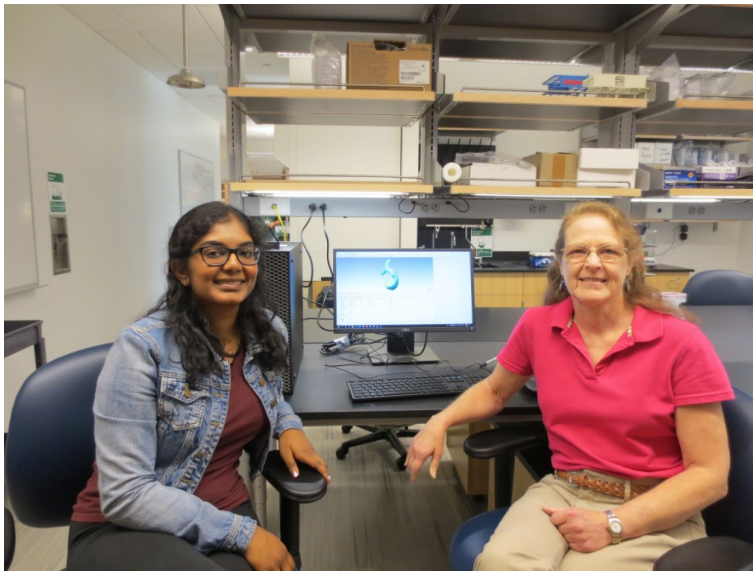
Pollen Aerodynamics

Grant Cignarella

Faculty Mentor: Dr. Lisa Grega (Mechanical Engineering)

Our research is looking into the aerodynamics of pollen grains. Specially how the geometry and texture effect it's drag coefficient. A major part of the summer has been design, machining and assembling an environmental chamber and its associated equipment. The chamber will be able to vary temperature to test different pollen models. The models are dropped from a three jaw chuck placed in the freezer. A scissor lift powered by a worm gear motor lifts the tank up the bottom of the chucks jaws. From there the chuck is unscrewed and the model precisely falls into place. A high resolution camera is used to record how the models fall. We intend to understand more about fluid dynamics by the end of the project.

Modeling Blood flow and Heat Transfer in Blood Surrounding a Pulmonary Artery Catheter used for Continuous Hemodynamic Monitoring



Keerthana Santhakumar

Faculty Mentor: Dr.Connie Hall (Biomedical Engineering)

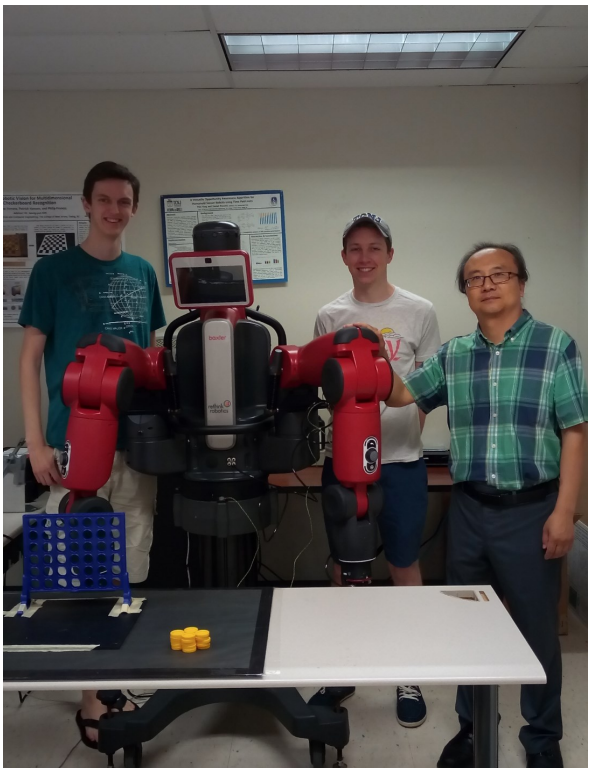
The objective of our project is to improve right heart and pulmonary artery model developed previously. The model enables examination of the flow and heat transfer surrounding an indwelling pulmonary artery catheter with a heating filament. The heat is applied to ultimately measure cardiac output in patients, however, it is suggested that the temperatures resulting from heating are high enough to affect platelet function, and thus thrombosis. The previous model applied a steady flow condition at clinically relevant flow rates. A waveform that more accurately represents pulsatile blood flow through the pulmonary artery will be developed and flow around a catheter will be performed across several cardiac cycles using computational fluid dynamics (CFD-ACE Suite, ESI Group, Inc.). Random sequences of heat pulses from the heating filament wall will then be added and both flow and heat transfer in the blood will be evaluated. The data obtained from the simulations will provide information about the velocity and temperature at different times and positions in the pulmonary artery across several cardiac cycles. The volume of blood reaching temperatures, which may affect platelet function, will be determined and subsequently the volume of platelets affected will be determined.

Using Petri Net Modelling and Simulation to Implement Card Game Algorithms for Improved Intelligent Human-Robot Collaboration

Paul Brodhead

Garrett Hope

Faculty Mentor: Dr. Seung-yun Kim (Electrical and Computer Engineering)



The purpose of this research project is to develop algorithms in order to improve the abilities of robots to identify different patterns. In order to make an improved algorithm, Petri net modeling and simulation will be used in order to allow a clearer understanding of how the new algorithm is to work. Three well-known Petri net modeling and simulation programs, HPetriSim, TINA and Yasper, will be used in this project. The simulation results will be compared to preexisting game-play algorithms to determine their effectiveness and success rates. Once a successful algorithm has been developed it will be implemented onto the Baxter Research Robot and tested.

Analyzing Bone Strength Changes in Animal Models of Bone Loss

Randolph Carpenter

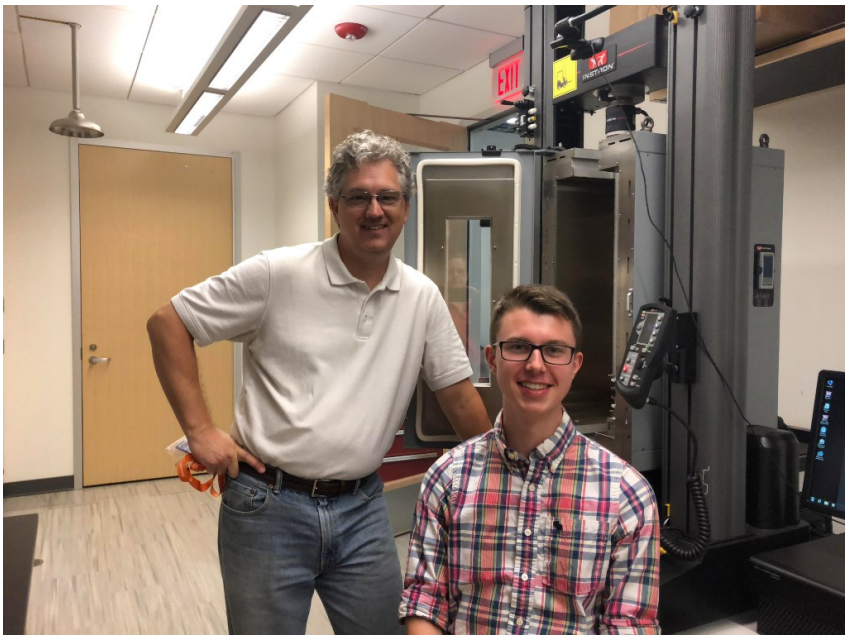
Benjamin Hezrony

Matthew Sanseverino

Faculty Mentor: Dr. Anthony G. Lau

(Biomedical Engineering)

Dr. Anthony Lau's research lab studies bone strength characteristics through the use of medical imaging, computational modeling, and mechanical testing. High resolution medical imaging through microCT provides 3-dimensional image data to study bone microstructure. From this 3D data, computational models can be created and mechanical simulations can be performed on the computer to assess bone strength. In addition, biomechanical tests are performed to break the bones to experimentally determine bone strength. These tools are used to evaluate bone strength changes in animal models for various pathological conditions. This summer, the MUSE research students in Dr. Lau's lab are employing these techniques to investigate bone changes in three different animal models: Rats exposed to space radiation, Mice undergoing tail suspension along with a bone drug to mimic the bone loss in space due to the absence of gravity, as well as Mice undergoing tail suspension and limb casting to study the combines of bone unloading and muscle atrophy.



Applications of Generative Adversarial Networks for Detecting Weeds in Lawns

Alex Benasutti

Jake Bezold

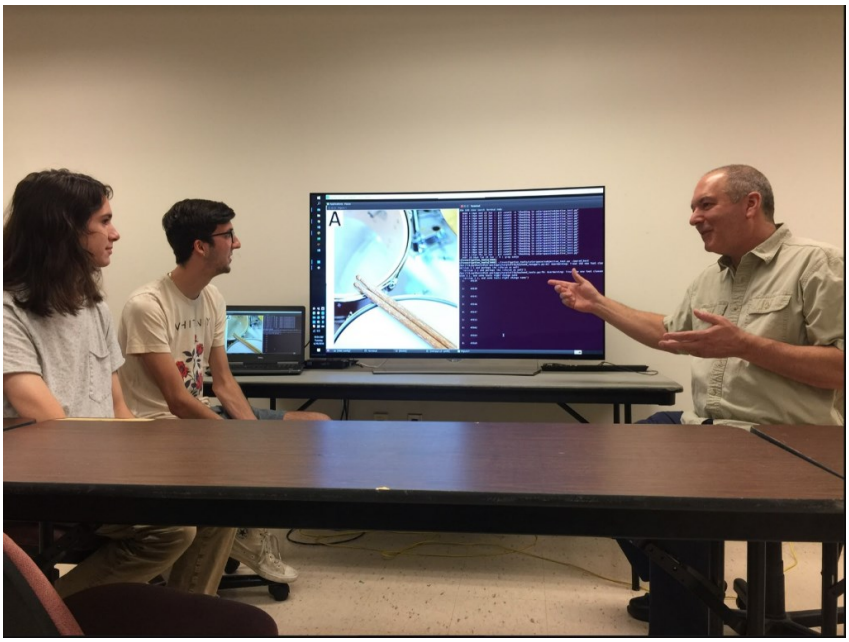
Faculty Mentor: Dr. Larry Pearlstein (Computer and Electrical Engineering)

Using deep learning and other machine learning methods to solve image classification problems to enable intelligent robotic devices. Specifically, we are working on a novel formulation of a Generative Adversarial Network(GAN) to make synthetic images appear real. Our goal for the GAN is to enable automated creation of a labeled dataset that can be used to train a classification network, which will be effective for processing natural images. Our overall application is to make an autonomous lawn weeder with the aim of reducing or eliminating the use of hazardous chemical herbicides.

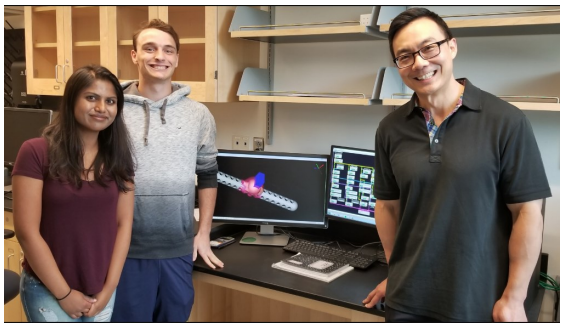
Fixture design and mechanical testing of aligned electrospun fibers for tissue engineering

Jared Posselt

Faculty Mentor: Dr. Christopher Wagner (Biomedical Engineering)



The overall goal of our research is to design, construct, and conduct design verification and validation on a bioreactor for tissue engineering tendon and ligament tissue using electrospun polymer nanofiber scaffolds. The focus of our research this summer is on designing, constructing, and testing a gripping mechanism for use with native extracellular matrix scaffolds, which will serve as control materials, and the polymer nanofiber scaffolds. Once the grip system is designed and constructed, we will evaluate the polymer nanofiber mechanical properties and system biocompatibility. This work will serve as a foundation for bioreactor-based research that will be continued through the Biomedical Engineering department's Research Track.



Recessed Array Electrode Geometries for Directional Deep Brain Stimulation/ Recessed Curvature-Contact Electrode to Minimize Tissue Damage in Deep Brain Stimulation

Kyle Ondar

Shruthi Radhakrishnan

Faculty Mentor: Dr. Xuefeng Wei (Biomedical Engineering)

Deep Brain stimulation is a therapeutic treatment that is used to treat multiple neurological disorders. When a patient undergoes the therapy, an electrode is inserted into their brain which emits an electric field. This will provide therapy to the intended areas that are affected by theses disorders. However, when inserted into the brain, on average, the location of insertion is off by a few mm. This can make a substantial difference in the effectiveness of the treatment. We proposed a new geometry for the electrodes that would increase the ability to stimulate the volume of tissue while decreasing the negative side effects of the treatment that would occur under a traditional electrode geometry. The electrode contacts would be recessed 0.25mm into the insulation of the device, this would help directional the electric field to have more control over its location. Another objective of the lab was to create an electrode that is recessed at minimum depth with curved contacts to obtain low and uniform current density across the contacts' surface. Lowering the current density of the contacts decreases the likelihood of tissue damage. We hypothesized that the recessed electrode will have a lower and more uniform current density profile than the standard array electrode due to it's curved contact geometry. The hypothesis was supported based on the obtained results, and was analyzed with Shannon Model to estimate how effective the recessed design was in comparison to the array model.

Demographic and Policy Change in Trenton NJ

Becca Colnes

Faculty Mentor: Dr. Diane Bates (Sociology)

The MUSE portion of the Demographic and Policy Change in Trenton NJ research involved collecting demographic data from the American Community Surveys. The two years that I focused on were 2016 and 2010. Dr. Bates and I began by narrowing down the variables that we felt would be important when looking at the demographic and policy changes in Trenton over time. Some of these variables included race, education, various incomes, work status, occupation, and disabilities. Initially my work involved cleaning up and preparing the datasets from 2016 and 2010 for analysis. I recoded variables with many categories by collapsing them into smaller categories, so it was easy to analyze. Dr. Bates and I would then look at the variables and run frequencies to make sure the datum was accurate and not skewed. Once the datasets were clean and accurate we begin to run the tables and compare the two years. The datasets were broken down into 5 areas: Trenton, Mercer County, Bucks County, New Jersey, and Pennsylvania. The goal was to compare the Trenton data to the data in nearby areas and compare the Trenton data to its county and state. Between 2016 and 2010 there were few notable differences between the datasets, but the research will continue through 1940 so that more differences can be uncovered in the demographics and policies of Trenton, NJ.

Aging and Memory – The Effect of Backward Recall

Christina Wood

Faculty Mentor: Dr. Tamra Bireta (Psychology)

There are four benchmark effects in working memory that have been heavily researched among younger adults. These effects include reduced memory when there is irrelevant background speech, when participants are unable to rehearse, when items contain more syllables, and when items sound similar to each other. Most of these studies require participants to memorize a short list of items and recall the items in order. The results of these studies have heavily influenced the development of memory theories. Our recent research, however, shows that these effects are greatly reduced or eliminated when participants are asked to recall the items in backwards or reverse order. These findings run contrary to the predictions of most major memory theories and suggest that participants approach backward recall with different retrieval processes compared to forward recall. Although younger and older adults show similar impacts of key variables on their working memory with typical forward recall, it is unknown whether or not older adults approach backward recall using the same processes as younger adults. If so, we would expect these effects to be reduced or eliminated among older adults as well. If not, theories attempting to explain age-related changes in memory would need to be modified.

Leveraging Feedback Orientation in the Workplace: Directions for Research and Practice

Rebekah Silva

Faculty Mentor: Dr. Jason Dahling (Psychology)

This summer I worked alongside a TCNJ Alum, Kajal Patel and Dr.Dahling in developing a chapter on feedback orientation in the workplace. Feedback orientation is a multidimensional individual difference that involves seeing feedback as valuable, feeling accountable and capable to act on feedback, and being cognizant of feedback information in one's social environment. Fostering and maintaining a positive feedback orientation is essential for employees to benefit from performance management processes, but relatively little research has explored this variable. In this chapter, we summarize existing findings concerning feedback orientation and chart important directions for future research and practice. We identify particular needs to study how feedback orientation develops over time, relates to leadership dynamics, operates in different cultural contexts, and shapes employee development in distributed work contexts. We conclude by offering recommendations for individual managers and organizational decision-makers based on trends that emerged in our literature review.

FIRSTS (Foundation for Increasing and Retaining STEM Students)

Rae Delacruz

Arianna Menendez

Faculty Mentor: Dr. J. Lynn Gazley (Sociology & Anthropology)

We have several objectives in our project: firstly, to determine areas of improvement for the summer bridge program for incoming STEM majors; secondly, to identify cues integral in the transition between highschool and established college students, and thirdly, to have a better understanding of the mechanisms of sociological research. We utilized ethnographic methods such as observation and field notes, and software such as Atlas.ti to code prior material. Our work this summer focuses on creating a basis on which future thematic coding during analysis can be based. Overall, this project has important implications, particularly since ethnography is rarely used in this context.

Intensive Longitudinal Study of the Directional Effects between Daily Affect and Procrastination in Liberal Arts College Students

Shira Pollack

Faculty Mentor: Dr. Joanna Herres (Psychology)

This Summer, I have been working on two lines of research and currently writing up papers to submit for publication. Dr. Herres and I analyzed data from a study that our lab conducted in the spring to use for my specific research project. With the help of Dr. Herres and my lab, I conducted an intensive longitudinal study to examine directional effects between daily affect and procrastination among college students. I am also writing another research paper that looks at adolescents' emotional arousal during an Adult Attachment Interview before and after Attachment Based Family Therapy for suicidal and depressive symptoms. In addition, I am currently writing up IRB proposal for my senior honors thesis which will look at the effects of gratitude intervention as a means for reducing negative affect and procrastination in college students.

A New Look at Trenton's Oldest House

Francesca Paldino

Faculty Mentor: Dr. Craig Hollander (History)

We are conducting research on the various people (both free and enslaved) who lived on William Trent's estate in Trenton, NJ, between 1719 and 1865. We hope to use this biographical information as a device for explaining political and social changes in the Trenton area over time.

Islamic Dirham Deposition in Viking Hoards

Chris Loos

Faculty Mentor: Dr. Roman Kovalev (History)

.This project investigated the dirham, a type of silver coin minted by various Islamic dynasties in the centuries following the death of the Prophet Muhammad in 632 C.E. Specifically, we looked at dirhams minted during the eighth, ninth, and tenth centuries. These coins quite frequently found their way into the hands of Viking traders and raiders, who carried them to Northern Europe, where they were buried for hundreds of years in hoards. These hoards, when discovered, are indexed, and we used these indexed hoards to compile a mass catalog of hoards and their respective dirhams. Included on the coins, where legible, were the rulers who minted them, the locations of the mints, the year of minting, the weight of the coin or coin fragment, and any other notable features about the coin, such as if it is a fragment; this information was likewise entered. Altogether, our research not only allowed us to track the outputs of various mints and rulers, but also enables future scholars to investigate Viking hoards and dirhams much more easily.

Cognitive-Behavior and Brain Activity Models of Decision Criterion During Recognition Event-Related Potential's

Anna Abrimian

Nicholas Danduone

Faculty Mentor: Dr. P. Andrew Leynes (Psychology)

Event-Related Potential's (ERPs) are segments of brain electrical activity that are time-locked to a stimulus and averaged to reveal a signal. The ERP signals are used to identify different mental processes through neurophysiological methods. Our research blends ERPs and cognitive-behavioral models to develop a comprehensive understanding of recognition processes. Recognition memory refers to instances when we are confronted with information and are able to determine that items were previously encountered. Through previous studies it has been found that ERP's can be affected through study context, which has been a variable that has not been controlled for. We followed this up with two experiments that both shifted decision criteria to manipulate test expectancies. In this way, we created different contexts while keeping stimuli constant in order to see how this variability shifts ERP's.

Postcolonial Ethics and the Partition of India

Trisha Basak

Faculty Mentor: Dr. Mindi Mcmann (English)

Our MUSE project looks into the role of ethics in encouraging reconciliation between countries disrupted by colonial violence. We specifically delve into the colonial past of India prior to partition and delineate the events that led to the partition of the subcontinent into India and Pakistan, and ultimately Bangladesh. The literature from these nations created in the "postcolonial" period of the twentieth century lends insight into the historical and socio-political complexities that divide the two nations. However, the same literature lends insight into the violence and displacement that emerged during partition and can be used to initiate a discourse about a peaceful relationship between Pakistan and India. With the application of philosophical concepts, such as those of Emmanuel Levinas and Jacques Derrida, to postcolonial literature, we analyze the possibility for future dialogue between the two countries and the hope for an ethical response that leads to reconciliation.

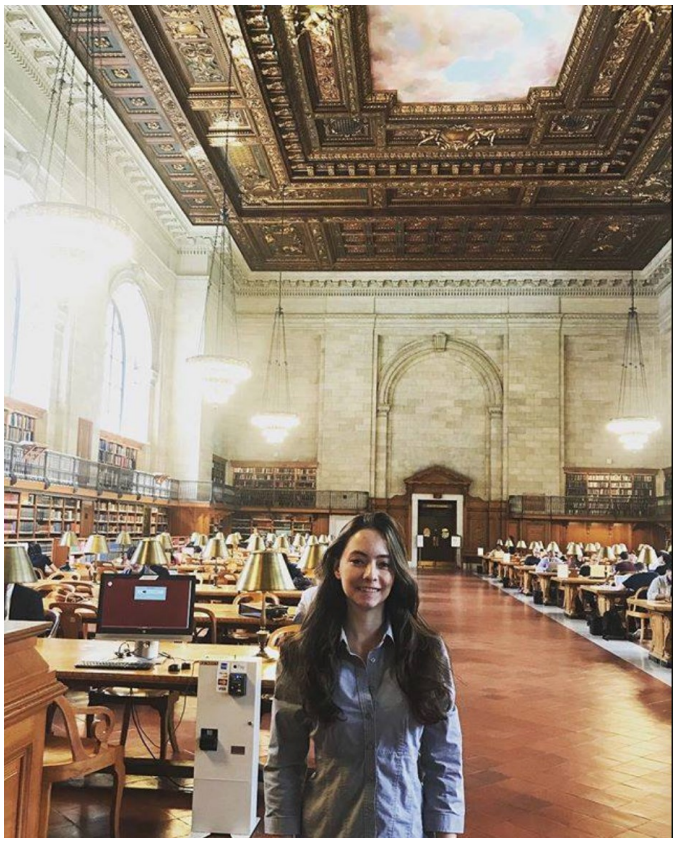
Overwriting the Dictator: Americanas, Autocracy, and Autobiographical Innovation

Ambar Grullón

Faculty Mentor: Dr. Lisa Ortiz-Vilarelle (English)

Our project analyzes memoirs by Latinas that rewrite womanhood during dictatorships in their countries of origin. These memoirs examine the intersection of motherhood, domesticity, mobilization, and the impact of testimony that can spearhead or inspire movements. This summer, we studied Chilean writer Isabel Allende's Aphrodite—a "memoir of the senses" that proposes food and sex as essential for healing—and identified it as the anti-handbook to First Lady Lucia Hiriart de Pinochet's La Mujer Chilena, a pamphlet promoting the self-sacrificing woman.

School of Humanities and Social Sciences/School of Nursing, Health, and Exercise Sciences



Remembering Lidice: International Memory of a Nazi Massacre 1942-1968

Carlie Goode

Faculty Mentor: Dr. Cynthia Paces (History)

In the aftermath of the assassination of top Nazi Reinhard Heydrich by Czech partisans in 1942, the Nazi regime ordered the destruction of the innocent Czech village of Lidice. When the Nazis executed all of the men, sent the women to concentration camps, and the children to 'the appropriate authorities,' they did not hide their crime as they had so many of their atrocities. Rather, the Nazis proudly announced to the world that Lidice had been wiped off the face of the earth. In response, the international community from England to Brazil commemorated Lidice by naming their towns after it, creating films, and staging art galleries. In preparation for an upcoming book of Dr. Cynthia Paces, we have researched international reactions to the massacre and how it was shaped through the politics of the Cold War.

School of Nursing, Health, and Exercise Sciences

Effect of Caffeine Supplementation on Acute Rope Exercise Performance and Metabolism

Hannah Mercado

Faculty Mentor: Dr. Jill Bush (Health and Exercise Science)

Our research examines the effect of caffeine supplementation on an acute, intense battling rope exercise. Performance outcomes including number of sets, repetitions, and perceived effort, and various metabolic properties including heart rate, blood pressure, and blood lactate and glucose are analyzed to assess the human body's response to 325 mg of caffeine supplementation. We are hopeful for strong results and to have our study published in the Journal of Strength and Conditioning and present our findings at the Mid-Atlantic Regional American College of Sports Medicine Conference this fall.

School of Nursing, Health and Exercise Science/School of Science

Using a Community Café Approach to Develop Culturally Sensitive Strategies to Address Pediatric Obesity in an Urban Underserved Community

Jasper Besa

Giselle Maragoto

Faculty Mentor: Dr. Katie Hooven (Nursing)

Building on the strong partnership between TCNJ faculty researchers and school personnel and the successes of the SNACK interventions, the project expands, extends, and refines successful strategies through meaningful conversations with interested parents of school age children, school representatives, and faculty from TCNJ using the "community café approach. The Community Café approach is ideal for generating meaningful conversations, engaging multiple perspectives, and building shared collective knowledge and community that can shape the future, Community Cafés have proven to be an important method for creating collaborative dialogue around questions that matter and has been used extensively with parents, caregivers, and community members. The long range research goal is to improve prevention and treatment strategies in reducing obesity in minority and underserved young school-aged children (7-12 years) through collaboration among parents, school personnel, other community leaders, and health professions faculty of TCNJ.

Content Validity and Reliability of the Parent Anticipatory Loss Scale

Paige Hammell

Faculty Mentor: Dr. Constance Kartoz (Nursing)

Anticipatory loss for an older, but healthy parent is an emerging concept. It is defined as set of emotions experienced by adult children with healthy aging parents that is characterized by feelings of sadness, worry, and gratitude. Currently, there is no instrument to measure this type of anticipatory loss. The purpose of this research is to establish content validity and reliability of the Parent Anticipatory Loss Scale (PALS). Expert validity was established using a six expert panel and quantified using content validity index (CVI). Reliability will be evaluated by distributing the scale to participants with additional questions regarding demographics and their relationship with their parent.

School of Science

Impact of Deep Eutectic Solvents on Cell Membranes and Insulin Proteins

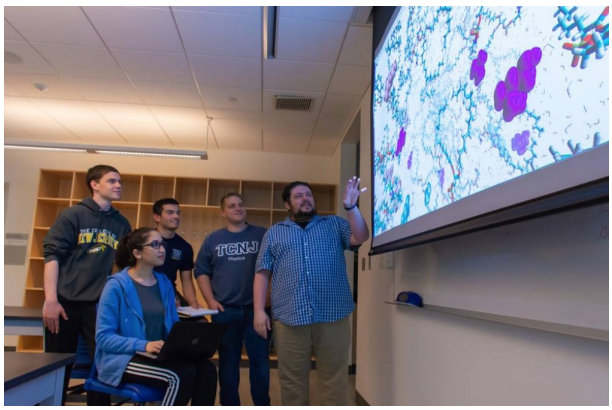
Alberto Gonzalez

Steven Jones

Christopher Lovenduski

Sarah Shoeb

Faculty Mentor: Dr. Joseph Baker (Chemistry)



Our group is using computer models of molecular systems to better understand the impact of deep eutectic solvents on bacterial biofilms, which are aggregations of bacteria present in 80% of bacterial infections in humans. We use these models to explore the physical effects of different solvents on cellular mem-

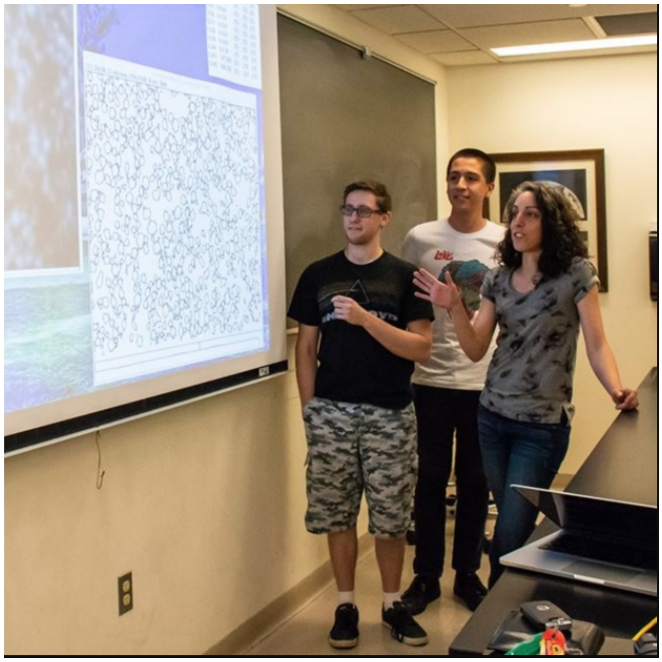
branes, with the goal of understanding why the solvents disrupt the growth of biofilms. We are also using molecular modeling to study the impact of these solvents on the insulin protein. Deep eutectic solvents have the ability to interact with and influence the stability of proteins, making them particularly useful in drug design. Understanding the ways that a deep eutectic solvent can alter the efficacy and delivery of insulin is essential to the development of diabetes treatment.

Understanding the Marginal Value of Additional Training Data for Machine Learned Systems

Ethan Kochis

Faculty Mentor: Dr. Michael Bloodgood (Computer Science)

We are investigating how an increase in data affects the performance of machine learned systems for natural language processing. We are building an extensive software infrastructure to train and test our machine learned models. We use the TCNJ High Performance Computing System to run our experiments.



Plasma Interactions with Liquids

Nick Juliano

Jake Syetta

Faculty Mentor: Dr. Angela Capece (Physics)

Motivated by the unanswered questions concerning the synthesis of nanoparticles in ionic liquids, we are investigating the physical and chemical processes that characterize the plasma-liquid interface. Specifically, we are studying the electrical mechanisms that affect nanoparticles of various compositions when in contact with different low-pressure plasma species (electrons, ions, excited neutrals) and what role the material composition of these particles plays in the ensuing interactions. Since experimental work of this nature on such a small scale is not straightforward, we are first working to model the expected behavior of nanoparticles in contact with a plasma (e.g., under low-temperature electron bombardment) and to outline lab work that is both feasible and necessary to better our understanding of the dynamics of the synthesis process.

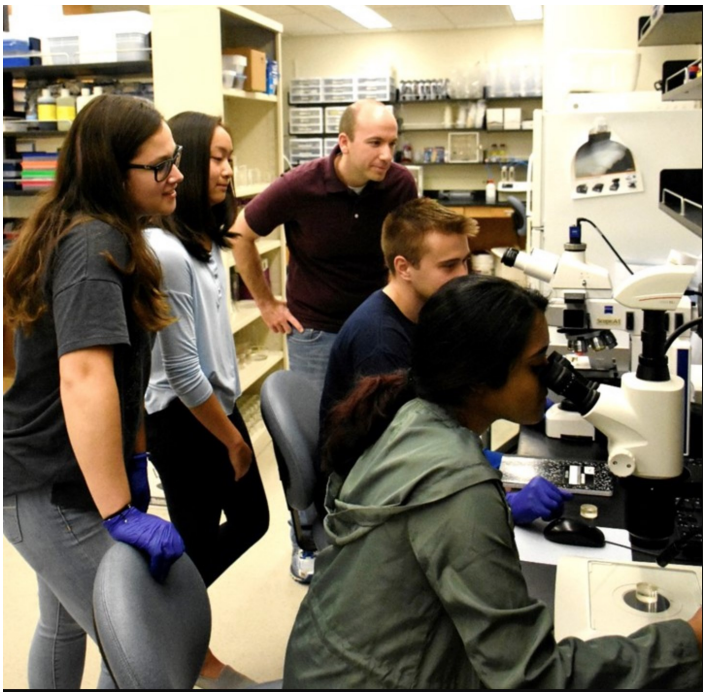
Comparative biomechanics of invertebrate shells

Maxx Cadmus

Teresa Dinh

Vaishnavi Rao

Faculty Mentor: Dr. Gary Dickinson (Biology)



Our lab investigates the effects of environment on shell formation in lobsters, barnacles, and freshwater mussels. We study mechanical and structural properties of shells of animals exposed to different pH levels that simulate predicted changes in seawater chemistry. To examine mechanical properties of hardness and toughness, shells are tested by measuring how resistant they are to force through microhardness testing. Thickness of shells is assessed through optical microscopy. Fine structure and crystal structure is assessed using an SEM (scanning electron microscope). Our research is relevant in assessing susceptibility of these species to climate change in our dynamic environment.

Don't Mess with Tex (or YqgF): Investigation of Bacterial Genes Important for DNA Damage Survival and Disease

Nicole Gadda

Michelle Mojena

Suki Putumbaka

Faculty Mentor: Dr. Kathryn Elliott (Biology)

We are bacterial geneticists working with the soil bacterium Acinetobacter baylyi ADP1 and focused on three genes of inte rest: yqgF, yqgE, and tex. The genes yqgF and yqgE are highly conserved among bacterial species. Because bacteria genomes are highly efficient and will delete out unnecessary genes over time, yqgF and yqgE likely play important biological roles. Our lab has found that yqgF contributes to repair of DNA damage. Our current work aims to investigate how YqgF contributes to DNA repair and to determine whether YqgF interacts with YqgE. Additionally, tex stands for “toxin expression” and is contributes to regulation of toxin expression and the ability to cause disease in some infectious bacteria. A. baylyi ADP1 contains the tex gene, but is noninfectious to most organisms other than some soil insects. We are working toward using an insect model to investigate the role of tex in infection.

Microscale Structure of Ice Crystals Found in High-Altitude Cirrus Clouds

Aaron Lynn

Nicholas Tusay

Xuanyi Zhao

Faculty Mentor: Dr. Nathan Magee (Physics)

Our summer 2018 MUSE project was working to study the microscale structure of ice crystals found in high-altitude cirrus clouds. The ice crystals that make up these clouds are the first solid objects encountered by solar radiation as it streams toward earth. The detailed shapes and surface textures of these ice particles affect how light is scattered in the atmosphere. To date, these ice crystals have not been well-measured, and improved measurements are critical to improving the radiative balance in climate models. We have spent a good part of the summer trying to capture crystals with a custom-built weather balloon device, and then rushing crystals for imaging in cryo-scanning electron microscopy. We've also analyzed ice crystals that we have grown in the laboratory under simulated cirrus conditions. **Note picture is of Aaron, Nick, and Xuanyi w/ weather balloon.

(Deer) X (Invasives)^2 : Interactive Effects in the Herb Layer of Suburban Forests

Daniela Nattes

Elena Nattes

Elizabeth Nemec

Claire Paul

Faculty Mentor: Dr. Janet Morrison (Biology)

Faculty Mentor: Dr. David Wynne (Biology)

We are part of a long-term ecological study to explore the effects of deer browse on the species diversity in six different forests. In each forest, there are about 40 plots, which may be fenced or unfenced. Furthermore, the plots may be treated with invasive species Japanese stiltgrass, garlic mustard, both, or neither. Our goal is to both maintain the integrity of the plots and conduct large-scale data collection projects including species census, leaf litter biomass, photo-synthetically active radiation levels, and soil composition analysis. Through the many spider webs walked in and mosquito bites tolerated, we're also building a bond to take into this continuing project next fall.

SlimShadey

Avi Shah

Faculty Mentor: Dr. Sudhir Nayak (Biology)

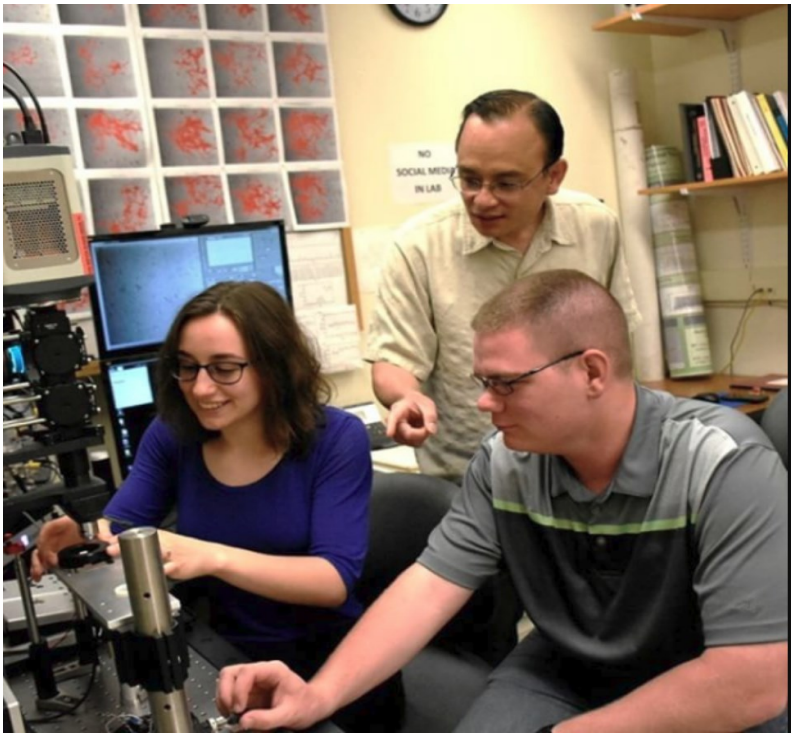
SlimShadey is a Java program for the visualization and analysis of multiple aligned biological sequences. Presently there are no programs available for the automated annotation, scanning, shading, coloring, editing, etc. of multiple sequence alignments. SlimShadey displays mutliple alignments in a user-friendly interface and allows for manual and automated manipulation and visualization of key features of the alignment, aiding in revealing underlying patterns and evolutionary conservation. SlimShadey can also align via a separate program module, and calculates and displays various conservation measures.

Investigating the Role of Inhibition in Neuronal Synchronization

Hannah Lemke

Robert Wagner

Faculty Mentor: Dr. Tuan Nguyen (Physics)



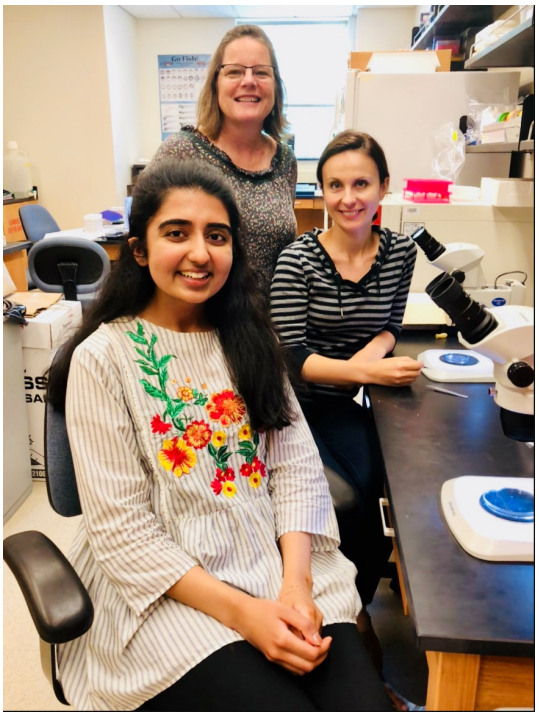
We are studying the physics of living neuronal networks, specifically how cultured nerve cells wire up to produce synchronized activity. Using an apparatus that combines laser scanning photostimulation and calcium imaging, we map the connections made within the network while recording the corresponding patterns of network activity. We seek to better understand how large populations of nerve cells fire together in rhythmic oscillations. In the brain, these oscillations are known as "brain waves" and are important for understanding many neural phenomena such as cognition, sleep, and epilepsy.

Zebrafish Embryogenesis

Wardah Bajwa

Sviatlana Karpovich,

Faculty Mentor: Dr. Marcia O'Connell (Biology)



Dr. Marcia O'Connell`s lab is concentrated on studying the processes by which a fertilized egg is transformed into a multicellular organism which expresses bilateral symmetry, also known as embryogenesis. The model organism we work with is the zebra fish (Danio rerio). In the lab, we primarily focus on the zsquidA-D genes in zebrafish, which are homologous to the squid gene in fruit flies. The four fish genes are known to be maternally expressed. It has been shown previously in the lab that zsquidA is responsible for dorsal/ventral patterning, while the rest of the zsquid genes are subject for further study. Along with this set of genes, we are in the process of studying another maternally regulated gene that codes for a CPEB (cytoplasmic polyadenylation element binding), known as ElrA. During the MUSE program, we mainly focused on zsquidC and ElrA expression and regulation mechanisms. For ElrA, one of these mechanisms includes deadenylation and then cytoplasmic polyadenylation, following translation. In order to further explore this concept, we purified plasmids with the ElrA construct, through bacterial transformation. Thus, this will allow us to conduct microinjections and perform more experiments. For zsquidC, we are interested in the specific pattern of expression throughout development of zebrafish. We performed morpholino microinjections using zebrafish embryos, which block the translation of the zsquidC mRNA, and analyzed the resulting phenotype.

Algorithms and Tools for Designing Combinatorial Protein Variant Libraries

Sarah Almeda

Madeline Febinger

Faculty Mentor: Dr. Dimitris Papamichail (Computer Science)

Our project aims to develop algorithms and computational tools that utilize synthetic biology advances to design combinatorial protein libraries, which minimize the cost of synthesis while balancing library size with quality.

The effects of mutation in glutamylation-associated genes in C. elegans

Jessica Dominguez

Thomas Oliver

Bhumi shah

Faculty Mentor: Dr. Nina Peel (Biology)

Dr. Peel's lab uses the model organism C. elegans to study genes that glutamylate or deglutamylate microtubules. Glutamylation is essential for microtubule severing and organization. Microtubules are implicated in cell division, and make up part of the cytoskeleton. Additionally, cilia and flagella are composed of microtubules. C. elegans is useful for studying the viability and number of offspring of mutants for glutamylation associated genes. Mutants of these genes in humans are associated with cancer and neurological disorders.

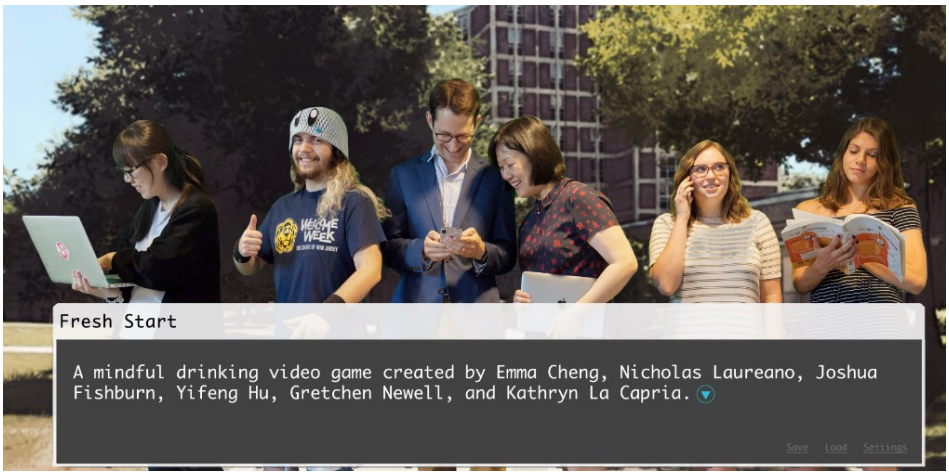
Social Learning in Stickleback Fish

Olivia Davis

Olivia El Naggar

Faculty Mentor: Dr. Matthew Wund (Biology)

We are examining social learning and predator recognition in stickleback fish. As stickleback occur in groups, conspecifics can potentially be an important source of information for individual stickleback to learn about the environment. In this case, we are looking to see how stickleback gather information about potential predators using responses of other stickleback to a predator cue. Our experiment involves playing a video of a group of stickleback to a live, individual fish in a tank, and seeing how the fish responds to the video being playing in combination with an odor cue from a trout, a predator of stickleback. The game is a piece of a larger mindful drinking campaign that will be implemented on TCNJ campus.



Fresh Start - A Mindful Drinking Video Game

Kathryn La Capria

Emma Cheng

Nicholas Laureano

Gretchen Newell

Faculty Mentors: Josh Fishburn M.A and Dr. Yifeng Hu (Interactive Multi-media, Communication Studies, Public Health)

Video Game Research has shown that college freshmen do not find existing alcohol intervention programs engaging. There is much existing literature that illustrates how interactivity and narrative immersion can aid in persuasion and behavior change. Using gamification, we aim to create a more engaging alcohol intervention program for college freshmen. The game is a piece of a larger mindful drinking campaign that will be implemented on TCNJ campus.

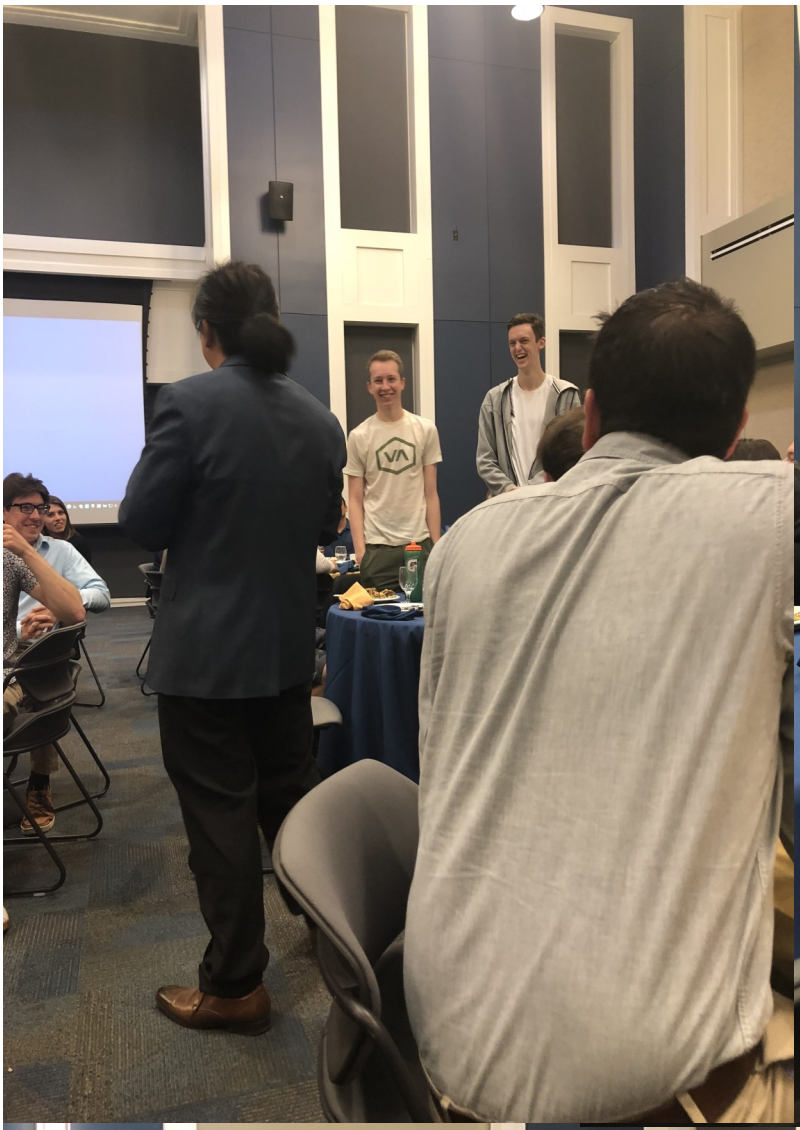
Predicting Naloxone use among intravenous drugs users

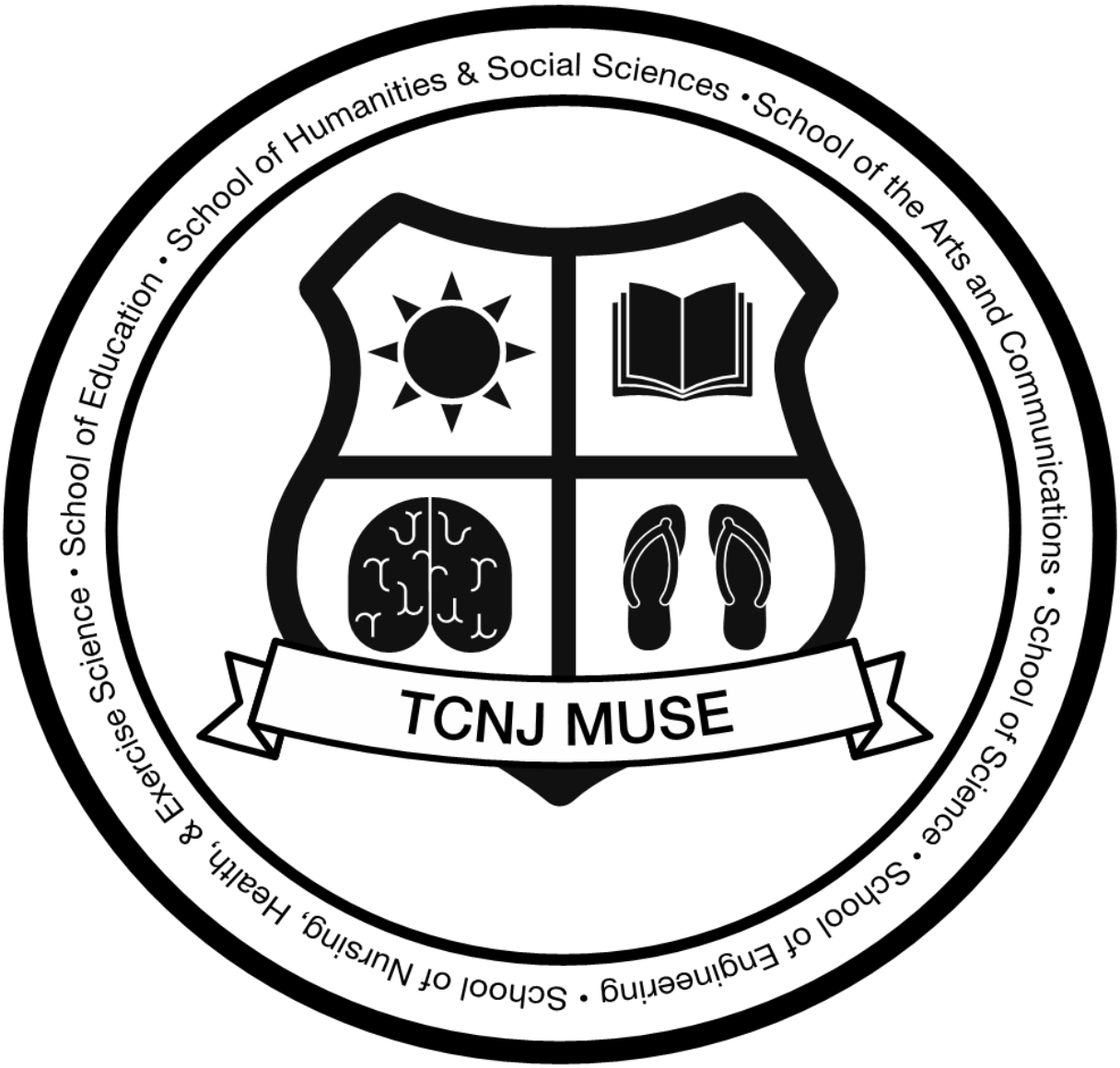
Estefany Rodriguez

Cyan Vasquez

Faculty Mentor: Dr. Sandy Gibson (Education, Biology, Arts and Communication)

The goal of this research is to examine who is getting trained to use and provide Nalaxone in the community, who is actually admistering it, with what frequency, and to what effect beyond the immediate overdose reversal. We will study individual demographics as they relate to drug use behaviors of those who are using nalaxone, including their overdose history and circumstances of reversals. Lastly, we will conduct qualitative interviews both with people who have administered nalaxone to others and those who have had nalaxone administered to them.

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