Summer 2019 Merit Research Projects

Faculty Name	Email Address	Faculty College	Faculty Dept	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference
Amy Freestone	amy.freestone@temple.edu	CST	Biology	Biogeographic variation in interaction strength and invasions at the ocean's nearshore (BioVision).	Global patterns of biodiversity demonstrate that most of the species on earth occur in the tropics, with strikingly fewer species occurring in higher-latitude regions. Biologists predict that this global pattern of species diversity is likely shaped by ecological species interactions. Yet few detailed experimental data exist that demonstrate how species interactions influence ecological communities from the tropics to the arctic. Therefore, a significant opportunity exists to transform our understanding of how these fundamental species interactions shape patterns of biodiversity across the globe. Furthermore, these species interactions have the strong potential to limit biological invasions by non-native species, which are often transported by human activities that breach historical dispersal barriers, such as ocean basins and continents. Biological invasions can cause undesired ecological and economic effects and are considered one of the primary drivers of global change. Through extensive field research on marine ecosystems along the Pacific Coast of North and Central America, from the tropics to the subarctic, this project is elucidating ecological factors that shape global patterns of diversity and limit biological invasions.	Main	Important selection criteria: A strong academic record, a strong interest in ecology and conservation, and a desire to apply these interests in a research setting. Relevant coursework (Principles of Ecology, upper level ecology and/or conservation electives, statistics, etc.) is helpful but not required.	Biology, Environmental Science	Sophomore, Junior or Senior
Blair Hedges	sbh@temple.edu	CST	Biology	Building a tree of life with DNA data	This project involves working with DNA sequence data of diverse organisms, and software, to help build the tree of life and better understand evolutionary principles. It takes place in the Center for Biodiversity and mostly involves learning and using new computer tools and applications. The center is located in SERC Building	Main	strong academics	normally biology but could be any major	Freshman, Sophomore, Junior

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Blair Hedges	sbh@temple.edu	CST	Biology	Conserving the biodiversity of Haiti	This project involves helping efforts in Temple's Center for Biodiversity to learn more about the biodiversity of Haiti, and to protect it. The multi-faceted team efforts include discovery of new species, mainly through DNA sequencing of samples collected in Haiti, ecological and evolutionary studies, and educational and outreach components. The center is located in SERC Building	Main	strong academics	normally biology but could be any major	Freshman, Sophomore, Junior
Brent Sewall	bjsewall@temple.edu	CST	Biology	Large-scale analysis of correlates of susceptibility to white-nose syndrome, an emerging pathogen in hibernating bats	White-nose syndrome is an emerging fungal pathogen affecting hibernating bat populations of eastern North America. Although it only appeared for the first time in 2006, it has already spread rapidly and has had devastating effects, including the death of millions of bats across hundreds of caves and mines. Such losses have important implications for endangered species management, conservation biology, and the ecology of natural communities in North America. Little is known about the disease, but most research to date has focused on bat-to-bat transmission and site-level effects. Recently, however, the disease has spread across a broad geographic area, and an improved understanding of factors influencing both the impacts and spread of the disease is needed. We will investigate factors that may influence the susceptibility of bats to the disease and its spread across large geographic scales.	Main	Coursework, training, or experience in relevant subjects such as statistics, Geographic Information Systems, epidemiology, public health, ecology, or conservation biology. Also strong motivation for research and strong interest in this topic.	Biology, Environmental Science, Mathematics, Computer Science, or related - Statistics, Geographic Information Systems (GIS), or Epidemiology (PBHL 3101) courses or equivalent (already	Sophomore, Junior or Senior

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Brent Sewall	bjsewall@temple.edu	CST	Biology	Influence of vertebrate frugivory on plant seed dispersal and germination	Vertebrate frugivores (fruit-eating mammal and bird species) play an essential ecological role, by facilitating the dispersal and germination of the seeds of a diversity of plant species. Vertebrate frugivory is therefore a key determinant of the reproduction of many plants. Frugivory is especially important in the tropics, where frugivorous primates, birds, and bats disperse seeds for up to 90% of tree species in some forests. The foraging behavior and community ecology of most species of frugivore, however, are poorly understood. This lack of understanding hinders our ability to quantify the impact of specific frugivore species on the plant community or to conserve threatened frugivore species. In addition, frugivores are particularly vulnerable to hunting, fragmentation, and other human-caused threats, but we still have only a rudimentary ability to predict the effects of the loss of a specific frugivore species on the plant community. The objectives of this study, therefore, are (1) to investigate the influence of frugivore feeding preferences and frugivore interspecific interactions on seed dispersal and germination, (2) to examine the ultimate impact of frugivore species on the composition of plant species in natural	Main	Coursework, training, or experience in relevant subjects such as ecology, statistics, Geographic Information Systems, animal behavior, conservation biology, and/or French language. Also strong motivation for research and strong interest in this topic.	Biology, Environmental Science, or related - Intro Series in Biology (Bio 1111, 2112) or equivalent required. Principles of Ecology (Bio 2227) strongly preferred. Statistics, Animal Behavior (Bio 3254), and/or Conservation Biology (Bio 3307)	Sophomore, Junior or Senior
Brent Sewall	bjsewall@temple.edu	CST	Biology	Conservation biology and community ecology	My lab is investigating multiple questions in the fields of conservation biology and community ecology, focusing on understanding human drivers of change in ecological systems and developing effective conservation strategies. Ongoing research projects focus on (1) understanding pollination and seed dispersal interactions among species in ecological communities, (2) clarifying the influence of emerging infectious diseases on wildlife populations, and (3) identifying management strategies to mitigate the negative effects of human activities on plant and animal communities. Research takes place both on campus and off-campus at field sites. Work may require travel to remote sites, hiking, and long hours	Main and off-campus at field sites (may involve travel)	Interest in the field of conservation biology or community ecology; experience and skills in biology, math, and other relevant fields; ability to conduct field work or engage in data manipulation or both; willingness to work hard under	Biology, Environmental Science, Mathematics, or related fields	

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Darius Balciunas	darius@temple.edu	CST	Biology	Genetic analysis of regeneration in zebrafish	Unlike humans, zebrafish possess remarkable regenerative capacity, including the ability to regenerate their hearts after severe injury. We are working to figure out which genes control this process and precisely how. To achieve this goal, we have been using the CRISPR/Cas9 system to introduce precise changes into the zebrafish genome, including integration of sequences coding for epitope tags and loxP sites. We are looking for several students to join this effort and contribute to different sub-projects ranging from screening for genome editing events to detection of tagged proteins using immunohistochemistry, to testing the ability of mutant fish to regenerate. For more information and	Main		Biology, Biochemistry	Freshman, Sophomore, Junior, Senior
Erik Cordes	ecordes@temple.edu	CST	Biology	Coral community diversity	Deep-sea corals create habitat for a diverse community of species. Some of these are tight symbioses, others are more casual associations. Using a combination of video analysis, morphological examination, genetic barcoding, and statistical techniques, the similarities and differences among deep-sea coral communities from a variety of locations around the world will be examined.	Main	Interest in ecology and evolution, and a desire to pursue graduate studies. The student will be involved in one or more of the following: video analysis, specimen identification, genetic sequencing, statistics.	Biology, Environmental Science	Freshman, sophomore, Junior

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Jocelyn Behm	jebehm@temple.edu	CST	Biology	Biodiversity and Ecosystem Services	The reason we have food to eat, oxygen to breathe, and we're not up to our shoulders in dead leaves is due to the services that ecosystems provide us. Despite the clear importance of ecosystem services, we still have a lot to learn about how the diverse species in ecosystems perform these services. This project involves investigating how the biodiversity of insects, birds and mammals contributes to ecosystem services in the Philadelphia area through field and lab work.	Main	Attention to detail; Willingness to work outside; Be ok with possibly touching live or dead insects; Organized; Able to work independently and follow directions	Biology, Environmental Science	Freshman, Sophomore, Junior, Senior
Jody Hey	hey@temple.edu	CST	Biology	Evolution and the Human Genome	Student's will work on questions about how the human genome has evolved. Some of the work may involve comparisons with Ape genomes.	Main	Freshmen and sophomores with interest in bioinformatics or in using computers to address important biological or medical questions.	all majors	Freshmen, Sophomores
Jody Hey	hey@temple.edu	CST	Biology	Evolutionary Genomics	Students will use genomic data to address questions about natural selection and adaptation	Main	Freshmen and sophomores with interest in bioinformatics or in using computers to address important biological or medical questions.	all majors	Freshmen, Sophomores

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Jody Hey	hey@temple.edu	CST	Biology	Population Genetics	Students will help develop mathematical and statistical models of evolutionary processes	Main	Freshmen and sophomores with interest in mathematical and computational biology	Biology/Math/Computer Science	Freshmen, Sophomores
Matthew Helmus	mrhelmus@temple.edu	CST	Biology	The invasion meltdown and how to stop it	In Pennsylvania, the spotted lanternfly (Lycorma delicatula) is a particularly worrisome invasive. In 2014, it invaded Berks County on material imported from Asia. It destroys vineyards, orchards, and timber (industries worth $18 billion to Pennsylvania). It rains showers of sticky sap on homeowners and can spread to new locations by hitchhiking on anything kept outdoors like a car. It has spread outside the Commonwealth, to Virginia; economic losses across the U.S. will be disastrous if it expands unchecked. Contact Dr. Helmus to help the iEco Lab stop the meltdown.	Main		BIO, Math, CIS, EES,Phys, & Chem	All levels
Matthew Helmus	mrhelmus@temple.edu	CST	Biology	Are there universal patterns in biodiversity?	Natural selection has caused a spectacular amount of biodiversity, from flying frogs to legless lizards, yet this evolution is not random. For example, on distant oceanic islands, species have evolved from the same types of natural selection, converging to similar body shapes and sizes. The goal of this project is to identify these universal patterns in biodiversity using specimens of lizards and frogs from across the Caribbean. The student will measure the body traits of the specimens and then build, using the R statistical programming language, genetic trees of evolutionary relationship of species to identify convergence in biodiversity.	Main	Basic excel	Biology, Environmental Science	

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Rachel Spigler	rachel.spigler@temple.edu	CST	Biology	The impact of plant mating patterns on population growth	What factors influence whether populations of organisms increase, remain stable, or decline to extinction? This project will investigate how genetic factors (inbreeding) might impact population growth of a native wildflower plant. Students will work in the plant facility on campus andout in the field in experimental plant populations.	Main Campus & Field sites	Strong academic record. Enthusiasm and attention to detail. Ability and willingness to perform greenhouse and field work in intense summer heat.	Biology, Environmental Science	Freshman, sophomore, Junior
Rachel Spigler	rachel.spigler@temple.edu	CST	Biology	Plant-pollinator interactions	Nearly 90% of flowering plants rely on animal pollination for successful seed production, including 75% of the world's leading food crops. For pollinators, nectar and pollen represent an essential resource for metabolism, growth and survival. We are studying dynamics of this critical partnership within an entire community of plants and their pollinators across grasslands in central and southeastern Pennsylvania. Students will travel weekly to perform field work and perform plant-pollinator surveys and/or butterfly collections	Field site near Harrisburg, PA	Strong academic record. Enthusiasm and attention to detail. Ability to work as part of a team and under difficult field condition. Ability to travel for field work (vehicle not required).	Biology, Environmental Science	Freshman, sophomore, Junior
Rachel Spigler	rachel.spigler@temple.edu	CST	Biology	Chemical Ecology of Nectar	Floral nectar is a critical resource for animal pollinators, essential for metabolism, growth, and reproduction. Plant species can vary markedly in both the quantity and quality of nectar they offer. Students will aid in the collection of plant nectars from various species in a grassland field site near Harrisburg, PA and in the analysis of nectar amino acids, sugars, and lipids using methods such as HPLC and GCMS.	Main Campus & Off-site field location	Strong academic record and background in chemistry. Attention to detail and organizational skills. Enthusiasm and an interest in ecology and field work. Ability to travel for field work (vehicle not required).	Biology, Chemistry	Freshman, sophomore, Junior

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Robert Sanders	robert.sanders@temple.edu	CST	Biology	Mixotrophic microalgae and climate change	Algae that ingest particles in addition to photosynthesisng (mixotrophs) are now known to frequently dominate phytoplankton throughout the world's oceans and lakes. We are using cultures of Arctic mixotrophs to investigate how factors related to climate change will affect the balance of feeding and photosynthesis in their nutrition.	Main	Interest in aquatic ecology. Biology 1111 or 1911.	Biology, Environmental Science	
Tonia Hsieh	sthsieh@temple.edu	CST	Biology	Dynamics of granular behavior during foot intrusion	Granular media (such as sand) is able to have both solid- and fluid-like behaviors depending on the stress applied. At certain angles, a sand pile becomes unstable such that small perturbations will cause the pile to flow. Ongoing studies in the lab show that sand specialist lizards exhibit lower performance decrements than desert generalist lizards when running up inclined sand. Preliminary evidence suggests that these differences are largely correlated with different impact angles of the feet relative to the sand, indicating that differences in foot and leg movement can have dramatic effects on running ability. Students will be trained to design and conduct experiments to measure impact forces on	Main	Basic knowledge in MATLAB programming and/or SolidWorks is desired, but not required.	Biology, physics, mechanical engineering	Freshman, sophomore, Junior
Vincenzo Carnevale	vincenzo.carnevale@temple.edu	CST	Biology	Catalytic role of alumina in prebiotic polymerization of biomolecules	Polymerization of amino acids into polypeptides is a thermodynamically disfavored process with remarkably slow kinetics. In cells, this process is catalyzed by the ribosome, a large protein-RNA complex harnessing energy from the hydrolysis of ATP. This begs the question: how could ancestral proteins, which enabled the emergence of life, be synthesized in absence of these molecular machineries? We are investigating the hypothesis that the catalytic properties of mineral-water interfaces (in particular those involving alumina) might have favored the synthesis of polypeptides. This computational research project uses molecular dynamics simulations and free energy calculations as primary tools of investigation.	Main	Interest in computational research, chemistry and biochemistry. Basic computational skills preferred but not required. The project is in collaboration with the lab of Eric Borguet from the Chemistry Department.	Physics or Chemistry	sophomore, Juniot or senior

Summer 2019 Merit Research Projects

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Steve Flemming	sfleming@temple.edu	CST	Chemisry	Virtual Reality (VR) of Bio-Organic Reaction Animations (BioORA)	In collaboration with Gillian Queisser. The teaching tool Bio-Organic Reaction Animations (BioORA) has been developed to assist student learning. BioORA is available online and it covers topics that include enzyme chemistry, lipids, nucleic acids, and carbohydrates. The animations that are included in the program are based on 3D data from crystal structures found in the Protein Data Bank (PDB). This research project involves developing a pipeline from PDB files to 3D visualization using Unity3D and Oculus Rift Virtual Reality hardware. The ultimate goal would be to generate a new VR-based teaching tool for bio-organic chemistry.	Main	Students working on this project would need to have a basic knowledge of scripting and/or object-oriented programming languages and an interest in learning virtual reality. A good foundation in organic chemistry would be helpful.	chemistry, biochemistry, CIS, math	Sophomore, Junior or Senior
Eric Borguet	eborguet@temple.edu	CST	Chemistry	Combining Photons, Electrons and Nanoparticles for Plasmonic Sensing and Catalysis	Students will develop and use nanoscale plasmonic materials for rapid, high sensitivity detection of biological and chemical agents, as well as catalytic conversion. They will learn to use a variety of analytical techniques such as spectroscopy, Atomic Force Microscopy http://www.temple.edu/borguet/index.html	Main	Interest, curiosity and persistence - Undergraduate researchers in my group typically present at local, regional and even national conferences. Many have been co-authors on publications.	Chemistry, Physics	Sophomore or Junior
Eric Borguet	eborguet@temple.edu	CST	Chemistry	Laser Vibrational Spectroscopy and Dynamics of Molecular Species at Bio and Geochemical Interfaces	Research involves learning to use ultrafast lasers (we make some of the shortest infrared pulses in the world) to perform vibrational Sum Frequency Generation (SFG) a technique that provides sensitivity to single molecualr layers. Students will investigate water, arguably the most important molecule on the planet at interfaces of biological and geochemical relevance. Students will learn about surface chemistry, biointerfaces, geochemistry and laser spectroscopy.	Main	Interest in research - Aptitude for careful laboratory research	Chemistry Physics	Sophomore or Junior

Summer 2019 Merit Research Projects

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Eric Borguet	eborguet@temple.edu	CST	Chemistry	Nanoparticle plasmonic sensors for biological and chemical detection	Develop novel plasmonic nanoparticles for rapid, high sensitivity detection of biological and chemical agents. Students will learn to use a variety of stat-of-the-art techniques such as nanoparticle synthesis, optical and infrared spectroscopy, Atomic Force Microscopy	Main	Interest in research - Aptitude for careful laboratory research	Chemistry	Sophomore or Junior
George A. Petersson	gpetersson@temple.edu	CST	Chemistry	3. Making high accuracy affordable through DFT	The coupled-cluster singles and doubles with perturbative triples complete basis set limit, CCSD(T)/CBS limit [J. Chem. Phys., 138, 144104 (2013), J. Chem. Phys. 143, 214110 (2015)] offers very high accuracy for much of thermochemistry, but these calculations are very expensive. If we limit the CCSD(T) calculations to the valence electron correlation energy, the remaining small corrections can be treated by DFT with little loss of accuracy at dramatically reduced cost. For example, we recently published [J. Chem. Phys. 143, 214111 (2015)] a core-valence density functional that requires less time than a single SCF iteration, but reproduces the CCSD(T)/CBS core-valence correlation energy to	Main	The undergraduate research participant should have a basic knowledge of quantum mechanics and computer programing.	Chemistry, Physics, Computer Science	sophomores or Juniors
George Petersson	tue44197@temple.edu	CST	Chemistry	Spectra of Acridone D erivatives	Sub tituted acriones are useful as fluorescent dyes for studies of protein folding. A collaboration with experimental studies at the University of Pennsylvania will employ ab initio caculations of electronic absorption and emission specra to determine what structural modifications would enhance the useful ness of these dyes. Methods will include CIS(D), EOM- CSD, and TDDFT. The student will learn to create input and interpret output using	Main	The undergraduate research participant should have a basic knowledge of quantum mechanics such as having completed CHEM 3302, or PHYS 2796 or PHYS 3701. The departmental major or class year are unimportant.	Chemistry or CS	Junior or Senior

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George Petersson	tue44197@temple.edu	CST	Chemistry	Interface between Gaussian16 WindNMR	Ab initio calculated nmr spectra are useful for the interpretation of expe rimental spectra and m lecular structural assignments. However, it is very tedious to paste calculated chemical shifts and spin-spin coupling constants into a program that simulates a high resolution nmr spectrum. This project involves writing computer code to read a Gaussian16 output file and create a data file for the pro ram WindNMR. This work is a collaboration with colleagues at the Kitas to Institute in Tokyo.	Main	The undergraduate research participant's background in Chemistry and Spectroscopy is far less important than an aptitude for writing computer code. The departmental major or class year are unimportant.	Chemistry or CS	Junior or Senior
Gregory Smutzer	smutzerg@temple.edu	CST	Chemistry	Examination of Human Chemosensory Function	Humans perceive five basic taste qualities, which include sweet, sour, salty, bitter, and umami taste. In addition, humans readily detect chemosensory irritants in the oral cavity, in the nose, and on the surface of the skin. One important chemical irritant is capsaicin, which is the pungent chemical that gives chili peppers their unique taste. Capsaicin is a vanilloid compound that activates TRPV1 receptors in trigeminal nerves in the oral cavity, and causes a stinging or burning sensation in the mouth. We recently developed a novel delivery method for examining capsaicin perception in the human oral cavity by incorporating this hydrophobic compound in edible taste strips. In addition, we recently identified compounds that temporarily block the stinging sensation of capsaicin in the oral cavity. Finally, we have found that capsaicin chemosensation contains both an olfactory and a trigeminal component. The goal of this research project is to examine the effect of inhibitors on capsaicin perception in the oral cavity	Main	Grade point average of 3.0 or higher. Ability to learn basic lab techniques. Standard lab skills include ability to prepare solutions, ability to use pipettes, and ability to carry out protein assays. Willingness to learn new lab techniques such as mammalian cell culture and fluorescence microscopy.	Biology, Biochemistry, Chemistry -	Sophmore, Junior or Senior

Summer 2019 Merit Research Projects

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Gregory Smutzer	smutzerg@temple.edu	CST	Chemistry	Inositol 1,4,5-Trisphosphate Signaling in Mammalian Odontoblast Cells.	Although calcium is critical for the formation of dentin, the origin and regulation of calcium during dentinogenesis is not known. Odontoblasts are specialized cells that secrete proteins and other molecules during the formation of dentin in mammalian teeth. We reported that secretory odontoblasts express high levels of the inositol 1,4,5-trisphosphate (IP3) receptor/channel, along with an associated GTP-binding protein. This receptor/channel releases calcium from the endoplasmic reticulum of cells. We are currently using cultured MDPC-23 cells as a model for dentin formation. The goal of this research is to demonstrate that the IP3 receptor, and a related GTP-binding	Main	Willingness to learn new lab techniques. - Standard lab skills including ability to prepare solutions, ability to use pipettes, ability to carry out protein assays, ability to carry out SDS-gel electrophoresis, and basic computer skills GPA of 3.0 or higher	Biochemistry - A year of General Biology. Biology Chemistry	Sophmore, Junior or Senior
Katherine (Kallie) Willets	kwillets@temple.edu	CST	Chemistry	Plasmonic nanomaterial fabrication and synthesis	In the first semester of research, students learn how to prepare gold and/or silver nanoparticles using wet chemistry and templated fabrication techniques (plus we tell you what a plasmon is!). Students who show interest and aptitude for research will then work with the PI and their graduate mentor to design independent research in subsequent semesters based on their interests (see willetslab.com for more details on what we do).	Main	Interest in physical/analytical chemistry. Many undergraduate students from our lab move on to Ph.D. programs so students with interest in performing research for multiple semesters and moving on to graduate-level	Chemistry (top priority). Physics (if space).	Sophomore, Junior, Senior
Robert Stanley	rstanley@temple.edu	CST	Chemistry	DNA Repair in eXtreme Salt and Co,d	The student will work with the PI and his group to overexpress and characterize a DNA repair enzyme from an extremophilic organism that lives in high salt and low temperature.	Main	Good chemistry and biology lab skills	Chemistry/ Biochemistry/Biology/ Physics	Freshman, Sophomore, Junior,

Summer 2019 Merit Research Projects

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Sarah Wengryniuk	tuf76212@temple.edu	CST	Chemistry	Two possible projects: "Evaluation of IL-8 inhibitors for inhibition of cancer metastasis" and "Development of novel cyclic ether synthesis from tertiary alcohols"	Two possible projects: "Evaluation of IL-8 inhibitors for inhibition of cancer metastasis" and "Development of novel cyclic ether synthesis from tertiary alcohols"	Main	Having completed both Organic 1 and Organic 2 with a B or higher in both courses. Strong letter of recommendation from with organic professor	Chemistry	Sophomore, Junior, Senior
Spiridoula Matsika	smatsika@temple.edu	CST	Chemistry	Modeling reactions in chemistry and biology	Processes initiated by light play an important role in biological systems with primary examples found in photosynthesis, vision, and photochemical damage and repair in DNA. We use computational methods to study processes important in biology, chemistry, astrochemistry, and other areas. Part of this research facilitates development of new fluorescent probes.	Main		Chemistry, Physics, Biochem, CIS	Freshman, Sophomore, Junior, Senior
Stephanie Wunder	slwunder@temple.edu	CST	Chemistry	Nanopartile/Lipid Project	Nanoparticles have high surface/volume ratios so that characterization of the material on the surface is very important in applications such as drug/DNA delivery and nanocomposites. The phase transitions, conformations and adsorption isotherms of lipids and polymers (both natural- proteins, DNA, RNA and synthetic-polymers) on silica nanoparticles of different sizes (from 5-500nm) will be investigated by a variety of analytical techniques such as HPLC, FTIR, Raman and fluorescence spectroscopies, and thermal analysis.	Main	Willingness to work hard, understanding of experimental techniques and the importance of obtaining reproducible data - wet chemistry techniques	Chemistry, Biochem - organic chemistry I, analytical chemistry	Junior or Senior

Summer 2019 Merit Research Projects

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Stephanie Wunder	slwunder@temple.edu	CST	Chemistry	Lithium Batteries & Fuel Cells: Materials preparation & Characterization	In order to improve the performance of lithium ion batteries and fuel cells, it is critical to make advances in many aspects of the materials used in the electrodes, electrolytes and separators. This project involves preparing and characterizing novel nanomaterials to be employed as separators for NaBH4 fuel cells and lithium ion batteries. In particular we have functionalized what are called polyoctahedral silsesquioxanes (POSS), which are nano silica (SiO1.5) cubes with eight groups at the corners that contain dissociable Li+, OH- ions or polyethylene glycol. The project(s) involve incorporation of these POSS materials with polymers, and the characterization of the nanocomposites by	Main	Willingness to work hard, understanding of experimental techniques and the importance of obtaining reproducible data - wet chemistry techniques	Chemistry, Biochem - organic chemistry I, analytical chemistry	Junior or Senior
Vincent Voelz	voelz@temple.edu	CST	Chemistry	Molecular simulation of proteins and peptide mimics	This work involves computational modeling of proteins and peptide mimics. We simulating the molecular dynamics of molecules on high-performace computing platforms, to make predictions about folding and binding.	Main	Some combination of programming experience, math skills and physics knowledge are important	Math, physics, computer science and chemistry	Sophomore or Junior
Chiu C. Tan	cctan@temple.edu	CST	CIS	Wearable Computers for Health Care	The project studies the use of wearable computing devices to monitor patients with dementia disorders. The goal is to develop systems and algorithms that can enable unobtrusive, long-term monitoring of high risk patients to improve early detection and measure effectiveness of treatment. The project is suitable for participants with strong prototyping skills.	Main	Familiar with Android programming and/or Web programming	CIS/IST, Math,	Sophomore, Junior, Senior

Summer 2019 Merit Research Projects

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Chiu C. Tan	cctan@temple.edu	CST	CIS	Reminder systems for patients with cognitive problems	Patients with cognitive problems sometimes have difficult remembering to complete everyday tasks like taking medication, consuming adequate fluids, and so on. Reminder systems are systems that help these patients keep track of these tasks. The project will involves studying currently available systems and designing better alternatives. This project is open to students with or without computer programming background.	Main	Students from CS backgrounds should be comfortable with Android application programming and/or web programming. Students from non-CS backgrounds should have some experience working with patients, e.g.	CIS, Pre Med	Sophomore, Juniors, Seniors
Eduard Dragut	edragut@temple.edu	CST	CIS	Identifying Entity Mentions in Social Networking Streams	The project aims to develop methods that are capable to recognize substrings in user messages that refer to an entity (e.g., Phila or Philly refers to Philadelphia).	Main	Good programming and analytic skills. Ideally, a student who would like to pursue grad studies.	Math, CS, ECE	Sophomore, Juniors, Seniors
Eduard Dragut	edragut@temple.edu	CST	CIS	Herveting User Comments from the Social Networking Websites	This project aims to develop techniques that allow automatic harvesting of user comments from microblogs and other social networking websites. You will work with Java, Javascript, JSON, MySQL, and other modern Web programming tools.	Main	Good programming and analytic skills. Ideally, a student who would like to pursue grad studies.	Math, CS, ECE	Sophomore, Juniors, Seniors
Justin Shi	shi@temple.edu	CST	CIS	Decentralized Computing Research	BitTorrent and Blockchain protocols demonstrated the feasibility of decentralized computing using end-to-end protocol designs. This research will generalize and extend these protocols for general purpose decentralized distributed and parallel computing.	Main	Operating systems, Unix/Linux preferred. Basic programming skills, C/Java/C#/C++ Basic networking concepts	CS	Juniors or Seniors

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Longin Jan Latecki	latecki@temple.edu	CST	CIS	Deep Convolutional Neural Networks for Computer Vision	One of the most innovative and transformative technologies of our time is deep learning, a form of machine learning that uses neural networks containing many hidden layers, which are called deep neural networks (DNNs). The recent success of deep convolutional neural networks (CNNs) has led to breakthroughs in applications in particular in computer vision. In this project, we will focus in applying CNNs to various computer vision tasks.	Main	Linear Algebra. Programming skills. Knowledge of Python and Matlab are a big plus.	Computer Science, Math	Sophomore, Junior, Senior
Richard Souvenir	souvenir@temple.edu	CST	CIS	Identifying Indoor Scene Attributes from Images	The student will apply and adapt recent techniques from computer vision and machine learning to identify attributes from images of indoor scenes. This work is part of an ongoing project to (http://traffickcam.org/about) to combat human trafficking by identifying hotel room features from images.	Main	Strong programming skills (preferably Python), interest or experience in image processing Courses taken CIS 3223 - Strong programming skills (preferably Python), interest or experience in image processing	CS	

Summer 2019 Merit Research Projects

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Xiaojiang Du	dux@temple.edu	CST	CIS	Mobile cloud computing.	Mobile cloud computing is one of today's hottest new technology markets. In mobile cloud computing, users lease computing/storage services from cloud service providers, and access the cloud from their mobile devices (smart phones, tablets). Gartner (2011) predicts that mobile cloud computing will reach a market value of US$9.5 billion by 2014. Mobile cloud computing shares with cloud computing the notion that some level of service is provided by a cloud but accessed by mobile platforms. Typical mobile cloud computing platforms include smart phones and tablets. The most-used mobile operating systems are UNIX variations such as Google Android and Apple iOS. Tablets are larger than a smart phone but	Main	Good programming skills - High GPA - Solid math background - Good communication skills - Team working skills	CS/IST/Math-CS majors	Sophomore, Junior or Senior
Xiaojiang Du	dux@temple.edu	CST	CIS	Security and Privacy Issues of Android Phones/Tablets	In this project, the undergraduate student will work with Dr. Du and his Ph.D. students on Security and Privacy Issues of Android Phones/Tablets. First we will identify possible attacks on Android Phones security and privacy. Second, we will design effective security schemes to defend these attacks. Third, we will implement the security schemes in real Android Phones. Fourth, we will perform real experiments on Android Phones to evaluate the effectiveness of the designed security schemes. If the experimental results are good, we will write research papers based on the design and experiments, and submit to ACM/IEEE conferences.	Main	Good programming skills - Good communication skills Team working skills High GPA Sound math background	CS	Sophomore, Junior or Senior

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Xiaojiang Du	xjdu@temple.edu	CST	CIS	Internet of Things (IoT) Security	Internet of things (IoT) have approached us in the last few years. For example, Apple Inc. released its first smart watch in April, 2015; Nest Labs (acquired by Google in 2014) released its 3rd generation learning thermostat in September 2015. In October 2015, Philips released a new smart light network bridge that lets you control the Philips Hue lights using mobile apps. More and more giant IT companies added their IoT products line. IoT devices and systems have been widely deployed in various domains. There will be 20.8 billion IoT devices in total by 2020. Needless to say, it's a huge market and a new technology innovation field.	Main	Good programming skills High GPA Sound math background	CIS, Math	
Sujith Ravi	sravi@temple.edu	CST	EES	Post-fire sediment transport	Many drylands are undergoing changes in fire regimes and increased fire frequency as a result of climate change and human activities. Aeolian processes are considered to be a significant but largely underestimated mechanism for the removal and deposition of post-fire soil and nutrients immediately following wildfires. Considering the deleterious impact of airborne contaminants on air quality and human health, accelerated post-fire aeolian transport is an increasingly serious geo-hazard. This project will investigate the flux and spatial distribution of sediments three years following a prescribed fire in the southwestern USA through a combination of long term-monitoring data and novel tracer-based	Main	Interest or experience in conducting laboratory soil/sediment analysis using ICP-OES and XRF. Interest in learning data analysis and visualization using R. Opportunities for field research (travel to field sites	Geology, Environmental Science, Biology	Sophomore or Juniot

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Sujith Ravi	sravi@temple.edu	CST	EES	Belowground responses to climate change: Root imaging and analysis	Belowground processes such as root dynamics can alter nutrient and water cycles and impact the response of terrestrial ecosystems to changing climate and disturbance regimes. Despite the relevance of belowground processes, studies addressing the response of fine roots to changing environmental conditions are rare, mostly due to the difficulties in quantifying root dynamics (production, growth and longevity) by non-destructive methods. This project will investigate the belowground responses of plants to simulated changes in climate, in particular warming and droughts. We will analyze a time series of below ground (root) images from a simulated climate change experiment (combination of	Main	interest in the project/research, critical thinking, quantitative ability - Basic statistics, interest in image processing, mostly computer-based project	Biology, Computer science, Environmental Sciences	
Alexandra Davatzes	alix@temple.edu	CST	EES	Geochemical analysis of a Paleoarchean impact event.	Student will be completing a detailed geochemical analysis of a section of rock collected from an impact boundary.	Main	Completed classes in General chemistry and Geochemistry or Petrology. Skilled in Excel; willing to work hard. - Gen Chem I, and Geochemistry or Petrology	Geology	Juniors or Seniors
Laura Toran	ltoran@temple.edu	CST	EES	Stormwater monitoring	Use data loggers, sampling, and other instruments to understand how stormwater moves through and affects urban ecosystems	Philadelphia	Comfortable with field work and with using computers to analyze data.	Geology, Environmental Science, Physics	sophomore or higher

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Faculty Name	Email Address	Faculty College	Faculty Dept	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference
Benjamin Seibold	seibold@temple.edu	CST	Mathematics	Understanding Traffic Flow and Autonomous Vehicles via Robotics, Simulation, and Visualization	This project focuses on developing better models and planning platforms for traffic flow and connected and automated vehicles. Possible research directions are: (a) Construct and program robot vehicles to behave like human drivers or automated vehicles. (b) Devise better models for stop-and-go traffic waves using real traffic data. (c) Visualize traffic waves in a virtual reality environment. No specific course or technical background is required; but the projects require a keen interest in mathematical models, simulations, data, programming, and hardware (all or some of the above). Students will work in the Center for Computational Mathematics and Modeling.	Main	Experience in robotics, data processing, and/or visualization (particularly Unity) is very welcome.	Mathematics, Computer Science, Physics	Sophomore, Junior, Senior
Benjamin Seibold	seibold@temple.edu	CST	Mathematics	Robotics and Visualization of Traffic Waves	The goal of this project is to transfer theoretical concepts, simulation results, and experimental traffic flow data to a lab environment setting. The first task involves the reproduction of real driving behavior (both by humans and by automated vehicles) via small-scale robot vehicles. The second task involves the visualization of traffic data in a virtual reality environment. The student can work on one of those two, or on both tasks at the same time. No specific technical background is required; but both tasks require interest in mathematical models and simulations, as well as a hands-on attitude towards data and hardware (robotics and visualization).	Main	Experience in robotics and/or visualization (particularly Unity) is very welcome.	Mathematics, Computer Science, Physics	Sophomore, Junior & Senior

Summer 2019 Merit Research Projects

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Gillian Queisser	gillian.queisser@temple.edu	CST	Mathematics	3D Neuron Simulations in Virtual Reality	In this project students will use computational methods to simulate electrical and biochemical signals in neurons and networks. These fundamental communication pathways are highly relevant for the understanding of cellular function and disease. The three-dimensionality of the system poses challenges to visualizing and analyzing computational results. Therefore, this project is intended to integrate with existing virtual reality hardware available at the Center for Computational Mathematics and Modeling. The project requires a strong interest in mathematical models, simulations, data, programming, and hardware. Students will work in the Center for Computational Mathematics and	Main	Programing skills (especially Java and C++) and experience in data visualization (e.g. Unity, Blender, ParaView) is very welcome.	Mathematics, Computer Science, Physics	Sophomore, Junior, Senior
Adrienn Ruzsinszky	aruzsinszky@temple.edu	CST	Physics	Implementation and application of advanced electronic structure methods	This project requires advanced programming skills either in Python or Fortran. In our research group we are developing approximations based on Density Functional Theory/Nonlocal Many Body Theory that need to be implemented in electronic structure codes. These approximations require thorough testing on molecules and solids. Within this project during the implementation, students can learn about the strengths and limitations of these methods along with acquiring practice in computation.	Main	advanced programming skills in Python or Fortran, some basic knowledge in Quantum Mechanics	Physics/Chemistry	Juniors or Seniors

Summer 2019 Merit Research Projects

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Xiaoxing Xi	Xiaoxing@temple.edu	CST	Physics	Fabrication and studies of superconducting thin films for device applications	We work mainly with superconducting thin films for device applications at small and large scales. For this purpose, films of magnesium diboride (MgB2) and various layered oxides are grown with different deposition methods in our lab. The films are characterized in terms of their transition temperature, critical currents, surface morphology, and performance under RF conditions. The purpose of these studies is to investigate the feasibility of these films for the use in josephson junction based devices as well as large scale applications, such as RF cavities currently being employed in particle accelerators.	Main	Interested in research, hard working, aptitude for careful laboratory research, fond of problem solving, motivated to learn, basic understanding of physics	physics, engineering	
Santiago Orrego	sorrego@temple.edu	Dental School	Restorative Dentristry and Bioengineering	Smart Biomaterials for Dental and Bone Applications	In our research project, we develop novel biomaterials with smart functionalities. We are focusing on biomaterials that kill bacteria and viruses, therefore, offering anti-infection capabilities. In addition, our biomaterial can regenerate tissue (e.g. bone) by activating the formation and growth of minerals. Our materials could be implanted in the body without any infection and by promoting regeneration of tissue. Our interdisciplinary work merges areas of bioengineering, microbiology and materials science. In our lab, we conduct experiments by preparing novel biomaterials to exposed them to body-like conditions with cells, viruses and bacteria. Our biomaterials also can delivery drugs after	TUHSC	We are seeking talented and self-motivated candidates with a good work ethics. Discipline, commitment and excellent communication are a must!	Bioengineering, Mechanical Engineering, Chemistry, Biochem	Juniors or Seniors

Summer 2019 Merit Research Projects

Faculty Name	Email Address	Faculty College	Faculty Dept	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference
Nancy Pleshko	npleshko@temple.edu	Engineering	Bio-engineering	Development of spectroscopic methods for assessment of engineered tissues	A significant impediment to advances in generating replacement tissues for damaged cartilage is the inability to assess the structure of an engineered tissue during growth. Near-infrared spectroscopic assessment could offer the ability to monitor tissue growth in vitro, and thus permit appropriate interventions to be undertaken on an ongoing basis to modify the tissue towards desired structural and compositional endpoints. The research project will involve growing engineered cartilage constructs on scaffold materials and developing spectroscopic methods to monitor tissue development.	Main	Motivation, organization, and ability to work productively in a team environment - Introductory Biology and Chemistry; Analytical or Organic Chemistry helpful	Bioengineering - Introductory Biology and Chemistry	Sophomore, Junior, Senior
Nancy Pleshko	npleshko@temple.edu	Engineering	Bioengineering	Gene Analysis of cell types for Tissue Engineered Cartilage	The Tissue Imaging and Spectroscopy Lab (TISL) is seeking a motivated summer student to assist in gene analysis for tissue engineered cartilage. In our lab, we tissue engineer cartilage using three types of cells: synovial derived stem cells, bone marrow derived stem cells and chondrocytes. We grow the cells under various conditions that mimic native cartilage development. The summer student would focus on assessing changes between cell types at the gene level, specifically using polymerase chain reaction (PCR). The summer student will work hand in hand with PhD students in the TISL lab.	Main	Skills needed: PCR Not required but desired: histology, Western Blot	Biology	Sophomore, Junior, Senior
Gangadhar Andaluri	gangadhar@temple.edu	Engineering	Civil and Environmental	Analytical Testing and Adsorbent Preparation	Assist in the development of Analytical methods and sample Analysis. The scope of work includes analysis on LC/MS/MS, GC/MS, BET, TOC, FTIR, IC and any other equipment as applicable etc.	Main	Chemistry Lab experience a plus	Environmental Engineering	Freshman, Sophomore, Junior,

Summer 2019 Merit Research Projects

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Gangadhar Andaluri	gangadha	Engineering	Civil and Environmental	Analytical Testing and Adsorbent Preparation	Assist in the development of Analytical methods and sample Analysis. The scope of work includes analysis on LC/MS/MS, GC/MS, BET, TOC, FTIR, IC and any other equipment as applicable etc.	Main	Chemistry Lab experience a plus	Environmental Engineering	Freshman, sophomore,
Rominder Suri	rominder.suri@temple.edu	Engineering	Environmenetal Engineering	Electro-oxidative Transformation of Perfluoro carboxylic acids (PFCAs)	The electrochemical oxidation behaviour of PFCAs, determination of optimum operation parameters, by-products formation.	Main	interest in the project/research, critical thinking, problem solving skills.	Chemistry, physics, engineering	Juniors or Seniors
Rominder Suri	rominder.suri@temple.edu	Engineering	Environmental engineering	Advanced oxidation processes for emerging contaminants removal from water	Investigation of emerging contaminant removal by different/combined advanced oxidation processes.	Main	interest in the project/research, critical thinking, problem solving skills.	Chemistry, engineering	Juniors or Seniors
John Karanicolas	john.karanicolas@fccc.edu	Fox Chase Cancer Center	Molecular Therapeutics	Developing potent inhibitors of RNA-binding protein Msi2	RNA-binding proteins play important roles in many different diseases, including cancer. We have designed inhibitors of the RNA-binding protein Musashi2 (Msi2), a key driver in pancreatic cancer. While these first inhibitors are effective in cells, they are not yet potent enough to be advanced into animals for further testing. Thus, we would like to make several derivatives of these first compounds, so that we can ultimately test whether they are effective in animals.	Fox Chase Cancer Center, 333 Cottman Ave.	Must have completed organic chemistry II	Chemistry or Biochem	Juniors or Seniors

Summer 2019 Merit Research Projects

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Ana Gamero	gameroa@temple.edu	LKSOM	Biochemistry	STAT2 Signaling in Cancer	STAT2 is a transcription factor widely recognized for its role in host defense against microbial attack and inflammation. Published work from my laboratory now suggests that STAT2 is also implicated in cancer development. We have evidence in animal models of cancer that STAT2 functions to promote tumorigenesis. Based on this exciting finding, the main objective of my lab is determine the underlying molecular mechanism by which STAT2 is promoting cancer development.	TUHSC	Strong knowledge of biological concepts Self-motivated and willingness to work hard Good communication skills Able to work well with others	Biology, Biochemistry	Sophomore, Junior, Senior
Ana Gamero	gameroa@temple.edu	LKSOM	Biochemistry	Understanding the Role of STAT2 in Colorectal Cancer	Cancer is a very complex disease driven by multiple genetic alterations. The focus of my research is to investigate the mechanism by which the transcription factor STAT2 promotes tumor progression in colorectal cancer. The long-term goal of this project is to determine how STAT2 cooperates with tumor oncogenes to enable tumor progression, conversion of benign lesions to malignant and metastasis. Understanding this process will lead to the development of novel therapeutic interventions to treat colorectal cancer.	TUHSC	Good communication skills, attention to detail and able to follow directions	Biology, Biochemistry	Sophomore, Junior, Senior

Summer 2019 Merit Research Projects

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Wenhui Hu	whu@temple.edu	LKSOM	Center for Metabolic Disease Research, Department of Pathology and Lab Med	Molecular mechanisms of hypothalamic neurogenesis and neural metabolic syndrome	The research interest in Dr. Hu's lab focuses on the role and mechanisms of a novel protein NIBP, which regulates NFkB signaling and trans-Golgi networking. Mutation of NIBP contributes to mental retardation, autism, obesity and stroke. In particular, NIBP knockout mice develop obesity under normal diet. Also, the lab is interested in the novel role of the schizophrenia and autism spectrum disorder gene TCF4 in regulating neuritogenesis and synaptic plasticity. The qualified students will actively participate in the daily research activities in the laboratory. These activities include: neural stem cell culture, transfection, reporter gene assay, CRISPR/Cas9 genome editing, molecular cloning, RT-	TUHSC	Motivation for science, responsible and reliable	Neuroscience, Biology, Psychiatry, Bioengineering, Computer science	Junior or Senior
Ellen Unterwald	ellen.unte	LKSOM	Center for Substance Abuse Research	Susceptibility to Substance Abuse following Traumatic Stress	This project utilizes a rat model of post-traumatic stress disorder (PTSD) to investigate the biological basis of enhanced drug and alcohol intake following traumatic stress exposure. The first aim of the project is to develop a classification method to predict which individual rats are likely to consume the most drug/alcohol (ie, susceptible individuals). This is done by applying predictive data analytics and machine learning to behavioral measures of anxiety following stress exposure. The second aim is to determine what makes the susceptible population vulnerable to substance abuse. This is achieved by studying target gene/protein regulation in specific brain regions. The third aim is determine if epigenetic alterations are	TUHSC	Must be willing to work with rats. Experience with animal handling preferred but not required.	any	Sophomore, Junior or Senior
Lee-Yuan Liu-Chen	lliuche@t	LKSOM	Center for Substance Abuse Research	Kappa opioid receptor (KOR): pharmacology, neuroanatomy and behaviors	1. genotyping and biochemical and behavior characterization of mutant mouse lines, including phosphorylation-deficient KOR mutant mice, b-arr2 knockout mice and KOR-tdTomato mice 2. Screening for selective KOR agonists that produce analgesic and anti-itch effects, but do not cause side effects such as aversion, sedation and motor incoordation	TUHSC	solid grades, eager to learn, organized, some lab experience preferred	Neuroscience, Biochemistry	Freshman, sophomore, Junior, Senior

Summer 2019 Merit Research Projects

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Douglas Tilley	douglas.tilley@temple.edu	LKSOM	Center for Translational Medicine	Leukocytes and Cardiorenal Syndrome	Cardiorenal syndrome (CRS) is a growing clinical problem that substantially increases the risk of adverse cardiovascular events and mortality outcomes in patients and costs billions of dollars per year in the U.S. Approximately 50% of CRS cases result from a deterioration in cardiac function, such as during the development of heart failure (HF), which promotes renal fibrotic remodeling and progressive dysfunction. A number of factors contribute to the development of CRS, including changes in hemodynamics, humoral factors such as cytokines and sympathetic nervous system (SNS) activation. Responsive to each of these changes are leukocytes, particularly monocytes and macrophages,	TUHSC		biochemistry, chemistry, biology	Sophomore, Junior, Senior
Sara Jane Ward	saraward@temple.edu	LKSOM	CSAR	Cannabinoids, Inflammation, and CNS Injury	Research focuses on determining the role of inflammation across a range of CNS disorders, from stroke to substance abuse. We take a behavioral and molecular immunological approach to studying the role of inflammation in CNS disorders and testing the hypothesis that cannabinoid based-treatments have a potential to reduce this inflammation and therefore improve behavioral outcomes.	TUHSC	Interest in neuroscience/experimental psychology	Neuroscience, Psychology	Junior or Senior
John Elrod	elrod@temple.edu	LKSOM	CTM	Mitochondrial Calcium Exchange in Heart Disease	Summer Research Students would be assisting lab members with general tasks ranging from mouse colony maintenance, genotyping, histology, cell culture and various other experiments that are needed for our current projects. You can view our recent publications and current projects via our website. Link listed below. http://www.elrodlab.org/projects/#/lab-publications/	TUHSC	Agreeableness and willingness to learn.	Biology	Sophomore, Junior, Senior

Summer 2019 Merit Research Projects

Faculty Name	Email Address	Faculty College	Faculty Dept	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference
Mahmut Safak	msafak@temple.edu	LKSOM	Department of Neuroscience	Understanding the regulatory roles of JC virus agnoprotein in viral life cycle	JC virus (JCV) is a human polyomavirus that infects the majority of human population during early childhood and remains latent in immunocompetent individuals throughout their life. However, it is reactivated from its latent state in a subpopulation of immunocompromised individuals, including AIDS, cancer and multiple sclerosis patients and specifically infects and destroys oligodendrocytes and astrocytes in the central nervous system (brain); and causes a brain disease, known as progressive multifocal leukoencephalopathy. This virus encodes several regulatory proteins, one of which is Agnoprotein (Agno). In the absence of Agno expression, JCV is unable to sustain its productive life cycle which is	TUHSC		Biology, Chemistry, Biochemistry, Neuroscience	Sophomores and Juniors
Mahmut Safak	msafak@temple.edu	LKSOM	Department of Neuroscience	Investigation of the regulatory roles of JC virus Agnoprotein in viral life cycle	Agnoprotein is one of the important regulatory proteins of the human polyomavirus, JC virus. It is a relatively small and basic protein. we have recently demonstrated that it forms highly stable dimers and oligomers. It exhibits the ability to be released from the infected cells. The implications of this release unknown. It appears to bind to viral transcripts and ins involved in the splicing and nucleo-cytoplasmic transport of these transcripts. Three dimensional structure of this protein has been recently resolved by our lab, confirming the involvement of dimerization domain in alpha-helix formation. Our lab has been heavily involved in characterization of the regulatory roles of this protein in viral life cycle in the	TUHSC	Student with a good work ethics	Biology, Chemistry Biochemistry Neuroscience	Sophmore

Summer 2019 Merit Research Projects

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Wenhui Hu	whu@temple.edu	LKSOM	Department of Pathology and Lab Med	Target-specific delivery of CRISPR/Cas9 genome editors to Disease-relevant cells	CRIPSR/Cas9 genome editing has been drawing extensive attention in both science and public. It has revitalized the gene and cell therapy. A large number of exciting and promising preclinical studies escalate the potential of genome editors to treat patients with genetic diseases, infectious diseases, cancer and others. One of many challenges before wide clinical application is the urgent need to effectively, specifically and safely deliver the powerful genome editing machinery to disease-relevant cells and tissues. Dr. Hu's lab is interested in developing novel viral and non-viral gene delivery for Cas9/sgRNA-expressing vectors or ribonucleoprotein by targeting neural, immune and cancer cells. The qualified	TUHSC	High motivation for science, responsible and reliable, hard-working	Molecular biology, Genetics, Biology, Neuroscience	Sophomore, Junior or Senior
Beata Kosmider	tug28074@temple.edu	LKSOM	Department of Thoracic Medicine and Surgery	Mutation analysis in emphysema.	Two million Americans suffer from chronic obstructive pulmonary disease, costing $2.5 billion/year and contributing to 100,000 deaths/year. Emphysema is caused by the destruction of alveolar wall septa, which is associated with inflammation. Alveolar type II cells make and secrete pulmonary surfactant and restore the epithelium after damage. In our preliminary data we identified 6 mutations in genomic DNA obtained from alveolar type II cells isolated from patients with emphysema. Our hypothesis is that these mutations may contribute to this disease pathogenesis. Student task and responsibility: The student will first get training in general laboratory techniques. This	TUHSC		Biology or Biochem	

Summer 2019 Merit Research Projects

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Beata Kosmider	tug28074@temple.edu	LKSOM	Department of Thoracic Medicine and Surgery	The role of microvesicles in emphysema.	Microvesicles are small membrane vesicles of 30–1,000 nm in diameter that are released into the extracellular environment under normal or pathological conditions by different types of cells including alveolar type II cells. Our hypothesis is that microvesicles secreted in emphysema may contain inflammatory factors, which can induce injury of neighboring cells. In our preliminary data, we found higher microvesicles secretion in alveolar type II cells isolated from patients with this disease compared to control non-smokers and smokers. We have also identified dysregulated expression of genes involved in microvesicles synthesis by RNA sequencing in alveolar type II cells isolated from patients with	TUHSC		Biology or Biochem	
Jonathan Soboloff	soboloff@temple.edu	LKSOM	Fels Institute for Cancer Research	Role of STIM-dependent calcium signals in T cell differentiation	T cells are critical players in adaptive immunity. T cells are made in the thymus and then released into peripheral blood where they seek out foreign agents. One of the first events that occurs in T cells when activated is a change in cytosolic calcium concentration. These calcium responses drive their differentiation into multiple differentiated T cell subsets that control the immune response in a manner dependent on both the duration and intensity of the calcium signal. We utilize a combination of cell lines and mouse models to understand the molecular events in control of calcium signal generation and T cell differentiation. This project would involve working closely with senior	TUHSC	Student must be enthusiastic with a genuine interest in learning research. Prior lab experience would be highly desirable but not required. Project involves cell culture, Western blots and fluorescence microscopy.	Biology/Biochemistry	Sophomore, Junior or Senior

Summer 2019 Merit Research Projects

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Jonathan Soboloff	soboloff@temple.edu	LKSOM	Fels Institute for Cancer Research	Role of STIM/Orai in esophogial differentiation and carcinogenesis	Increases in cytosolic Ca2+ concentration are a common component of multiple signal transduction pathways regulating a wide variety of responses ranging from rapid events such as membrane fusion and muscle contraction to control of proliferation, differentiation and apoptosis. Keratinocytes are unique amongst cellular systems in that the undifferentiated cells live in a low calcium environment and, as they differentiate, they move into a high calcium environment, which drives this process. The entry of calcium into the cell requires the presence of ion channels that remain poorly described, particularly in esophogeal biology. Working closely with Dr. Kelly Whelan, an expert in	Main	Student must be enthusiastic with a genuine interest in learning research. Prior lab experience would be highly desirable but not required. Project involves cell culture, Western blots, PCR and fluorescence microscopy.	Biology/Biochemistry	Sophomore, Junior or Senior
Raza Zaidi	zaidi@temple.edu	LKSOM	Fels Institute for Cancer Research	molecular mechanisms of Melanomagenesis	Melanoma is the deadliest type of skin cancer, which originates from the pigment (melanin)-producing cells (melanocytes) in the skin. Approximately 85% of melanomas are directly caused by the UV radiation from the sun and artificial tanning beds. However, the molecular mechanisms of this cause-and-effect relationship remain largely undefined. We are using cell culture and mouse models, and cutting-edge molecular biological techniques, genomics, and epigenomics to tease out the molecular mechanisms of UV-induced melanomagenesis.	TUHSC	Highly motivated individuals who have the passion for molecular biology research, and are willing to commit themselves to a steep learning curve, dedication, and hard work. Prerequisites: Intro Biology I+II+Lab; General Chemistry I+II+Lab; Calculus I;	Biochemisry or Biology	

Summer 2019 Merit Research Projects

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Xavier Graña	xgrana@temple.edu	LKSOM	Fels Institute for Cancer Research	Protein phosphatase 2A in cancer and the control of cellular processes	Project 1: While it is well accepted that PP2A plays a key tumor suppressor function in human cells, the particular holoenzyme(s) implicated in different tumor types is unclear at best. PP2A is a major Ser/Thr Protein Phosphatase that functions as a trimeric holoenzyme consisting of a scaffold protein (A), which bridges a catalytic subunit (C) and a regulatory B subunit. The regulatory subunit is thought to mediate substrate specificity and integrate regulatory inputs from a variety of signaling pathways. There are four different families of B regulatory subunits (B, B', B'' and B'''), each with multiple members encoded by distinct genes. We have found, that limited ectopic expression of	TUHSC	- No previous expertise needed. - Strong interest in pursuing a research related career - Students who have taken Cell structure and Function, Genetics, Cell Signaling and Motility and/or Biochemistry are encouraged to apply.	Biology, Biochemistry	Freshman, sophomore, Junior
Brad Rothberg	rothberg@temple.edu	LKSOM	Medical Genetics and Molecular Biochemistry	Crystal structures of potassium channel proteins	Potassium channels are membrane proteins that are critical for electrical signaling in nerve and muscle cells. Our research is focused on crystallizing potassium channel proteins and their regulatory domains, with the goal of solving the structures of these proteins using X-ray diffraction. Note: This is expected to be a training experience, so previous experience in X-ray crystallography is not required.	TUHSC	Most important criterion is a strong interest in protein structure and/or neuroscience. Previous laboratory experience is preferred, but NOT required. Good communication skills are also preferred.	Biology; Biochemistry; Chemistry; Neuroscience	Juniors or Seniors

Summer 2019 Merit Research Projects

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Glenn Gerhard	gsgerhard@temple.edu	LKSOM	Medical Genetics and Molecular Biochemistry	Fentanyl overdoses and pharmacogenetics	Fentanyl has been implicated as a major contributor to the increased number of opioid overdose deaths. Surprisingly, little is known about the pharmacogenetic influences on fentanyl pharmacokinetics or pharmacodynamics. Pharmacogenetic reports on fentanyl use are largely derived from small-scale studies of the potential association of a small number of high frequency variants in selected candidate genes with post-operative pain. Few data are available on low frequency variants or from racially/ethnically diverse populations. In this project, blood samples will be obtained from individuals who have died from fentanyl overdose for the isolation of DNA and	TUHSC		Biochemistry, Biology, Genetics	Sophomore, Junior, Senior
Parkson Lee-Gau Chong	pchong02@temple.edu	LKSOM	Medical Genetics and Molecular Biochemistry	Design of Novel Liposomes for Drug Delivery	The goal of this research is to design novel liposomes for targeted drug delivery to treat cancers. We will use bipolar tetraether lipids (BTL) as the matrix lipids and polyethylene glycol (PEG)-linked conventional lipids as the minor component to make liposomes (100-200 nm in diameter) with entrapped anticancer drugs. BTL will be isolated from the thermoacidophilic archaea Sulfolobus acidocaldarius. Physical properties of these BTL-based liposomes will be characterized using a variety of biophysical techniques. Drug release and the inhibitory effect of liposomal drug against breast cancer cells will be monitored. These BTL-based liposomes are expected to show remarkable stability against temperature, pH gradient,	TUHSC	GPA, research interest -Basic chem. lab skills	Chemistry, Biology, and Physics	Sophomore, Junior or Senior

Summer 2019 Merit Research Projects

Faculty Name	Email Address	Faculty College	Faculty Dept	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference
Parkson Lee-Gau Chong	pchong02@temple.edu	LKSOM	Medical Genetics and Molecular Biochemistry	Novel Membranes for Targeted Drug Delivery/Controlled Release and Other Technological Applications Such As Artificial Photosynthesis	Project 1: Archaeal bipolar tetraether liposomes (BTL) are remarkably stable and robust biomaterials, holding great promise for technological applications. They can be used as targeted carriers, slow-release drug carriers, biosensors, microbubbles for imaging and diagnosis, sterilized storage devices, and coating materials. The goals of this research are: (1) to gain a deeper molecular understanding of the structure-activity relationship of BTL liposomes in order to improve their usage as biomaterials and explore their possible new applications, and (2) to design and fabricate liposomes (i) for targeting phosphatidylserine- and phosphatidylethanolamine-rich areas in cells and (ii) as thermosensitive	TUHSC	having passion in science and technology; eager to learn new things; willing to devote a significant amount of time to the lab work; - general chemistry--required; advanced courses, including but not limited to organic chemistry and physical	Chemistry, Biology, Physics, Bioengineering	
Bettina Buttaro	bbuttaro@temple.edu	LKSOM	Microbiology and Immunology	Enterococcal pheromone inducible conjugative plasmids as virulence factors and disseminators of antibiotic resistance genes	Pheromone inducible conjugative plasmids, such as pCF10, play a central role in the ability of Enterococcal faecalis to cause disease. They encode antibiotic resistance and virulence genes in addition to mediating transfer of chromosomal determinants between strains. These plasmids also contribute to the ability of the bacteria to cause disease and to spread antibiotic resistance genes to other species and genera of bacteria. The goal of the chemistry/biochemisty projects is to characterize the molecular mechanisms that allow the bacteria to vary the copy number of the plasmids in response to oxidative stress. The goal of the biology projects is to understand how the plasmid transfers antibiotic	TUHSC	desire to learn to design and perform experiments independently under guidance -- Students are given a scientific question to answer experimentally. They will be mentored in designing their experiments, performing them	chemistry/biochemistry and biology	

Summer 2019 Merit Research Projects

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Marion Chan	marion.chan@temple.edu	LKSOM	Microbiology and Immunology	Atherosclerosis and Arthritis	Rheumatoid arthritis (RA) is an autoimmune disease that affects 1.3 million individuals. The most noticeable symptom is inflammation in the joints of the hands and feet. The clinical symptom surfaces in flares and goes through cycles of wax and wane. Eventually, the joints are damaged. Nonetheless, clinical studies discovered that RA patients have an abnormally shortened life expectancy due to atherosclerosis, leading to death from strokes and heart attacks. Our laboratory is interested in studying whether diets and dietary components that are pro- or anti-atherosclerosis will affect clinical manifestation in RA. Comparing the common pathogenic mechanisms between the two diseases,	TUHSC	Techniques used include tissue culture, western blots, and maybe animal (mice) handling	Biology, chemistry, etc.	Sophomore, Junior, Senior
Tomasz Skorski	tskorski@temple.edu	LKSOM	Microbiology and Immunology	Targeting DNA damage to eradicate leukemia	Tumor cells carrying specific genetic mutations can be eradicated by synthetic lethality triggered by DNA repair inhibitors. The project will test mechanistic and pre-clinical aspects of this approach.	TUHSC	tissue culture, Western blot	Biology, Biochemistry	Freshman, Sophomore, Junior, Senior

Summer 2019 Merit Research Projects

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Jun Yu	jun.yu@temple.edu	LKSOM	Physiology/CMDR	Molecular control of vascular remodeling	One of our lab's research focus is to identify novel signaling pathways that regulate ischemia-induced collateral remodeling and angiogenesis, one of the major cardiovascular problems. Prohibitin-1 is a highly conserved protein that is mainly localized to the mitochodrial membrane and regulates mitochondria function and vascular homeostasis. The subject of this project is to uncover the role of prohibitin-1 in regulating endothelial cell function and the underlying mechanism(s).	TUHSC	Basic cell and molecular biology techniques. Understanding of human physiology. Highly motivated and responsible.	Biology or pharmacology	Sophomore, Junior or Senior
Shuxin Li	shuxin.li@temple.edu	LKSOM	Shriners Hospitals Pediatric Research Center	Neural repair and CNS neuronal regeneration	Our lab is highly interested in neural repair and CNS axon regeneration research. Our projects focus on the molecular/cellular mechanisms for CNS neuronal growth failure and development of novel and effective strategies to promote neuronal regeneration, remyelination and functional recovery after injury and/or in neurodegenerative disorders. We employ various in vitro and in vivo research approaches, including molecular/cellular neurobiology, biochemistry, genetic and pharmacological methods, transgenic over-expression and knockout mice and multiple neuronal/axonal lesion models (such as spinal cord injury, optic nerve crush and EAE) in mice and rats. We have produced a	TUHSC	Motivated person and basic background on research.		
Seo-Hee Cho	seo.hee.cho@temple.edu	LKSOM	Shriners Hospitals Pediatric Research Center/ Anatomy and Cell Biology	Examining the effects of Yap WT and Yap mutant genes overexpression in the developing retina using AAV (Adeno-associated virus) vectors.	This project consists of three parts. First, construction of AAV-Yap (WT), AAV-YapS1A and AAV-YapS1D via recombinant DNA technology. Second, expression of Yap, WT and mutant, genes in the neonatal retina by electroporation or viral injection. Lastly, characterization of resulting retinas with various analysis tools including immunofluorescennce assay followed by microscopic imaging.	TUHSC		Biology	Sophomore

Summer 2019 Merit Research Projects

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Sunil Karhadkar	sunil.karhadkar@tuhs.temple.edu	LKSOM	Surgery / Abdominal Transplant	General Surgery in Transplant recipients	General non-transplant surgical considerations in the kidney transplant recipient include issues relating to glucocorticoids, antibiotic prophylaxis, and tissue integrity and wound healing. Specific surgical problems include gastrointestinal surgical emergencies, cardiac surgery, and abdominal aortic aneurysm (AAA) surgery. Thus, kidney allograft recipients who are undergoing non-transplant surgery may have particular considerations with regard to immunosuppression and/or technical issues. We are interested in studying the National Inpatient Sample (NIS) database to evaluate morbidity and mortality in transplant patients undergoing general non-transplant surgery. This project involves employing	TUHSC	The applicants should possess good writing skills; be able to work independently; have a strong knowledge of biological concepts, be Self-motivated and willing to work hard.	Biology, Biochemistry,	Freshman, Sophomore, Junior, Senior
Sunil Karhadkar	sunil.karhadkar@tuhs.temple.edu	LKSOM	Surgery / Abdominal Transplant	Correlation of pre transplant renal allograft histology with transplant outcomes after deceased donor renal transplantation	Analysis of donor renal histology with regard to glomerulosclerosis, vascular changes in intra renal blood vessels and fibrosis; generation of pathological composite score and its correlation with short term and long term renal allograft function	TUHSC		biology, immunology, data science	Freshman, Sophomore & Junior
Sunil Karhadkar	sunil.karhadkar@tuhs.temple.edu	LKSOM	Surgery / Abdominal Transplant	Role of Donor Specific Antibodies(DSA) in Kidney Transplant Immune Modulation	Donor-specific antibodies have become an established biomarker predicting antibody-mediated rejection. Antibody-mediated rejection is the leading cause of graft loss after kidney transplant. Donor-specific antibodies (DSAs) identified before kidney transplant (preformed DSAs) can cause early rejection, such as hyperacute rejection, accelerated acute rejection, early acute antibody-mediated rejection, and graft loss. Alternatively, de novo developed DSAs after transplant are associated with late acute antibody-mediated rejection, chronic antibody-mediated rejection, and transplant glomerulopathy. The summer project will involve analysis of DSAs in Kidney Transplant recipients and	TUHSC	The applicants should possess good writing skills; be able to work independently; have a strong knowledge of biological concepts, be Self-motivated and willing to work hard.	Biology, Chemistry, Biochem, Premed	Freshman, Sophomore, Junior, Senior

Summer 2019 Merit Research Projects

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Sunil Karhadkar	sunil.karhadkar@tuhs.temple.edu	LKSOM	Surgery / Abdominal Transplant	Pancreas Transplantation for type 2 Diabetes and New Onset Diabetes after Transplantation	Diabetes occurs in a substantial number of patients following kidney transplantation. New-onset diabetes after transplant (NODAT) is associated with increased mortality and morbidity and, in particular, higher rates of cardiovascular disease and infection, which are the leading causes of death in kidney transplant recipients. Higher doses of glucocorticoids among kidney transplant patients have been associated with the development of NODAT. This project aims to look at dual organ transplantation and steroid sparing immunosuppression protocols and their effects on NODAT	TUHSC	The applicants should possess good writing skills; be able to work independently; have a strong knowledge of biological concepts, be Self-motivated and willing to work hard.	Biology, PreMed, Data Science	Freshman, sophomore, Junior
Sunil Karhadkar	sunil.karhadkar@tuhs.temple.edu	LKSOM	Surgery / Abdominal Transplant	Hypothermia in donors for organ transplantation and effects on allograft outcomes	Hypothermia is often utilized to minimize cerebral injury after cardiac arrest. Progression to brain death after cardiac arrest and subsequent organ donation and recovery is associated with variable outcomes from the procured allografts. The duration of hypothermia and the ischemia times will be correlated with outcomes after transplantation	TUHSC		Biology, biochemistry, neuroscience, data science	Freshman, Sophomore & Junior
Sunil Karhadkar	sunil.karhadkar@tuhs.temple.edu	LKSOM	Surgery / Abdominal Transplant	Obesity and Frailty as risk factors for adverse outcomes after renal transplantation	Study and analysis of indices of frailty as determinants of adverse outcomes after renal transplantation. This will involve review of bioinformatics data and statistical analysis and correlation with serum markers of renal failure, morbidity and graft loss	TUHSC		biology, biochemistry, data science	Freshman, Sophomore & Junior

Summer 2019 Merit Research Projects

Faculty Name	Email Address	Faculty College	Faculty Dept	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference
Marc Ilies	mailies@temple.edu	School of Pharmacy	Pharmaceutical Sciences	Synthesis and characterization of carbonic anhydrase inhibitors and activators	Carbonic anhydrase is a zinc metalloenzyme involved in many physiologic processes such as cellular respiration and transport of CO2 from metabolizing tissues to lungs, pH homeostasis, gastric acid secretion, bone remodelling gluconeogenesis, etc. It has 15 isozymes with different cellular localizations and biochemical properties. Some of these isozymes are over-expressed in various disfunctions and diseases including cancers. We are interested to generate isozyme-selective inhibitors and activators for carbonic anhydrase with high intrinsic activity and in vivo efficacy.	TUHSC	background (organic chemistry), past experience, motivation	chemistry, biochemistry	
Marc Ilies	mailies@temple.edu	School of Pharmacy	Pharmaceutical Sciences	Development of drug delivery systems with enhanced in vivo stability	Drug delivery systems can modify the pharmacokinetics of drugs, protect them from decomposition and control their spatial and temporal delivery in the organism. In recent years we were active towards the development of drug delivery systems based on amphiphilic compounds of different molecular weight, from simple surfactants, gemini surfactants, lipids, dendrons and polymers. We are currently seeking talented and highly motivated students to develop the next generation of drug delivery systems with enhanced in vivo stability capable of long circulation time in the body. Students majoring in chemistry, biochemistry and biology are welcomed. Experience in working with cells and	TUHSC	General knowledge in chemistry, biochemistry, biology and especially in the inter-disciplinary integration of this knowledge is needed. We will train the student in the specifics of the project. Will take Freshman to Seniors	Chemistry, Biochemistry, Biology	Freshman to Seniors

Summer 2019 Merit Research Projects

Faculty Name	Email Address	Faculty College	Faculty Dept	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference
Marc Ilies	mailies@temple.edu	School of Pharmacy	Pharmaceutical Sciences	Physicochemical and biological evaluation of novel carbonic anhydrase inhibitors and their pharmaceutical formulations.	Carbonic anhydrases (CAs, E. C. 4.2.1.1) are a class of ubiquitous metallo-enzymes that catalyze the reversible hydration of carbon dioxide: CO2 + H2O ↔ HCO3- + H+. Sixteen isozymes are currently known, with different catalytic activity, subcellular localization and tissue distribution. These isozymes are involved in critical physiologic and pathologic processes including respiration, acid-base regulation, electrolyte secretion, bone resorption/calcification, gluconeogenesis, tumorigenicity and the growth and virulence of various pathogens. Some of them are over-expressed in pathological conditions such as edemas, glaucoma, obesity and cancer. Therefore CA isozymes have become important targets for	TUHSC	previous experience in physicochemical/biological evaluation of organic compounds and their formulations (e.g. liposomes), as well as towards handling cells constitutes a plus	Biochemistry, Biology	Sophomore, Juniors, Seniors
Mohsin Khan	tuf72052@temple.edu	TUSM	Department of Physiology/Center for Metabolic Disease Research	Human Cardiac stem cell and exosome based therapies for cardiac regeneration	The goal of these studies is to develop a cardiac regeneration strategy based on human cardiac stem cells isolated from heart failure patients. Understanding the role of aging and disease onset will allow development of novel strategies for enhancing human cardiac stem ability to repair the heart after myocardial damage. Students will work with characterizing human cardiac stem cells by fluorescence microscopy, immunoblot analysis, viral modification and cell proliferation/death assays. Students will be expected to work on these projects efficiently with inclusion of their name in a conference abstract or a publication depending on the level of their contribution.	TUHSC	General Lab Skills	Biology	Junior or Senior
Eileen Jaffe	eileen.jaffe@fccc.edu								
Rodrigo B Andrade	randrade@temple.								
Sadia Mohsin	tuf65474@temple.								