Spring 2018 URP Faculty Projects

Faculty Name	Email Address	Faculty College	Faculty Department	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference	Hours per week
Abdelkarim Sabri	sabri@temple.edu	TUSM	Cardiovascular Research Center	Inflammatory proteases and cardiac repair	In the adult heart, cell death following myocardial infarction initiates an inflammatory reaction that removes dead cells and contributes to scar formation and cardiac repair. Since the regenerative capacity of the adult mammalian heart is limited, induction of this innate immune response could be maladaptive and compromises cardiac contractile function. Our study uses a combination of in vivo and in vitro model systems to define the role of inflammatory proteases on endogenous cardiac repair and function after myocardial infarction.	TU Health Science Campus	Basic cell and molecular biology techniques. Highly motivated students with sound knowledge in cell and molecular biology.	Biochemistry	Junior & Senior	
Adrienn Ruzsinszky	aruzsinszky@temple.edu	CST	Physics	First-principles electronic structure methods for materials	Development and applications of first-principles electronic structure methods in Physics and Chemistry.	Main campus	Interest in theoretical research. Solid mathematical background. Satisfactory programming and computational skills.	Physics or Chemistry	Junior	
Alexandra Davatzes	alix@temple.edu	CST	Earth and Environmental Science	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 Campus	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	

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Allen Nicholson	anichol@temple.edu	CST	Biology	Analysis of a Gene-regulatory Ribonuclease Complex	Proteomic analyses of protein-protein interactions in the bacterium Escherichia coli suggest that two ribonucleases, RNase III and RNase II, as well as the protein YmdB, function as a complex to process RNA molecules. We will investigate how RNase III and RNase II may work in concert to process RNA, and how YmdB regulates the action of RNase III. These experiments will use purified recombinant proteins and RNA substrates to examine the activity of the protein complex and the individual proteins.	TU Main Campus	Interest in biochemistry and molecular biology; strong foundation of basic biochemical/biological concepts, critical thinking skills, attention to detail, willingness to tackle an early-stage research project.	Biology, Biochemistry - Biology 2112, Genetics, Chemistry	Sophomore, Junior or Senior	
Allen Nicholson	anichol@temple.edu	CST	Biology	Understanding ribonuclease mechanism and function in gene regulation	We apply biochemical and molecular genetic techniques to probe the mechanism of ribonucleases and their function in gene expression and RNA stability. Our primary system is the bacterial cell, and we seek to understand how bacterial cell motility, biofilm formation, and response to stress are regulated by ribonucleases.	TU Main Campus	Strong performance in biology and chemistry courses (including at least one semester of organic chemistry) Biology and Chemistry coursework through the sophomore year. Must have an eagerness to learn techniques, and be prepared to go the extra distance to complete occasionally	Biochemistry, Biology, Chemistry majors	Sophomore, Junior or Senior	

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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	TU Main Campus	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	Biology, Environmental Science	Sophomore, Junior or Senior	
Ananias Escalante	Ananias.Escalante@temple.edu	CST	Biology	Phylomedicine of vector-borne pathogens	It is increasingly evident that genomic information, together with concepts from epidemiology and evolutionary biology, allows for testing of hypotheses and exploration of scenarios that otherwise could not be investigated by traditional approaches. Our lab characterizes the processes shaping the genetic variation of vector-borne parasites and viruses. In particular, we utilize genetic data to learn how pathogen populations respond to the selective pressures exerted by the host immune system or antimicrobial drugs. By comparing genetic data derived from historical samples and/or comparing pathogens genomes, we expect to provide information regarding which types of parasite populations/dynamics are most prone to the emergence of drug resistance or how genes	TU Main Campus	I am looking for highly motivated students who are interested in gaining research experience. A minimum of 3.7 GPA is required. Basic knowledge on biology (transcription/translation; DNA structure and replication) and analytical/computational skills will be considered as selection criteria. Programming at a basic level is considered a plus, but it is not required.	Biology, Biochem, Applied Mathematics, Natural Sciences	Freshman or sophomore	

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Ananias Escalante	Ananias.Escalante@temple.edu	CST	Biology	Genetic diversity of vector borne pathogens/parasites.	I am looking for highly motivated students who are interested in gaining research experience. A minimum of 3.7 GPA is required. Students should interview with the PI. Our expectation is that the selected candidates will continue to work with us after the summer. Traditionally, undergraduate students appear as co-authors in per-reviewed publications.	Main Campus	Basic knowledge on biology (transcription/translation; DNA structure and replication) OR analytical/computational skills will be considered as selection criteria.	Biology, Natural Sciences, Math (applied) and Computer Sciences - BIOL 2112	Sophomore or Junior, Freshman could be considered	
Anduo Wang	adw@temple.edu	CST	CIS	A Consistent SDN Management Plane with Logic Reasoning	My research interests center around improving networked-systems with database techniques and formal methods. My current research projects focus on software-defined networks (SDN).	Main Campus	good math, programming with Python, some understanding of networking and database	computer science	seniors	
Ann Valentine	ann.valentine@temple.edu	CST	Chemistry	Bioinorganic Titanium Chemistry	The Valentine Lab is interested in hydrolysis-prone metal ions of biological relevance. The student will investigate possible ligand systems for stabilization of titanium(IV) in a water environment, will make and characterize new inorganic coordination compounds, and will evaluate their interactions with biomolecules	TU Main Campus	intelligence enthusiasm conscientiousness - will teach skills necessary	chemistry biochemistry	Sophomore, Junior	
Bassel E Sawaya	sawaya@temple.edu	TUSM	Neurology/Fels Institute	Can HIV-1 proteins promote premature brain aging	Patients infected with HIV-1 suffer from learning and memory deficit. The mechanisms leading to these alterations remain unknown. We are in the process of deciphering these mechanisms	TU Health Science Campus	Ask, Learn, Enjoy, - Serious, ability to learn and to interact with others 1- Someone who is serious, ready to learn. If the students does not have any lab experience, this will not work against him/her. Our mission is education and we are ready to help the student to require the min and necessary	All	Sophomore, Junior, Senior	

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Beata Kosmider	tug28074@temple.edu	TUSM	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 person will be involved in planning experiments with a research group, preparing samples for DNA isolation and analyze sequencing results. We will meet at least once every week to discuss this project.	TU Health Science Campus		Biology or Biochem		
Beata Kosmider	tug28074@temple.edu	TUSM	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	TU Health Science Campus		Biology or Biochem		

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Benjamin Seibold (new)	seibold@temple.edu	CST	Mathematics	Traffic flow control via autonomous vehicles	In the near future, a few self-driving cars will enter our highways. In a cross-disciplinary multi-university project, we are exploring ways to use those few robotic cars to dissipate and prevent stop-and-go traffic waves and thus render the flow safer and more fuel-efficient. Our research team here at Temple University develops mathematical models for human driving, which are crucial for simulations of future mixed human-robot traffic flows. Possible URP research involvement includes: development of better data-fitted models for human driving; implementing novel models in simulation environments; implementing	TU Main Campus	Basic programming skills (ideally Matlab, or another scripting language). Math 1042 Is required	Mathematics, Physics, Computer Science	Sophomore, Junior, Senior	8-12
Bernd Surrow	surrow@temple.edu	CST	Physics	Automated Leakage Current Measurements	This project requires a lot of hands-on lab time. The student will develop a graphical user interface (GUI) via MATLAB/LABVIEW that can interact with the measurement devices, which supplies a voltage to a micropattern detector and reads the resulting current. The GUI will then be automated to record the voltage and current at a specific frequency, and plotting the values as a function of time. Applications concern the design of new detector systems for a future electron-ion collider (EIC) in the US and medical imaging applications.	TU Main Campus		Physics or Math	Sophomore, Junior, Senior	

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Bettina Buttaro	bbuttaro@temple.edu	TUSM	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 resistance genes to bacteria in mixed species biofilms.	TU Health Science Campus	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 and interpret their data.	chemistry/biochemistry and biology		
Bettina Buttaro	bbuttaro@temple.edu	TUSM	Microbiology and Immunology	Antibiotic Resistance Gene Transfer Mediated by Enterococcus faecalis plasmid pCF10.	The plasmid makes helps make E. faecalis antibiotic resistant and virulent. Current biochemistry projects focus on characterizing how oxidative stress increases the number of plasmids in the bacterial cell. The biology projects focus on how the plasmid transfers antibiotic resistance genes to other bacteria in mixed species biofilms.	TU Health Science Campus	introductory biology or chemistry courses are sufficient	Chemistry and Biology	Any	
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 (www.biodiversitycenter.org) and the PI's lab is www.hedgeslab.org.	TU Main Campus	strong academics	normally biology but could be any major	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	TU Main Campus	strong academics	normally biology but could be any major	Sophomore,Junior	
Bo Ji	boji@temple.edu	CST	CIS	Timeliness optimization in information-update systems	Timeliness optimization in information-update systems	TU Main Campus		CIS/Math/ECE	Juniors & Seniors	
Bo Ji	boji@temple.edu	CST	CIS	System and Application Development for Internet of Things	Develop Internet of Things applications and systems based on Android platform.	TU Main Campus		CIS/Math/ECE	Junior	
Bojana Gligorijevic	bojana.gligorijevic@temple.edu	Engineering	BioEngineering	Real-time imaging of cancer cell motility in the context of complex environments	Student would use multiphoton and confocal fluorescent microscopes to image cancer cells labeled with 3 different fluorescent proteins. The goal is to compare how motility of cells relates to cell cycle stage distribution in 3D cellular spheroids embedded in collagen matrix. We hypothesize that cells which are	TU Main Campus	use of microscopes, sterile cell culture, cell transfection and transduction, PCR, microarrays, immunofluorescence or histology	biology	seniors	
Bojeong Kim	bkim@temple.edu	CST	Geology	Phytotoxicity of metal oxide nanoparticles	Ecological toxicity of nano-sized materials hasn't been thoroughly evaluated. Through this project, plant toxicity of metal oxide nanoparticles will be systematically examined.	TU Main Campus	I will train students for proper skills that need for the project. No skills needed.	Geology, Environmental Science, Chemistry, Biology	Sophomore or Higher	
Brad Rothberg	rothberg@temple.edu	TUSM	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.	TU Health Science Campus	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	

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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.	TU Main Campus	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 taken or concurrent with first semester on project)	Sophomore, Junior or Senior	
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	TU Main Campus	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	Sophomore, Junior or Senior	

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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 of data collection in hot	TU Main Campus 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 sometimes difficult field conditions. Math and science courses relevant to the research topics.	Biology, Environmental Science, Mathematics, or related fields		
Brent Sewall	bjsewall@temple.edu	CST	Biology	Regional and global patterns of threat to biological diversity and the identification of large-scale spatial conservation priorities	Biological diversity is under threat from a variety of local- and global-scale threats, including land use change, climate change, and invasive species. Ecologists and conservation biologists have worked for decades to document patterns of biological diversity and the threats facing biological diversity from the tropics to the poles. Recently, the results of some of these efforts have been compiled into several new spatially-explicit regional and global datasets. We will use these datasets, along with Geographic Information Systems software, to investigate large-scale patterns of biodiversity and change, and to identify spatial priorities for conservation action to protect the Earth's biological diversity.	TU Main Campus	Coursework, training, or experience in relevant subjects such as Geographic Information Systems (GIS), remote sensing, statistics, ecology, or conservation biology. Also strong motivation for research and strong interest in this topic.	Biology, Environmental Science, or related - Geographic Information Systems (GIS) course (already taken or concurrent with first semester on this project) required. Intro Bio series (Bio 1111 and 2112),	Sophomore, Junior or Senior	

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Bruce Vanett	Bruce.Vanett@tuhs.temple.edu	TUSM	Orthopaedic Surgery and Sports Medicine	Study of Risk Factors for Bleeding in Knee Arthroplasty Patients	In this study, we will review medical record of knee arthroplasy patients and collect the transfusion information and other clinical information including pre-transfusion hemoglobin, and other factors which possibly associated with bleeding. Then we will analyze the data to identify the risk factors for bleeding during knee arthroplasty. Based on our results, we will revise our criteria for ordering blood before the knee arthroplasty and to decrease unnecessary requests for blood before surgery.	TU Health Science Campus		Biology	Sophomore or Junior	
C. J. Martoff	martoff@temple.edu	CST	Physics	Position Sensitive Scintillation Detector With SiPM Readout	A two- dimensional scintillation light readout is required for an API-120 neutron generator. The generator will be deployed as part of the calibration system of the DarkSide experiment at LNGS, Italy. The readout involves electronics and software creation for an SiPM or MA-MCP	TU Main Campus				
Cagla Tukel	ctukel@temple.edu	TUSM	Microbiology and Immunology	Innate immune recognition of bacterial amyloids	Amyloids, complex proteins with a conserved beta sheet structure (1-4), are associated with complex diseases including, Alzheimer's disease, Prion Diseases and Type II diabetes. Bacteria uses amyloids to decorate the extracellular matrix of biofilms, highly	TU Health Science Campus	pipetting, agarose gel electrophoresis, SDS-PAGE	Biochemistry, biology and chemistry	Juniors	
Chiu C. Tan	cctan@temple.edu	CST		Early stage Alzheimer's Disease detection	The project will involve experimenting with human movement date to identify symptoms that are suggestive of Mild Cognitive Impairment (MCI), the precursor for Alzheimer's Disease.	TU Main Campus	Some knowledge of Matlab, R, or some other statistical package	CS, Physics, Mathematics, Statistics, Chemistry, Biology	Junior, senior	
Christian Schafmeister	Christian.schafmeister@temple.edu	CST	Chemistry	Software for materials design	Assist in the development of CANDO, a programming environment for designing new medicines, catalysts and molecular devices.	TU Main Campus	Chemistry or Computer Science background	Chemistry or Computer Science	Sophomore, Junior or Senior	

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Dale Haines	dale.haines@temple.edu	TUSM	Fels Institute for Cancer Research	Finding Tet2 interacting proteins	TET2 is emerging as an important tumor suppressor in a variety of cancers, including in leukemias. Through three consecutive oxidation reaction, TET2 converts 5-methylcytosine into 5-hydroxymethycytosine, 5-formylcytosine, and 5-carboxylcytosine. 5-carboxylcytosine can then be converted to cytosine by the base excision repair pathway. The current paradigm is that loss of function TET2 mutations results in DNA hypermethylation, leading to suppression of gene expression and tumor development. We currently have a poor understanding of the nature of genes and regulatory elements that are under the control of TET2 and ways in which TET2 is targeted to DNA. Preliminary data presenting here comparing the epigenome of leukemic cells harboring wild-type (wt) versus TET2 mutations indicate that loss of TET2 function does not alter global methylation, but methylation of specific non-CpG island enhancer elements. As TET2 does not harbor a sequence specific DNA binding domain, it is hypothesized that recruitment to these enhancer elements is dependent on associations with cofactors that interact with	TU Health Science Campus		Biology, Biochemistry, Chemistry	Sophmore, junior	
Daniel Strongin	dstrongi@temple.edu	CST	Chemistry	Reactivity of Pyrite and Acid Mine Drainage	The iron sulfide, pyrite, is found at active and abandoned coal mining sites. Its decomposition in the environment leads to acid mine drainage (sulfuric acid generation) which is a significant problems for coal mining companies and the surrounding environment. The goal of the project is to look into strategies to suppress the oxidation of pyrite and the resulting acid generation.	TU Main Campus	Motivation Academic performance - Introductory Chemistry Courses with Laboratory.	Chemistry ESS		

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Darius Balciunas	darius@temple.edu	CST	Biology	Precision genome editing using	Unlike humans, zebrafish possess a remarkable regenerative capacity, including the ability to regenerate their hearts after severe injury. We	TU Main Campus	For more information, please see the lab website	Biology, Biochemistry	Sophomore or Junior	
Dong Zhou (new)	dzhou@temple.edu	CST	Mathematics	Highly accurate computational methods for time evolution problems.	A wide variety of practical applications, including fluid flows, quantum physics, heat and neutron transport, materials science, and many complex multi-physics problems, require the numerical simulation of models that involve a time evolution. This time evolution must be performed in a way that the high accuracy of modern computational methods is retained. However, many existing approaches for time evolution lead to less accurate results than the theory predicts. In this project, the	TU Main Campus	Must have completed Calculus II (Calculus III and Differential Equations are preferred, but not required).	Mathematics, Physics, Computer Science	Junior, Senior	10 to 15
Douglas Tilley (new)	douglas.tilley@temple.edu	TUSM	Center for Translational Medicine	GPCR modulation for cardiovascular therapeutics	The project will aim to differentiate the molecular and functional impact of distinct G protein-coupled receptor (GPCR) signaling outputs in cardiomyocytes and/or cardiac fibroblasts in response to novel compounds.	TU Health Science Campus	Basic cell and molecular biology knowledge and skills. Critical thinking, enthusiasm and willingness to work with others.	Biology, Biochemistry or Chemistry	Sophomore, Junior, Senior	10-15
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).	TU Main Campus	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.	TU Main Campus	Good programming and analytic skills. Ideally, a student who would like to pursue grad studies.	Math, CS, ECE	Sophomore, Juniors, Seniors	

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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	TU Main Campus	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.	TU Main Campus	Interest in research - Aptitude for careful laboratory research	Chemistry Physics	Sophomore or Junior	
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	TU Main Campus	Interest in research - Aptitude for careful laboratory research	Chemistry	Sophomore or Junior	

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Erik Cordes	ecordes@temple.edu	CST	Biology	Molecular stress response of deep-sea corals	Field studies and laboratory experiments have revealed the effects of various anthropogenic stressors (ocean acidification, oil and dispersant exposure) on deep-sea corals. The next step is to identify the molecular markers that underlie these responses. Once identified, these may reveal the potential for corals to be resilient to stress, or for use as biomarkers to identify stressed populations in future incidents. The research scholar(s) would be responsible for processing samples in the laboratory for a combination of physiological measures (protein/lipid analysis, enzyme activity, etc.) and genetic analyses (qPCR, RNAseq) that will contribute to our research on the effects of human impacts on the deep sea.	TU Main Campus	Students who are interested in pursuing graduate school in the natural sciences, ecology and evolution.	Biology and environmental science majors are preferred, but the position would be open to other students as well.		
Erik Cordes	ecordes@temple.edu	CST	Biology	Molecular stress response of deep-sea corals	Field studies and laboratory experiments have revealed the effects of various anthropogenic stressors (ocean acidification, oil and dispersant exposure) on deep-sea corals. The next step is to identify the molecular markers that underlie these responses. Once identified, these may reveal the potential for corals to be resilient to stress, or for use as biomarkers to identify stressed populations in future incidents. The research scholar(s) would be responsible for processing samples in the laboratory for a combination of physiological measures (protein/lipid analysis, enzyme activity, etc.) and genetic analyses (qPCR, RNAseq) that will contribute to our research	TU Main Campus	Students who are interested in pursuing graduate school in the natural sciences, ecology and evolution.	Biology and environmental science majors are preferred, but the position would be open to other students as well.		

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Fabio A. Recchia	fabio.recchia@temple.edu	TUSM	Physiology	New pharmacological and biological therapies for heart failure and atrial fibrillation	The general aim of this project is to identify new pharmacological and biological agents for the therapy of heart failure and atrial fibrillation in experimental dog models. These are two major pathological conditions that affect millions of Americans and there is a pressing need for new therapies. Research in large animal models is called "pre-clinical" in that the related discoveries can be rapidly translated into clinical practice.	TU Health Science Campus	Interest in the biomedical field and potential interest in future medical studies. At least the basic courses of biology	biology, bioengineering, biochemistry, kinesiology		
Fabio Recchia	fabio.recchia@temple.edu	TUSM	Physiology	New pharmacological and biological therapies for heart failure and atrial		TU Health Science Campus				

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Flavio Rizzolio	rizzolio@temple.edu	CST	Biology	The role of Pin1 in tumor growth	Normal cells became tumor cells through deregulation of multiple pathways. There are some pathways that are altered in many tumors and RB and p53 pathways are one of the most important. These proteins are regulated during carcinogenesis by a phosphorylation mechanism. Ser or Thr followed by Pro are major phosphorylation motifs in the cells but their significance was obscure until the discovery of the PIN1 protein (protein interacting with NIMA (never in mitosis A)- 1). Pin1 is an isomerase specific of pSer/Thr-Pro motifs that catalyzed the conformational switch from cis to trans, which is especially important because Pro-directed kinases and phosphatases are conformation-specific and act only on the trans conformation. In vivo and in vitro data have demonstrated that Pin1 is involved in many aspects of cell cycle control. PIN1 was originally identified and defined as a protein that function in mitosis. Since than, a plethora of protein targets have now been discovered many of which are involved in the G0, G1/S control.	TU Main Campus	For Junior: interest in interdisciplinary research; basic knowledge of molecular and cellular Biology or basic knowledge of optical microscopy or basic knowledge in bio-chemistry and basic tools for the quantification of protein and nucleic acids concentrations - motivation; learning capability; team working; interest to obtain scientific results	Biology, Pharmacology, Chemistry. - Chemistry I, Chemistry Lab I, Chemistry II, Chemistry Lab II, Biology I, Biology Lab I.	Sophomore, Junior	
Frank Spango	spano@temple.edu	CST	Chemistry	Photophtsical Properties of Histochemical Dye Aggregation		TU Main Campus		Chemistry		

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George A. Petersson (new)	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 within ±0.27 kcal/mol rms error. We are now developing density functional methods covering the elements H through Kr for the geometry (±0.011 Å which corresponds to ±0.065 kcal/mol rms error in the energy), zero-point-energy (±0.063 kcal/mol rms error), scalar relativistic	Main Campus	The undergraduate research participant should have a basic knowledge of quantum mechanics and computer programing.	Chemistry, Physics, Computer Science	sophomores or Juniors	10

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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 the program GassView, and learn to run the program Gaussian16 on the Owl's Nest Custer at Temple	TU Main Campus	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	
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.	TU Main Campus	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	

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George Smith	george.smith@temple.edu	TUSM	Shriners Hospitals for Pediatric Research/Neuroscience	Transplantation of neural stem cells to promote circuit relays in the injured spinal cord.	The prospects of inducing long-distance functional regeneration of supraspinal tracts leading to connectivity and restoration of function remain a challenge. However, selective treatments induce sprouting, prevent dieback, or induce short distance regeneration. These processes, particularly sprouting, contribute to spontaneous recovery after injury by forming relays onto propriospinal interneurons that bypass the lesion and connect to caudal locomotor centers. Similarly, transplantation of neural stem cells or fetal spinal cord tissue into the lesion site is thought to increase functional recovery by recruiting supraspinal and propriospinal inputs to reinforce relays to downstream motor targets. To date, some of the best functional recovery has been observed in fetal transplants into neonatal animals most likely through formation of such relays. In adults, the addition of neurotrophins to the transplant site enhanced the number of ingrowing supraspinal and propriospinal axons and enhanced functional recovery, possibly by forming relays to bypass	TU Health Science Campus	Basic understanding of stem cells, immunochemistry, and molecular biology	Neuroscience, Biology, or Chemistry	Juniors or Seniors	

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Gianfranco Bellipanni	bellipa4@temple.edu	CST	Biology	Role of Beta-Catenin in Zebrafish Development and Cancer	In our laboratory we are interested to study the molecular and cellular mechanisms leading to the induction and specification of D/V patterning in the zebrafish embryo via Wnt/ Beta-catenin activity. During our previous research we have identify the gene responsive for the maternal recessive mutation ichabod (ich) in a second beta-catenin gene (beta-cat2) (Bellipanni et al. 2006). Beta-catenin plays essential roles in cellular physiology being the pivotal player for Ca+-dependent cell-cell adhesion and for transduction of Wnt signaling. In the cytoplasm b-catenin interacts with alpha-catenin and type I cadherins mediating cell-cell adherence junctions adhesion, but, in response to Wnt signaling, it	TU Main Campus		Biology or Chemistry	Sophomore, Junior	
Gillian Queisser	gillian.queisser@temple.edu	CST	Mathematics	Simulating networks of brain cells under synapse loss	The student researcher will get to know novel simulation tools to simulate neural networks and use these tools to investigate the behavior of networks when connections between cells, so called synapses, are lost. This effect is common in diseases like Alzheimer's and identifying ways for cells to compensate synapse loss is of great importance. The focus of this project is to systematically simulate network behavior under various neuro-degenerative conditions with the goal of identifying cellular components that can compensate synapse loss.	Main Campus	Programming skills (scripting language and/or object-oriented language) are a plus.	Mathematics, Computer Science, Biology	Juniors or Seniors	

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Gillian Queisser	gillian.queisser@temple.edu	CST	Mathematics	Modeling and Simulation of Calcium Dynamics in Healthy and Diseased Neurons	In this project the student researcher will use novel simulation tools to simulate and evaluate the dynamics of calcium signals in neurons. Calcium is one of the most important molecules in neuronal signaling and is implicated in multiple ageing-related neurodegenerative diseases. The project will focus on systematically simulating cell-calcium dynamics under the influence of calcium regulating parameter sets representing healthy and disease-state neurons. The goal is to identify critical components in the calcium signaling cascade towards and into the cell nucleus, which eventually give rise to new	Main Campus	Programming skills (scripting language and/or object-oriented language) are a plus.	Mathematics, Computer Science, Biology	Juniors or Seniors	
Gillian Queisser (new)	gillian.queisser@temple.edu	CST	Mathematics	Investigating biofilm dynamics	In a collaboration with Bettina Buttaro (Temple Medicine), imaging data will be used to study the dynamics of cell movement within biofilms. These dynamics are very important in human function and spatio-temporal dynamics at the ultrastructural level not yet well understood. In this project the student researcher will get to know novel computational tools to study biofilm dynamics and collaborate on an interdisciplinary project combining mathematical methods and medical imaging.	Main Campus	Programming skills (scripting language and/or object-oriented language) are a plus. CHEM 3302, or PHYS 2796 or PHYS 3701	Mathematics, Computer Science, Biology	Juniors or Seniors	2-8

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Giordano Tierra Chica (new)	GTIERRA@TI	CST	Mathematics	Complex fluids and its applications in life sciences	In this project we are interested in studying systems of PDEs that govern the behavior of complex fluids, with special emphasis on models related with dynamics of biofilms and tumors. This study will focus on modeling (proposing new models or combining models already presented on the literature), numerical analysis (proposing/studying numerical schemes) and simulations (effective implementation and comparison with other numerical and experimental results that can be found on the literature).	TU Main Campus	Interest in applied mathematics	Mathematics, Computer Science, Biology, Physics, Engineering	Seniors	10 to 15
Glenn S. Gerhard	tuf81289@temple.edu	TUSM	Medical Genetics and Molecular Biochemistry	A new thyroid cancer gene.	Cellular hydrogen peroxide is associated with cancer, although the source(s) and precise role remains unclear. We have identified a candidate cancer gene in a family with a highly penetrant dominant form of papillary (non-medullary) thyroid cancer. A predicted damaging mutation in a transmembrane domain segregated with papillary thyroid cancer in the family. We hypothesize that the transmembrane mutation causes mis-localization of the protein to the cytoplasm with inappropriate intra-cellular production of hydrogen peroxide that subsequently leads to the development of papillary thyroid cancer in carriers of the mutation. Our aims are to determine whether the mutation causes oxidative stress in vitro and thyroid cancer in zebrafish and mice.	TU Health Science Campus	Team oriented Prior laboratory experience Science GPA --If you work with zebrafish, be prepared to get wet!	Biochemistry Biology Chemistry		

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Grace Ma	grace.ma@temple.edu	TUSM	Center for Asian Health & Clinical Sciences	Cancer, CVDs, Diabetes-Ethnic populations	We have over 18 ongoing studies focusing on Cancer, CVDs, diabetes in underserved ethnic minority popualtions to reduce health disparities in clinical and community settings. Go to "medicine.temple.edu/cah"	TU Health Science Campus	Good writing skills; be able to work independently and team player, motivated and reliable.	Any fields, with health science interests preferred	Sophomore, Junior or Senior	
Graham Dobereiner	dob@temple.edu	CST	Chemistry	Exploring the influence of Lewis Acids on Organometallic Compounds	Organometallic complexes, which feature metal-carbon bonds, underpin key catalytic reactions in chemical industry. This project will explore the synthesis of new complexes using air-free technique, and investigate the reactivity of these complexes in new chemical reactions.	TU Main Campus	Prior classroom laboratory experience (General Chemistry, and preferably Organic Chemistry).	Chemistry		

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Gregory Smutzer, Ph.D.	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 by means of threshold studies, whole mouth suprathreshold taste	TU Main Campus	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	
Gregory Smutzer, Ph.D.	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	TU Main Campus	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 in science.	Biochemistry - A year of General Biology. Biology Chemistry	Sophmore, Junior or Senior	

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He Wang	He.Wang@tuhs.temple.edu	TUSM	Pathology & Lab Medicine	Compare microvascular disease in right and left ventricular wall at different time after heart transplantation	Despite significant improvement in short term survival, cardiac allograft vasculopathy (CAV) remains the major cause of death in late survival transplanted patients. The definition of cardiac microvessel varies between authors, but a vascular diameter < 20 um is believed to be “micro-” by most investigators. Coronary microvascular bed is the site where myocardial blood flow is tightly adjusted to meet myocardial metabolic needs. Coronary microvascular dysfunction is well documented in hypertension, obesity, diabetes, acute myocardial infarction, chronic stable angina, cardiomyopathies and heart failure with	TU Health Science Campus	Dedicated - previous exposure to histology and morphometric analysis are preferred/not absolutely necessary	biochemical science or neuroscience	Junior or Senior	
Hong Wang	hongw@temple.edu	TUSM	Center for Metabolic Disease Research	Homocysteine and Cardiovascular Disease	The objective of project is to study how hyperhomocysteinemia (HHcy, is a medical condition characterized by an abnormally high level of homocysteine in the blood, conventionally described as above 15 µmol/L.) causes atherosclerosis. Since atherosclerosis is a pathological characteriostics of cardiovascular disease, which is the number one killer in the United States and developed contries. HHcy is the identified independent risk factor for CVD. However, the unberlying mechnism is unknown and ecffective therapeutis approaches are not available. Our laboraory is the leading laboratory in	TU Health Science Campus	Motivation, carefulness - Students who completed sophomore year.	Biology		

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Hong Wang	hongw@temple.edu	TUSM	Center for Metabolic Disease Research	Mechanism of metabolic disorder-induced cardiovascular disease, DNA methylation, monocyte and stem cell differentiation, vascular inflammation and repair.	Cardiovascular disease is the number one killer in the developed countries, but the mechanism remains largely unknown. Dr. Wang's laboratory is focused on exploring molecular and biochemical mechanisms contributing to cardiovascular disease. The Wang lab has extensive expertise in the areas of cardiovascular inflammation, atherosclerosis, vascular function, molecular mechanism, and signal transduction. UPR studies will use bioinformatics, cell biology and molecular biochemical approaches to assess the potential fundamental mechanisms. We will examine monocyte differentiation	TU Health Science Campus	GPA greater than 3.4, Cell culture or Protein biochemistry , Hard working and dedicative	Biology, Biochemistry, Computer Science	Junior	
Ilker K Sariyer	isariyer@temple.edu	TUSM	Neuroscience	Neuroimmune regulation of JC virus gene expression in glial cells	Patients undergoing immune modulatory therapies for the treatment of autoimmune diseases such as multiple sclerosis, and individuals with an impaired-immune system, most notably AIDS patients, are in the high risk group of developing progressive multifocal leukoencephalopath (PML), a fatal demyelinating disease of the white matter caused by human neurotropic polyomavirus, JC virus. We employ multidisciplinary strategies to determine molecular mechanism of JC virus reactivation during the latent period of viral infection. JC virus replicates almost exclusively in glial cells, and its promoter	TU Health Science Campus		Biology, Chemistry, Neuroscience - Previous experience in biochemical lab techniques preferred.	Sophomore,Junior,senior	
Ilker K. Sariyer	isariyer@temple.edu	TUSM	Neuroscience	Molecular regulation of JC virus reactivation in the brain.	Patients undergoing immune modulatory therapies for the treatment of autoimmune diseases such as multiple sclerosis, and individuals with an impaired-immune system, most notably AIDS patients, are in the high risk group of developing progressive multifocal leukoencephalopathy (PML), an often lethal disease of the brain characterized by lytic infection of oligodendrocytes in the central nervous system (CNS). Immune system plays	TU Health Science Campus	Talented with good work ethics,	Biology Pharmacy	Sophomore, Junior, Senior	

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Ilya Buynevich	coast@temple.edu	CST	EES/Geology	Neoichnology: Imaging of Animal Traces in Coastal Sediments	Analysis of modern structures (casts) and georadar images of several large organisms (crustaceans, reptiles) that produce bioturbation structures (burrows, nests) in coastal settings (beaches and dunes). The findings will have implications to geomorphology, sedimentology/stratigraphy, petroleum geology (macroporosity), geoarchaeology, geoforensics, and	TU Main Campus	Ability to work both independently and as part of a research team, with a possibility of field data collection. Computer skills (especially MATLAB preferred, but not required). Introductory	Geology, Environmental Science, Biology, Civil Engineering	Sophomore, Junior or Senior	
Italo Tempera	tempera@temple.edu	TUSM	Fels Institute for Cancer Research	Post-translation modifications of LMP1	LMP1 is an important viral protein that is expressed by Epstein-Barr virus, EBV, during latent infection. EBV is a human herpesvirus that infects B cells and establishes a persistent infection in 95% of the population worldwide. LMP1 plays an essential role in activating B cells and inducing cell proliferation. Targeting LMP1 is an important strategy that the host employs to counteract EBV infection. For	TU Health Science Campus	Must have completed Biol 1111	Biology or Biochem	Sophomore, Junior or Senior	
Jacqueline Tanaka	jtanaka@temple.edu	CST	Biology	Investigating ion channel mutations associated with complete color blindness.	My lab studies mutations in an ion channel protein expressed in cone photoreceptors that are associated with complete color-blindness in humans and day-blindness in dogs. The canine project is a collaboration with U Penn Vet school faculty.	TU Main Campus	I would like to recruit potential MARC students. The MARC U-STAR program provides mentoring and financial support for junior and seniors interested in PhD programs in biomedical science. We	Biology, biochemistry, chemistry, biophysics.		
Jacqueline Tanaka	jtanaka@temple.edu	CST	Biology	Investigating ion channel mutations associated with complete color blindness.	My lab studies mutations in an ion channel protein expressed in cone photoreceptors that are associated with complete color-blindness in humans and day-blindness in dogs. The canine project is a collaboration with U Penn Vet school faculty.	TU Main Campus	I would like to recruit potential MARC students. The MARC U-STAR program provides mentoring and financial support for junior and	Biology, biochemistry, chemistry, biophysics.		

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Jamie Payton	payton@temple.edu	CST	Computer and Information Sciences	Using sensors on wearable devices to detect health-related behaviors	Smartwatches and other wearable computing devices offer new opportunities for pervasive health and wellness applications that are responsive to the perceived state of the user and the surrounding environment. These commodity mobile devices support multiple forms of network connectivity (e.g, Bluetooth, WiFi) that can be exploited to share information and feature an array of on-board sensors (e.g.,heart rate monitor, light sensor, gyroscope, magnometer,accelerometer) that can be used to detect a user's physiological state, a user's actions, and the state of the	TU Main Campus	Programming (Java or C#); Completion of algorithms and data structures course; Exposure to statistics; Critical thinking	CS, IS&T, or Math CIS 2168, CIS 2033 (or equivalent), CIS 3223		
Jamie Payton	payton@temple.edu	CST	Computer and Information Sciences	Assigning Tasks to Ensure Coverage in Crowdsensing Applications	Mobile crowdsensing via smartphones enables mobile data collection on a massive scale and has been widely used to investigate scientific questions or address civic issues, such as public safety, traffic planning, and environment monitoring. Compared with static sensor networks, mobile crowdsensing leverages existing sensing and communication infrastructure without additional costs; provides unprecedented spatio-temporal coverage, especially for observing unpredictable events; and integrates human intelligence into the sensing and data processing. However, new challenges are introduced due to data quality, inconsistency, security, and privacy. This project focuses on	Main Campus	Programming (Java or C#) Completion of algorithms and data structures course Exposure to statistics Critical thinking	CS, IS&T, or Math CIS 2168, CIS 2033 (or equivalent), CIS 3223	No preference	

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Jie Wu	jiewu@temple.edu	CST	CIS	Cloud Computing	Various distributed computing projects and testing have been run on our computing cluster. We maintain a virtual computing platform in order to test our programs in different environments and virtual hardware. Similarly we maintain a hadoop installation for projects that involve large data sets. An example of project that included both of these installations was a project which aimed to select the best virtual machine size depending on what kind of algorithm was used in hadoop. Recently, we've installed SDN switches to allow us to virtualize the network as well. This opens up the doors to a lot of novel research in the rising field of SDN.	TU Main Campus		CIS/IST, Math,	Sophomore, Junior, Senior	
Jie Wu	jiewu@temple.edu	CST	CIS	Wireless Networks	This project will be supported under the GENI project involving transferring large amounts of video data wirelessly to a processing server. This research began with surveying the current research in this field to find out what was already done. Once we had an idea of related research, we tested the wireless networks available on campus including Wi-Fi, 4G LTE, and our lab's WiMAX tower located on the top of Wachman. After that, we formulated a couple different solutions which were implemented in Python using the POX software controlled networking (SDN) controller and Java using the Floodlight	TU Main Campus		CIS/IST, Math,	Sophomore, Junior, Senior	

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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 biodiversity contributes to ecosystem services.	TU Main Campus	Attention to detail, willingness to work outside, organized	Biology, Environmental Science		
Jocelyn Behm	jebehm@temple.edu	CST	Biology	Evaluation of "green" certification programs for biodiversity	Starbucks! Chipotle! Target! What do these companies have in common? They sell products with "green" certifications, but how green are they? This project involves evaluating "green" certification programs for how biodiversity is considered during the certification process.	TU Main Campus	Must be a creative, independent thinker with good attention to detail. Willingness to learn new skills	Anyone interested in both ecology and sustainability (biology, environmental science,		
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.	TU Main Campus	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	TU Main Campus	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	TU Main Campus	Freshmen and sophomores with interest in mathematical and computational biology	Biology/Math/Computer Science	Freshmen, Sophomores	
Joel Sheffield	jbs@temple.edu	CST	Biology	Analysis of microglia in retina and pecten	Immunohistochemical localization of specific antigens during development of the chick retina.	TU Main Campus	Electrophoresis, microscopy - Bio 3096 is a plus.	Biology	Junior & Senior	
John Elrod	elrod@temple.edu	TUSM	Center for Translational Medicine	Identification of novel sORFs in cardiovascular disease	It has recently become apparent that previous computational methods used to identify genes throughout the human genome likely missed a significant number of small genes (small open reading frames, sORFs) that encode micropeptides that likely play a very significant role in physiology and disease. The overall goal of this project is to discover new genes with novel functions and regulatory roles in cardiovascular disease. We have begun to establish a database containing all possible sORFs in the genome to prioritize our search for bona fide peptide encoding sORFs. In addition, we examining the differential expression of sORFs in disease starting with heart failure samples from two well	TU Health Science Campus	Priority placed on previously molecular biology laboratory experience. Motivated, hard-working individuals are a must.	Any	Freshmen, Sophomores - Junior or Seniors	

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John Muschamp -	John.muschamp@temple.edu	TUSM	Center of Substance Abuse Research - Pharmacology	Behavioral neuroscience research assistant in drug addiction and pharmacology studies	Under the supervision of graduate students; student will characterize the molecular and behavioral effects of the recently approved FDA drug suvorexant. Mice and rats will be used for behavioral paradigms to explore suvorexant's pharmacologic properties and effects on motivated behavior. Molecular studies will be conducted to elucidate physiologic effects on the neuropeptide system orexin and dynorphin. The goal of the project is to better understand the orexin and dynorphin system and consequently potential therapeutic avenues.	TU Health Science Campus	Prefer 6 month+ commitment - Basic lab math (dose calculations, percentages, dilutions) Comfortable with animal handling	Neuroscience, biochem, biology but other majors are welcome.	Sophomore, Junior	
Jonathan M. Smith	jonathan.m.smith@temple.edu	CST	Chemistry	High energy chemistry in combustion and the atmosphere	Molecules in extreme high energy settings are highly reactive as expected. Molecular reactions under these conditions can follow unique reaction pathways not possible at low energy including roaming radical pathways. Energized molecules emit light in the infrared providing a way to study these excited reactive molecules. This project will involve the study of energetic molecular reactions experimentally and computationally.	Main Campus	Enthusiasm for taking on supervised independent research. Skills can be learned as needed based on general chemical knowledge.	Chemistry, Biochemistry, Physics	All levels	

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Jonathan Soboloff	soboloff@temple.edu	TUSM	Fels Institute for Cancer Research	Modulation of calcium signaling by changes in STIM expression	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. Since Ca2+ signals typically occur in a time frame of seconds to minutes, how Ca2+ transients can regulate events that occur over hours to days is poorly understood. Recent investigations from our lab have led to the identification of Early Growth Response 1 (EGR1) as a regulator of the expression of STIM1, a required component of store-operated Ca2+ entry, the primary means of Ca2+ entry in non-excitable cells. A student working in my lab will	TU Health Science Campus	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, cloning and fluorescence microscopy.	Biology/Biochemistry	Sophomore, Junior or Senior	
Joshua Schraiber	joshua.schraiber@temple.edu	CST	Biology	Detecting inbreeding in ancient humans	We now have ancient DNA sequences from hundreds of early modern humans spanning the last ~50 thousand years of human evolution. Many of these individuals come from nearby sites (such as individuals buried at the same graveyard), raising the possibility that they are related to each other. The student will develop an algorithm that estimates the relatedness of ancient samples while accounting for genotype uncertainty due to low coverage sequencing data, and use it to determine how inbred humans were during the colonization of Eurasia.	Main Campus	Some programming, some math, willingness to bang head against hard problems BIOL 2112 OR MATH 1044 OR CIS 1057	Math, computer science	Juniors or Seniors	

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Faculty Name	Email Address	Faculty College	Faculty Department	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference	Hours per week
Jun Yu (new)	jun.yu@temple.edu	TUSM	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).	TU Health Science Campus	Basic cell and molecular biology techniques. Understanding of human physiology. Highly motivated and responsible.	Biology or pharmacology	Sophomore, Junior or Senior	12 and up
Justin Y. Shi	shi@temple.edu	CST	CIS	Digital Currency and Distributed Computing	The lack of robust security in physical assets fostered the research in distributed crypto systems like block-chains. It has been shown that trust in distributed computing is a better form of currency than the physical currencies. However, while double-spending can be eliminated by the use of block-chains, challenges still exist in preventing money laundering, theft and other forms of cybercrimes.	Main Campus	Basic knowledge of programming and cryptographic methods.	CIS, Physics, Math, Engineering - CIS 2168	Juniors or seniors	
Justin Y. Shi	shi@temple.edu	CST	CIS	Big Data in Healthcare Industry	The healthcare industry collects massive structured and semi-structured data with increasingly higher resolution (thus the volume). Making sense of these data can improve the efficiency and effectiveness of medicine and help manufacturers improve their research and development processes.	Main Campus	Basic Statistics Basic Economics Optional: Database SAS R	CIS, Math	Juniors or seniors	

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Faculty Name	Email Address	Faculty College	Faculty Department	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference	Hours per week
Kai Zhang (new)	tuh47866@temple.edu	CST	CIS	Brain Functional Networks and Human Intelligence	In this project, we are interested in unraveling the relation between the functional brain connections and the intelligence of a human subject. The former is reflected in a dynamic process recording the activities of human brains simultaneously over time, and the latter is a one-time score for evaluating the capacities of a human in terms of memory, judgement, reasoning, question answering, and many more tests. Advanced techniques in time series analysis and deep learning will be the key driving tool for discovery.	Main Campus	(1) basic knowledge in data mining, good skill in linear algebra (2) good knowledge and intuition in time series analysis, graph/network (3) programming skills (such as matlab, python) (4) knowledge and/or experience of programming in deep networks	CS, Statistics, Math	Seniors	12
Karen B. Palter	palter@temple.edu	CST	Biology	Does hyperinsulinemia affect the basal and induced levels of Upd2 (leptin) in Drosophila?	Patients who are obese are at an increased risk of developing metabolic syndrome, characterized by impaired glucose tolerance, abnormal plasmid lipids, hypertension and development of Type II diabetes. Our laboratory has shown that Drosophila melanogaster lacking a functional sialic acid pathway display a range of metabolic defects, that are similar to those observed in patients with Type II diabetes. We have demonstrated that one target of sialylation is a potassium channel in the nervous system. We propose that the metabolic defects are a result of	TU Main Campus	Motivation, interest in project and academic accomplishment. Quick learner, careful and good at quantitiative skills.	Bio, Biochem or Neuroscience - Completed Biology 1111 and 2112	Sophomore, Junior or Senior	
Karen B. Palter	palter@temple.edu	CST	Biology	Is there a functional sialic acid pathway in the insulin producing cells (IPCs) of Drosophila?	Our laboratory has previously shown that Drosophila melanogaster lacking a functional sialic acid pathway display a range of metabolic defects, that are similar to those observed in patients with Type II diabetes. We have demonstrated that one target of sialylation is a potassium channel in the nervous system. We hypothesize that the	TU Main Campus	Motivation, interest in project and academic accomplishment. Quick learner, careful and good at quantitiative skills.	Bio, Biochem or Neuroscience - Completed Biology 1111 and 2112	Sophomore, Junior or Senior	

Spring 2018 URP Faculty Projects

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Karen Palter	palter@temple.edu	CST	Biology	Investigating the mechanism of insulin resistance in Type II diabetes	Our laboratory has previously shown that Drosophila melanogaster lacking a functional sialic acid pathway display a range of metabolic defects. We hypothesize that the metabolic defects are a result of excess insulin secretion from the insulin producing cells (IPC). We have generated transgenic flies carrying an ectopic copy of the sialic acid synthase gene (SAS) under a Dilp2 (insulin promoter) that is active only in IPC cells. Fly strains were generated that have this transgene in a SAS2d/2d background (null for SAS) and therefore will express the sialic acid synthase only in IPC cells. All transgenic flies are male	TU Main Campus	Motivation and interest in research. Biology 2112	Biochemistry or Biology		
Katherine (Kallie) Willets	tuf79482@temple.edu	CST	Chemistry	Using light and nanoparticles to destroy pollutants	Breaking down organic pollutants into smaller, less harmful molecules is a major challenge in water remediation projects. Titania nanoparticles have been shown to catalyze this process by using light to initiate the reaction. However, titania only absorbs ultraviolet light, leaving a large range of the solar spectrum unused. We are using titania nanoparticles attached to gold nanoparticles, which allows us to capture more of the solar	TU Main Campus	good attitude, willingness to learn and ask questions	chemistry, physics	Sophomore, Junior, Senior	
Katherine (Kallie) Willets	tuf79482@temple.edu	CST	Chemistry	Using light and nanoparticles to destroy pollutants	Breaking down organic pollutants into smaller, less harmful molecules is a major challenge in water remediation projects. Titania nanoparticles have been shown to catalyze this process by using light to initiate the reaction. However, titania only absorbs ultraviolet light, leaving a large range of the solar spectrum unused. We are using titania nanoparticles attached to gold nanoparticles,	TU Main Campus	good attitude, willingness to learn and ask questions	chemistry, physics	Sophomore, Junior, Senior	

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Katherine Willets	kwillets@temple.edu	CST	Chemistry	Fabricating noble metal nanoparticle arrays for applications in molecular plasmonics	In this project, students will fabricate nanodisk and nanohole arrays for applications in plasmonics and electrochemistry. For the nanodisk arrays, block copolymers consisting of polystyrene and polymethylmethacrylate (PS-b-PMMA) are spun coat onto substrates and allowed to self-assemble such that the sample yields PMMA cylinders in a PS background. Next, the PMMA is removed and metal is deposited into the remaining holes in the PS mask. Once the PS is removed, an array of nanodisks remain behind. For nanohole arrays, PS nanospheres self-assemble into a hexagonal closed packed array on a substrate. The nanospheres are reduced in size via	TU Main Campus	Patient and self-motivated. At least two lab courses.	Chemistry		
Katherine Willets	kwillets@temple.edu	CST	Chemistry	Fabricating noble metal nanoparticle arrays for applications in molecular plasmonics	In this project, students will fabricate nanodisk and nanohole arrays for applications in plasmonics and electrochemistry. For the nanodisk arrays, block copolymers consisting of polystyrene and polymethylmethacrylate (PS-b-PMMA) are spun coat onto substrates and allowed to self-assemble such that the sample yields PMMA cylinders in a PS background. Next, the PMMA is removed and metal is deposited into the remaining holes in the PS mask. Once the PS is removed, an array of nanodisks remain behind. For nanohole arrays, PS nanospheres self-assemble into a hexagonal closed packed array on a substrate	TU Main Campus	Patient and self-motivated. At least two lab courses.	Chemistry		

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Ke Chen	kchen@temple.edu	CST	Physics	Superconducting devices for high performance sensors and circuits	Superconductors are superior materials for devices with phenomenal performance compared to normal materials due to their zero dc electric resistivity and other unique quantum properties. This project will focus on fabricating and characterizing MgB2 (an amazing superconductor) devices for high-speed circuits and high-sensitive magnetic field sensors. These applications are the current interest in defense, industrial, and many other areas.	TU Main Campus	Skillful in carry out experiments in a lab. Familiar with electronics and material sciences. Interested in solving problems. General Physics I and II (either calculus based or not)	Physics, Electric engineering, Chemistry		
Krishna Kant	kkant@temple.edu	CST	CIS	Collaborative caching in content centric networks	The project will involve simulation study of a computer network designed for distributing content such as audio/video that is widely accessed and may have varying levels of demands from different parts of the network. The purpose of the simulation is to study various collaborative policies for caching the content.	TU Main Campus	The project would need good programming skills, exposure to discrete-even simulation, and basic background in computer networks.			
Krishna Kant	kkant@temple.edu	CST	CIS	Reliability prediction of large scale storage systems	This project involves analysis of data collected from storage systems and its characterization relative to the observed errors that can be used for reliability prediction of the storage system.	TU Main Campus	The project would need good programming skills, exposure to discrete-even simulation, and basic background in computer networks.			

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Laura Goetzl	laura.goetzl@tuhs.temple.edu	TUSM	Obstetrics & Gynecology	Novel noninvasive sampling of fetal neurodevelopment through fetal derived neuronal exosomes in maternal blood.	There has been limited methods for assessing fetal neurodevelopment during gestation in human in-vivo models. Our new methodology allows us to elucidate what elements of abnormal neural development can be detected in the maternal bloodstream.	TU Health Science Campus	Advanced, motivated, interested in research	Neuroscience, Biology, Pharmacy, Medical, Psychiatry, Gynecology	Juniors & seniors	
Laura Goetzl	laura.goetzl@tuhs.temple.edu	TUSM	Obstetrics & Gynecology	Placental Serotonin Transporter (SERT) is Modified by Maternal Opioid Exposure: Implications for Altered Fetal Vulnerability with Multi-Substance Use	In the placenta, SERT transports serotonin and amphetamines to the fetus. Prenatal exposure to drugs, which triggers changes in placental SERT expression, may also change fetal synaptic serotonin and serotonergic neurotransmission. Maternal drug exposure may also alter SERT activity resulted in increasing and/or decreasing fetal exposure to medications in early gestation. Our group is investigating effects of maternal exposure to psychoactive medications during pregnancy, including opioid exposure, on the activity of five placental transporters, such as SERT, NET,	TU Health Science Campus				
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 Department	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference	Hours per week
Laurie Kilpatrick, PhD	laurie.kilpatrick@temple.edu	TUSM	Lung Center/Physiology	Regulation of neutrophil-endothelial interactions in bacterial sepsis	Dr. Kilpatrick's research focuses on investigating molecular mechanisms regulating pro-inflammatory signaling in the innate immune system; particularly the role of activated leukocytes in the development of lung injury. An important focus of her work is examining the regulation of leukocyte migration into the lung. Using both in vitro and in vivo approaches, she is examining signaling pathways which regulate leukocyte-endothelial interaction and the control of transmigration. Her research group has extensive expertise with different models of inflammation in rodents and in the isolation and analysis of human neutrophils, monocytes and alveolar macrophages. Dr. Kilpatrick	TU Health Science Campus	Some previous lab experience, highly motivated with an interest in research	Biochemistry, Chemistry, Biology	Juniors or Seniors or highly motivated sophomores	
Lee-Yuan Liu-Chen	lliuche@temple.edu	TUSM	Center for Substance Abuse Research & Department of Pharmacology	Characterization of a knockin mouse line expressing a fusion protein of the kappa opioid receptor (KOPR) and the fluorescent protein tdTomato (tdT) [KOPr-tdT]	Lack of specific antibodies against the KOPR has hindered in vivo study of KOPR in terms of localization, trafficking, expression and signaling. My lab has generated a knockin mouse line expressing KOPR-tdT. The project is to do genotyping of the mice and map the distribution of KOPR-tdT in the brain.	TU Health Science Campus	solid grades, eagerness to learn, organized, some lab experience preferred, experience in handling rodents, perfusion and tissue sectioning is a plus.	Neuroscience	Junior or Senior	
LIQING JIN	jinliqin@temple.edu	TUSM	Shriners Hospitals Pediatric Research Center	molecular mechanisms of axon regeneration in the lamprey spinal cord	With molecular biological techniques, we study the role of local protein synthesis in axonal tips in axonal regeneration in lamprey spinal cord.	TU Health Science Campus	Diligent - biology, biochemistry, molecular biology, neuroscience, etc. -- Students are welcome in our center.	Medicine or biology		

Faculty Name	Email Address	Faculty College	Faculty Department	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference	Hours per week
Madesh Muniswamy	yson@temple.edu	TUSM	Biochemistry	MCU gene knockout using zebra fish model system	We are creating a knockout zebra fish for the mitochondrial calcium uniporter (MCU) gene using Crispr/Cas9. We plan to breed the homozygotes for the MCU deletion and then use them for functional analyses. The goal is to measure how the deletion of MCU affects the ATP production/Calcium handling/Oxidative stress in the mitochondria.	TU Health Science Campus	Prior experience in a Biology/Life Science Lab Good Laboratory Practice General curiosity Bio 1, Bio 2, Genetics	Biology, Biochemistry, Molecular Biology	Juniors or Sophomore	
Mahmut Safak	msafak@temple.edu	TUSM	Department of Neuroscience	Understanding the regulatory roles of JC virus agnoprotein in viral life cycle	JC virus is a human polyomavirus that causes a fatal disease, known as progressive multifocal leukoencephalopathy, in the central nervous system of a sub-population of immunocompromised individuals including AIDS and cancer patients. This virus encodes a small regulatory protein, Agnoprotein, from its late coding region. In the absence of its expression, this virus unable to sustain its productive life cycle. It is a highly basic phosphoprotein that localizes mostly to the perinuclear area of infected cells, although a small amount of the protein is also found in nucleus. It forms highly stable dimers/oligomers in vitro and in vivo through its Leu/Ile/Phe-rich domain. Structural NMR studies revealed that this domain adopts an	TU Health Science Campus		Biology, Chemistry, Biochemistry, Neuroscience	Sophomores and Juniors	

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Mahmut Safak	msafak@temple.edu	TUSM	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 past and we will to do so for the next five year. This project has been recently funded by NIH and	TU Health Science Campus	Student with a good work ethics	Biology, Chemistry Biochemistry Neuroscience	Sophmore	
Marc A. 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.	TU Health Science Campus	background (organic chemistry), past experience, motivation	chemistry, biochemistry		

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Faculty Name	Email Address	Faculty College	Faculty Department	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference	Hours per week
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	TU Health Science Campus	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	Chemistry, Biochemistry, Biology	Freshman to Seniors	
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: $CO_2 + H_2O \leftrightarrow HCO_3^- + H^+$. 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,	TU Health Science Campus	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	
Maria Iavarone	iavarone@temple.edu	CST	Physics	Low Temperature STM Characterization of Superconducting Nanostructures	Superconducting ultrathin films and islands will be fabricated on different substrates in ultra high vacuum environment and characterized by scanning tunneling microscopy and spectroscopy.	TU Main Campus	The students should be very interested in research and very motivated to learn.	Physics - General Physics I and II. Introduction to quantum mechanics is optional.	Junior & Senior	

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Maria Pacheco	tug00270@temple.edu	CST	Biology	Biodiversity and evolution of parasites	All known multicellular organisms harbor diverse assemblages of dependent species, many of which are considered parasites. Despite a growing awareness of the importance of dependent species for biodiversity, parasitological investigations have largely focused on the harm caused by parasites to their hosts. However, the ecology and evolutionary biology of parasitic organisms are worthy of study in their own right despite the challenges that these organisms pose as relatively unknown elements of biodiversity. Indeed, our ability to understand the processes shaping parasite diversity and to mitigate threats to that diversity is limited by gaps in our knowledge of issues such as species delimitation, population structure and spatial distribution, and the dynamics of assemblages which include multiple parasite and multiple host species. This project seeks to characterize multiple	TU Main Campus	Highly motivated. A minimum of 3.7 GPA. Basic knowledge on biology (transcription/translation and DNA replication), analytical/quantitative skills and curiosity are required. Programming at a basic level is considered a plus, but it is not required. Students should interview with the PI. Our expectation is that the selected candidates will continue to work with us after the summer. Traditionally, undergraduate	Biology, Applied Math, Natural Sciences, Information Science and Technology, Computer Sciences	Freshman or sophomore	
Marion Chan	marionc@temple.edu	TUSM	Microbiology	The action of dietary phytochemicals on ovarian cancer cells	Tumors constitute from heterogeneous cell populations. Within them are a group of self renewing and differentiating stem cells, named tumor initiating cells or cancer stem cells (CSCs). These CSCs have been regarded as the cause of drug resistance and metastasis. The goal of our project is to test whether certain dietary phytochemicals (curcumin, EGCG, quercetin, resveratrol) and pharmaceutical small molecules (metformin, niclosamide, thioridazine) are effective in eliminating CSC population in ovarian cancer. Students will learn sterile technique, pipetting accuracy, tissue culture techniques, drug testing	TU Health Science Campus	Good work ethics, punctual, analytical thinking, dexterity	Biological Sciences related majors and Chemistry majors - Basic/Introductory Biology	Sophomore, Juniors	

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Mary Abood	mabood@temple.edu	TUSM	CSAR/Anatomy and Cell Biology	Molecular Pharmacology of Cannabinoid Receptors	Characterizing new ligands at CB1 and CB2 cannabinoid receptors or the orphan receptor GPR55 using cell-based assays. Site-directed mutagenesis of these receptors in order to identify structural features of receptor activation.	TU Health Science Campus		Biology, Chemistry	Juniors	
Matthew Helmus	mrhelmus@temple.edu	CST	Biology	The genomics of scared tadpoles	Tadpoles just want to grow up to become frogs, but in nature there are plenty of predators. Luckily, tadpoles have a defense--when exposed to predators, tadpoles can radically change their body shapes and musculature so that they are harder for predators to catch. The goal of this project is to analyze experimental genomic data (already collected) to determine gene expression during body changes. Bioinformatics that may be used are: R statistical programming, Galaxy bioinformatic pipelines and BLAST2GO software.	TU Main Campus	Basic computer programming	Courses in Genomics or Computer Programming		
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.	TU Main Campus	Basic excel	Biology, Environmental Science		

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Michael Autieri (new)	mautieri@temple.edu	TUSM	Cardiovascular Research Center	Molecular mechanisms of anti-inflammatory cytokines for vascular inflammatory diseases	Many vascular diseases, including Atherosclerosis, are inflammatory in nature. Accordingly, any compound which may decrease inflammation could represent a therapeutic to attenuate most vascular diseases. Interleukin-19 (IL-19) is a cytokine which occurs naturally in humans and functions to modify inflammatory cells. We have generated IL-19 knock out mice and shown that IL-19 is protective for vascular diseases, likely by reducing mRNA stability of pro-inflammatory genes. In this project, the student will prepare and analyze tissue sections from RNA stability protein knock out mice mice by histology and immunohistochemistry to determine if these mice are protected against atherosclerosis	TU Health Science Campus	manual dexterity. ability to get along with others. Enthusiasm, eagerness to learn, ability to follow direction and willingness to learn new techniques. honesty, punctuality and dependability. any general biology, anatomy, physiology, or the similar.	biology, chemistry, biochemistry, pre-med	junior, senior	5 - 12, we are flexible!
Michael J. Zdilla	mzdilla@temple.edu	CST	Chemistry	Preparation and reactivity of manganese clusters inspired by photosynthetic water oxidation	We are seeking undergraduates to aid in the synthesis and characterization of manganese clusters that mimic the oxygen evolving complex of photosystem II. The student will synthesize new cluster molecules and explore biologically relevant reactivity of these molecules.	TU Main Campus		Chemistry, Biochemistry	Sophomore, Junior or Senior	
Michael J. Zdilla	mzdilla@temple.edu	CST	Chemistry	Preparation and catalytic properties of layered, solid state materials.	We are seeking undergraduates to aid in the synthesis and characterization of layered catalytic materials as part of our energy frontiers research center. These materials are of interest for the achievement of solar water splitting. The student will prepare metal-oxide or metal-chalcogenide-based solid-state catalyst and examine their activity for catalytic water oxidation.	TU Main Campus		Chemistry, Biochemistry	Sophomore, Junior or Senior	

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Michael J. Zdilla	mzdilla@temple.edu	CST	Chemistry	Synthesis of novel energetic molecules.	We are seeking undergraduates to aid in the development of novel energy-rich molecules containing redox frustration. These materials are of interest as next-generation energetic materials. The student will prepare novel nitrogen rich molecules containing high-valent manganese or chlorine atoms, and study their energetic properties.	TU Main Campus		Chemistry, Biochemistry	Sophomore, Junior or Senior	
Michael J. Zdilla	mzdilla@temple.edu	CST	Chemistry	Preparation and testing of solid electrolytes for battery applications	We are seeking undergraduates to aid in the synthesis of salt-organic hybrid electrolyte materials by co-crystalizaiton methods, and the assessment of their conductivity using electrochemical techniques.	TU Main Campus	GPA, Intent to pursue Graduate education. Skills from General Chemistry and Organic Chemistry laboratory.	Chemistry - General Chemistry completed, Organic chemistry completed or in	Sophomore, Junior or Senior	
Michael Shifman	mshifman@temple.edu	TUSM	Shriners Hospitals Pediatric Research Center	Epigenetics regulation of axonal regeneration	The goal of this research is to use the advantages of the lamprey CNS to test the hypothesis that “good regenerating” RS neurons have higher levels of histone acetylation, favoring activation of a regeneration program, whereas histone deacetylation contributes to regeneration failure after SCI.	TU Health Science Campus	self-starter, good general laboratory skills	Neuroscience		
Mohammad Kiani	mkiani@temple.edu	Engineering	Mechanical Engineering	Does low doses of ionizing radiation damage DNA in HUVECs.	The effects of low and high doses of ionizing radiation on human umbilical vein endothelial cells will be determined using cell proliferation and comet assays.	TU Main Campus	Some experience in any lab setting	Biology, Engineering	Sophomore,Junior,senior	

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Mohan Patnala Achary	achary@temple.edu	TUSM	Metastasis and Radiation Research Lab	Markers for non-metastatic human breast cancers and inhibition of human glioblastoma In Vivo.	Validation of genomic and gene expression markers for differentiating human metastatic and non-metastatic primary breast cancers. Inhibition of human glioblastoma tumors by betulinic acid combined with ionizing radiation in a nude mouse model.	TU Health Science Campus	None to one summer lab research experience - Sincerity	Biology	Sophomore, Junior, Senior	
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	TU Health Science Campus	General Lab Skills	Biology	Junior or Senior	
Muruganandham Manickavachagam	tud20497@temple.edu	Engineering	Environmental Engineering	Technology development for water and wastewater treatment	The Water and Environmental Technology (WET) Center (funded by National Science Foundation and Industry), Department of Civil and Environmental Engineering, Temple University focused to address issues related to water and wastewater. The primary research related to (1) Physico-chemical water and wastewater treatment processes, 2) Analytical methods development for emerging compounds, and 3) bio-chemical water and wastewater treatment process.	TU Main Campus		environmental science/engineering and or Chemistry background	Sophomore, Junior, Senior	

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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.	TU Main Campus	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	
Nora Engel	noraengel@temple.edu	TUSM	Fels Institute for Cancer Research	Genetics and Epigenetics of sex-specific expression patterns in early embryogenesis	We are investigating differences between male and female embryonic stem cells and the mechanisms by which these early differences are established. Epigenetic assays will be performed to detect the impact of sex on differentiation of the cells.	Fels Institute for Cancer Research	Basic laboratory skills, such as pipetting and making solutions required.	Biology, Biochemistry	Junior & Senior	

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Faculty Name	Email Address	Faculty College	Faculty Department	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference	Hours per week
Nune Darbinian, PhD	nsarkiss@temple.edu	TUSM	Shriners Hospitals Pediatric Research Center	Human Brain Development and Exposure to Psychoactive Medications and Alcohol:	Our group investigates effects of maternal exposure to psychoactive medications and alcohol during pregnancy on the fetal brain development. Maternal alcohol (EtOH) exposure can lead to significant neuronal loss, synaptic dysfunction that can lead to Fetal Alcohol Syndrome (FAS). Mechanisms of neurotoxicity have been explored in animal models and in vitro human models, but data from in vivo human models is scarce. Our group developed unique in vivo human FAS model to investigate molecular mechanisms of massive neuronal and synaptic loss, and to identify neurological diseases-specific miRNAs that upon prenatal alcohol exposure can lead to Fetal Alcohol Syndrome, depression or Cerebral Palsy (CP). We also investigate molecular mechanisms in neuroprotection by	TU Health Science Campus				
Nune Darbinian, PhD	nsarkiss@temple.edu	TUSM	Shriners Hospitals Pediatric Research Center	Effects of Maternal Alcohol Consumption and Gestational Age on Human Fetal Brain Apoptosis:	Maternal alcohol (EtOH) exposure can lead to significant neuronal loss, synaptic dysfunction and fetal alcohol syndrome (FAS). Mechanisms of neurotoxicity have been explored in animal models and in vitro human models, but data from in vivo human models is scarce. We will investigate role of EtOH exposure on oligodendrocyte differentiation; we will develop neuroprotection pathways in FAS.	TU Health Science Campus	Advanced, motivated, interested in research	Neuroscience, Biology, Pharmacy, Medical, Psychiatry, Gynecology	Juniors & Seniors	

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Faculty Name	Email Address	Faculty College	Faculty Department	Project title	Project Description	Project Location	Important selection criteria	Student Majors Desired	Class Preference	Hours per week
Parkson Lee-Gau Chong	pchong02@temple.edu	TUSM	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	TU Health Science Campus	GPA, research interest - Basic chem. lab skills	Chemistry, Biology, and Physics	Sophomore, Junior or Senior	
Pei Wang	pei.wang@temple.edu	CST	CIS	Testing an intelligent reasoning system	NARS is an intelligent reasoning system that accepts knowledge and problems in a formal language, and uses some inference rules to derive new knowledge and to solve the problems (see online publications and demo). This system will be applied to various practical situations to test the expressive power of the language and the inferential power of the rules. Also under study will be the possibility of using this logic to reason on structured knowledge sources, such as databases and the Semantic Web.	TU Main Campus	Strong interest in science, especially in human and machine intelligence; solid background in mathematics and computer science. - knowledge of formal logic, probability theory, and computer programming	computer and information sciences, mathematics	Sophomore, Junior or Senior	
Prasun Datta	dattapk@temple.edu	TUSM	Neuroscience	Cross-talk between HIV-1 and glucose metabolism	Elucidate mechanism(s) by which HIV-1 protein Vpr modulates macrophage glucose metabolism. 2. Elucidate mechanism(s) by which HIV-1 protein Tat modulates microglia and astrocyte glucose metabolism. If significant progress is made by the student then he/she will be allowed to submit an abstract to a national meeting or submit a manuscript for publication as a contributing author.	TU Health Science Campus	Willingness to learn new techniques. - Prefer prior experience in research.	Biology, Neuroscience, Biochemistry	Sophomore, Junior or Senior	

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Prasun Datta	dattapk@temple.edu	TUSM	Neuroscience	Regulation of glutamate transporter EAAT2 in the context of NeuroAIDS	Research focuses on determining the role of HIV-1, cytokines and drugs of abuse in the regulation of glutamate transporter expression in astrocytes, microglia and macrophages. If significant progress is made by the student then he/she will be allowed to submit an abstract to a national meeting or submit a manuscript for publication as a contributing author.	TU Health Science Campus	Selection criteria are good organizational skills, interest in learning and hardworking. Prefer prior experience in research	Biology, Neuroscience, Biochemistry	Sophomore, Junior or Senior	
Qiang Zeng	qzeng@temple.edu	CST	CIS	New security features of the new Intel processors	The latest generation of Intel processors provides new security features, which may bring a revolution of systems and software security. We will analyze such new features and consider the fancy applications.	Main Campus	Interest in cyber security. Good programming skills in C, C++, Java or Python.	CIS	Juniors or Seniors	
Qimin Yan	qiminyan@temple.edu	CST	Physics	Computational study of elastic properties of two-dimensional materials	Layered two-dimensional (2D) materials, such as graphane and MoS2, have attracted a lot of attentions in the recent years for electronics and energy applications. These two-dimensional compounds have shown completely different elastic properties compared with their bulk counterparts, which motivates the computational study in this proposal. The student will develop a finite-element-analysis method combined with first-principles parameters to evaluate the deformation of single-layer 2D materials under a uni-axial stress. The derived force curve will be useful to analyze the results of atomic force	Main Campus	Good computational and programming skills (Linux, matlab, python), responsible, willing to work hard.	Physics, Materials science	Seniors	
Qimin Yan	qiminyan@temple.edu	CST	Physics	Machine learning based on Hamiltonian for materials science applications	Machine learning technology has shown a great potential to learn from existing data and predict new properties in the area of materials science. In this proposal, the student will work with experts in materials science and computer science to develop machine learning models to recognize the similarity in different Hamiltonians, which is a quantum mechanics quantity to define a physical system, and	Main Campus	Good programing skill with python or java, good communication skills, willing to work hard, responsible	Computer science, physics, materials science	Seniors	

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Qimin Yan	qiminyan@temple.edu	CST	Physics	Computational study of photocatalytic water splitting on transition metal oxides	Artificial photosynthesis using complex oxides poses a grand challenge for the generation of renewable energy from sun light and water. The student will carry out high-throughput calculations and data-mining to search for promising transition metal oxides for solar water splitting.	Main Campus	Programming skills, Python, Linux, good communication skills	Physics, Materials Science	Seniors	
Rachel Spigler	rachel.spigler@temple.edu	CST	Biology	Evaluating effects of habitat fragmentation on plant-animal interactions and their consequences for floral trait evolution	Habitat fragmentation and degradation due to human activities continue to occur at alarming rates, threatening biodiversity and ecosystem health. One of the first lines of defense in habitat conservation is ensuring that the plant populations that build the foundation of that habitat remain intact and viable. Because plants are stationary and so many rely on pollinators for successful reproduction presents them with particular challenges when habitats are fragmented and degraded, including reduced pollinator and mate availability. This summer, we will perform a series of studies in wild populations investigating how pollination conditions and floral traits vary across habitat fragments in	Main Campus	enthusiastic, hard-working, reliable, ability to follow directions and exceptional attention to detail, interest in ecology and evolution	Biology	Frehman - sophomore - juniors	
Raymond Habas (new)	habas@temple.edu	CST	Biology	Our laboratory concentrates on understanding the role of the Wnt signaling pathway during both embryogenesis and tumorigenesis.	We are dissecting the Wnt signaling pathway using a multidisciplinary approach, drawing on techniques from molecular biology, biochemistry, cell biology and embryology. Our primary model systems are the Xenopus laevis (frog) and Danio rerio (fish) embryos, along with mammalian tissue culture cells.	Main Campus	Highly motivated students with an interest and enthusiasm in understanding and performing basic science studies. Biol 1111	Biology, Biochemistry, Neurobiology and Chemistry..	Freshmen, Sophmores	15

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Raza Zaidi	zaidi@temple.edu	TUSM	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	TU Health Science Campus	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	Biochemisry or Biology		
Richard Katz	Richard.Katz@fccc.edu	FCCC	Fox Chase Cancer Center	Organization of chromatin within the cell nucleus	The most striking feature of the eukaryotic nucleus is the spatial and functional organization of chromatin into two fundamental units: euchromatin (open, active) and heterochromatin (closed, Inactive). Heterochromatin is localized largely in a compartment at the inner nuclear periphery, in association with the fibrous nuclear lamina framework. An emerging concept, based on evidence from C. elegans and mammals, is that heterochromatic histone tail modifications, e.g. H3K9me3, serve as anchoring points for	FCCC		Biology		
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.	TU Main Campus	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		

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Richard T. Pomerantz	richard.pomerantz@temple.edu	TUSM	Fels Institute for Cancer Research	How the process of transcription contributes to genome instability in human cells.	Genome instability in the form of chromosome breaks, rearrangements and deletions is a hallmark of cancer cells and contributes to tumorigenesis. The research project aims to understand how the process of transcription contributes to genome instability in human cells. Current research in the lab reveals a direct link between transcription and DNA deletions and rearrangements in human cancer cells. This suggests that transcription plays a much larger role in promoting genome instability and potentially cancer than previously thought. The goal of the project is to analyze and annotate the sequences of DNA deletions and rearrangements generated at transcription sites in human cells. The results of this research is likely to provide new important insight into how the fundamental process of transcription can cause genome	TU Health Science Campus	Intelligent, hard-working, independent, passionate about science and research. - General Biology, perhaps Chemistry -- Successful summer research is likely to be published in peer reviewed journals.	Biochemistry, Biology, or Chemistry		
Richard T. Pomerantz	richard.pomerantz@temple.edu	TUSM	Fels Institute for Cancer Research	This research will provide important insight into how polymerase theta functions during alt-EJ and promotes the survival of cancer cells and chemotherapy resistance and will likely be published in a	A newly discovered DNA repair process called alternative end-joining (alt-EJ) or microhomlogy-mediated end-joining causes chromosome deletions and rearrangements and promotes the survival of breast and ovarian cancer cells. Current research in the lab has reconstituted the process of alt-EJ in vitro and has elucidated how a key protein in this pathway, DNA polymerase theta, generates insertion mutations at DNA repair junctions. The goal of the project is to analyze and annotate the sequences of insertion mutations generated by polymerase theta during alt-EJ in vitro. This research will provide	TU Health Science Campus	Intelligent, hard-working, independent, passionate about science and research. - General Biology, perhaps Chemistry -- Successful summer research is likely to be published in peer reviewed journals.	Biochemistry, Biology, or Chemistry		

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Richard Waring	waring@temple.edu	CST	Biology	Mutational Analysis of DNA Meganucleases	Most DNA nucleases employed in molecular biology research cut DNA at a specific recognition sequence that is usually 4 to 6 basepairs in length (for example GAATTC on one strand of the DNA). A meganuclease is an enzyme that cuts DNA at a specific sequence that is approximately 20 basepairs in length. The likelihood of this sequence occurring by chance in the human genome is very small. For various reasons there are situations where researchers would like to be able to make a single cut in the DNA of a cell without cleaving any other regions and so we would like to understand how these nucleases cut DNA and	TU Main Campus	Interest in independent research - Solid arithmetical skills Ability to keep good lab notebook Reasonable hand dexterity	Biology and Biochemistry Majors - 1031 & 1032 General Chemistry	Sophomore, Junior or Senior	
Rob Kulathinal	robkulathinal@temple.edu	CST	Biology	Forensic Population Genomics	New sequencing and genotyping platforms provide a fast, inexpensive, and statistically powerful way to genotype individuals. In collaboration with the Pennsylvania Innocence Project, we will develop forensic genomic kits that will be able to rapidly and effectively provide genotype evidence for court cases. Population genomic pipelines based on 1000 Genomes Project data as well as other initiatives cataloging global human variation will be developed to work in concert with ready-made genotyping platforms including 23andme and Ancestry.com. We will also develop population-specific ancestral-informative markers (AIMs) along with statistical algorithms that can be used by members of the justice system.	TU Main Campus	Curiosity, determination, well-disciplined, computationally-inclined. The ideal candidate will be able to work independently and closely with Dr. Kulathinal.	Biology, CompSci, Math, Physics	Freshman & Sophomore	

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Rob Kulathinal	robkulathinal@temple.edu	CST	Biology	New Gene Evolution	With multiple genomes sequenced, we can now track how novel genes are formed within species. Our current hypothesis is that de novo male genes are rapidly evolving under adaptation. We will test this hypothesis using a population and functional genomic framework on primates and fruit flies. This will provide new exciting insights into the importance of sexual selection, early on in speciation.	TU Main Campus	Curiosity, determination, well-disciplined, computationally-inclined. The ideal candidate will be able to work independently and closely with Dr. Kulathinal.	Biology, Computer Science, Math	Freshman & Sophomore	
Robert J. Levis	rjlevis@temple.edu	CST	Chemistry	Stand-Off Detection of Molecules using Advanced Laser Technology	The ability to detect molecules at distances up to 50 meters is valuable for many applications including explosives detection, analyzing smoke stacks and probing urban environments. This project will involve working with femtosecond laser filamentation ("a light saber") and a new Raman spectroscopy method developed in the Center for Advanced Photonics Research. Interested students should read the publications on the Center's web site at www.temple.edu/CAPR for additional information.	TU Main Campus	independent motivation	Neuroscience, Cell and Developmental Biology	Sophomore, Junior, Senior	
Robert J. Levis	rjlevis@temple.edu	CST	Chemistry	Nanomaterials by Design	Nanomaterials include size as a design parameter for a material's properties. For instance the color of a quantum dot changes as the size changes from 100nm to 10nm. The aim of this project is to discover new nanomaterials using femtosecond laser processing of precursors including chemical compounds, bulk metals, semiconductors and organic materials. The project involves the use of lasers and state of the art optics as well as characterization methods including UV-VIS, mass spectrometry, transmission electron microscopy, dynamic light scattering and a	TU Main Campus	independent motivation	Neuroscience, Cell and Developmental Biology	Sophomore, Junior, Senior	

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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.	TU Main Campus	Interest in aquatic ecology. Biology 1111 or 1911.	Biology, Environmental Science		
Robert Stanley	rstanley@temple.edu	CST		Hot and Cold DNA Repair	Work with the PI and graduate students to prepare and characterize extremophile DNA photolyase, a light-driven DNA repair enzyme found in hot- and cold-adapted organisms. The lab work involves recombinant DNA methods, protein overexpression and purification, and a variety of optical spectroscopies.	TU Main Campus	Useful skills: Organic chemistry, biochemistry, some physical chemistry	Open to all natural science majors,		
Ross Wang	rosswang@temple.edu	CST	Chemistry	Chemical probes to study post-translational modifications	Chemical biology approaches to the mechanism study, diagnosis, and treatment of human diseases II. Chemical proteomics to identify key proteins for the onset of cancer and inflammatory disorders.	TU Main Campus	Having completed General Chemistry, Organic Chemistry I with a grade of B or higher. Preferably with prior laboratory experience in Chemistry and Biochemistry	Chemistry, Biology, Biochemistry, Pharmaceutical	Sophomore, Junior, or Senior	rising sophomores and juniors, and seniors with sufficient time to contribute to the work

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Ross Wang	rosswang@temple.edu	CST	Chemistry	Development of novel imaging agents for image-guided cancer therapy	Chemical biology approaches to the mechanism study, diagnosis, and treatment of human diseases	TU Main Campus	Having completed General Chemistry, Organic Chemistry I with a grade of B or higher. Preferably with prior laboratory experience in Chemistry and Biochemistry	Chemistry, Biology, Biochemistry, Pharmaceutical	Sophomore, Junior, or Senior	
Ross Wang	rosswang@temple.edu	CST	Chemistry	Design and synthesis of antibody mimics	Chemical biology approaches to the mechanism study, diagnosis, and treatment of human diseases	TU Main Campus	Having completed General Chemistry, Organic Chemistry I with a grade of B or higher. Preferably with prior laboratory experience in Chemistry and Biochemistry	Chemistry, Biology, Biochemistry, Pharmaceutical	Sophomore, Junior, or Senior	
Sadia Mohsin (new)	tuf65474@temple.edu	TUSM	Cardiovascular Research Center	Stem cell for cardiac repair	The project would help in understanding different mechanisms that could be involved in heart repair after stem cell or exosomes transplantation after cardiac injury. Immune response is one of the major events that occur after injury, we would study how stem cells can play a part in modulating immune response after myocardial infarction.	TU Health Science Campus		Biology	Juniors or Seniors	12-15

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Sara Jane Ward	saraward@temple.edu	TUSM	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.	TU Health Science Campus	Interest in neuroscience/experimental psychology	Neuroscience, Psychology	Junior or Senior	
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"	TU Main Campus	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	
Scott Sieburth	scott.sieburth@temple.edu	CST	Chemistry	Simple Methods for Complex Molecules	Using light to drive cycloaddition reactions and make strained, reactive new structures.	TU main campus	work hard, work smart.	science	Freshman	

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Seo-Hee Cho	seo.hee.cho@temple.edu	TUSM	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-	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	TU Health Science Campus		Biology	Sophomore	
Seo-Hee Cho	seo.hee.cho@temple.edu	TUSM	Shriners Hospitals Pediatric Research Center/ Anatomy and Cell Biology	(1) A new LCA model by polarity gene ablation (2) Genetic analysis of the signaligng genes during eye development	Our research focuses on understanding the cellular and molecular mechanisms underlying the normal development and degenerative diseases of the mammalian retina. Topics we currently study include: (I) Functional analysis of apical polarity gene Pals1 during retinal development. (II) Pathophysiology study of degenerative retinal diseases (LCA and RP) to understand the underlying disease causing mechanisms. We are particularly interested in	TU Health Science Campus	not required	Biology related - General Biology recommended	any	
Seonhee Kim	tue62079@temple.edu	TUSM	Anatomy and Cell Biology	The role of cell signaling and polarity in neural development	My laboratory's research focuses is to understand the molecular and cellular mechanisms controlling brain development to study the basis of neurodevelopmental disorders. To gain in-depth knowledge of neural development and neuronal disorders, we utilize multidisciplinary approaches such as molecular and neuroanatomical techniques including gene cloning, progenitor or neuronal culture, cortical electroporation and time-lapse imaging of cortical explants. Students will involve the characterization of animal	TU Health Science Campus		Biology	Junior or Senior	

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Sergei Pond	spond@temple.edu	CST	iGEM and Biology	Software development and Bioinformatics	Utilize and develop open-source software to explore DNA mutations. Please see www.hyphy.org and github.com/veg/hyphy for more information. Using high-performance computing, statistical techniques, and the latest web technologies, we provide methods that researchers use to answer questions about their genetic sequence data. All computational development and research takes place within iGEM located in the SERC building (igem.temple.edu).	Main Campus		Computer Science, Mathematics, Biology, Physics	any	
Shelby Stanhope (new)	stanhope@temple.edu	CST	Mathematics	Mathematical Models of the Immune System Response to Bacterial Infection on the Surface of Implant Devices	In this study, we will use mathematical modeling in conjunction with data collected in laboratory studies, to model the immune response to bacterial infection on the surface of implant devices. Focusing on the initiation of infection, we aim to understand which factors determine the elimination of infection and which eventually lead to the development of a biofilm on the device. Our modeling efforts will employ partial differential equations and stochastic differential equations. The project will involve both theoretical analysis and computer simulation.	TU Health Science Campus	Experience with MATLAB or willingness to learn. Background in differential equations.		Mathematics, Biology	Sophomores, Juniors, Seniors

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Shuxin Li	shuxin.li@temple.edu	TUSM	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 number of high impact papers related to CNS	TU Health Science Campus	Motivated person and basic background on research.			
Slobodan Vucetic	vucetic@temple.edu	CST	CIS	Data Science	Scientific and technological advances have allowed us to collect massive amounts of diverse types of data. There is an increasing recognition that data created by scientists, mobile apps, internet, social media, crowdsourcing, healthcare could be translated into valuable insights. A data scientist is a person who has the skills, knowledge, and ability to extract actionable knowledge from the data -- either for the good of society, advancement of science, or profit in business. This project will be custom-made to suit the background and interest of a student and give	TU Main Campus	Some programming experience, good math background - Programming in any language (Python, Java, C, Matlab) Calculus 1	Any CST major might find this project valuable		

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Spiridoula Matsika	smatsika@temple.edu	CST	Chemistry	Studying the photophysics and photochemistry of DNA using quantum mechanics	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. A fundamental understanding of these processes reveals the way nature works and also provides ideas on how to mimic or alter these mechanisms to our own benefit. The current project focuses on studies of the photophysical behavior of DNA bases and their fluorescent analogs. When UV radiation is absorbed by DNA, photochemical reactions	TU Main Campus	Students should be motivated, interested in research and computational work, with an aptitude for math.	Chemistry, Physics	Junior or Senior	
Stefania Gallucci	gallucci@temple.edu	TUSM	Microbiology-Immunology	Regulation of Type I Interferons in Autoimmunity	The project includes studies of cellular immunology and molecular biology of signal transduction of cytokines involved in the pathogenesis of an autoimmune disease, Systemic Lupus Erythematosus. The goal of the project is to test novel biologics to be used in the therapy of autoimmune diseases.	TU Health Science Campus	Strong motivation to learn and hard working.	Biology_Premed		
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.	TU Main Campus	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	

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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	TU Main Campus	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	
Steven Houser	srhouser@temple.edu	TUSM	Cariology	Role of Cortical bone derived stem cells for improving heart function after myocardial infarction	We are studying role of cortical bone derived stem cells (CBSCs) in repair of heart after cardiac injury. We have previously shown that these stem cells have capacity to improve heart function mainly by secreting cardio protective factors and mediating cardiac repair by differentiation into cardiac lineages. Currently, we are testing this hypothesis in a larger animal model for clinical relevance of CBSCs. Concurrently, we are focused on investigating if these beneficial effects can be achieved by transfer of small vesicles called exosomes from these cells.	TU Health Science Campus	General lab skills	Biology or Chemistry	Junior or Senior	
Sudarsan Rajan	tuf37597@temple.edu	TUSM	Center for Translational Medicine	MCU Knockout gene using zebra fish model system	We are creating a knockout zebra fish for the mitochondrial calcium uniporter (MCU) gene using Crispr/Cas9. We plan to breed the homozygotes for the MCU deletion and then use them for functional analyses. The goal is to measure how the deletion of MCU affects the ATP production/Calcium handling/Oxidative stress in the mitochondria.	TU Health Science Campus	Prior experience in a Biology/Life Science Lab Good Laboratory Practice General curiosity	Biology, Biochemistry, Chemistry - Bio 1 - BIO 2 - Genetics	Sophomore or Junior	

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Sudhir Kumar	s.kumar@temple.edu	CST	iGEM and Biology	Software development and Bioinformatics	We develop software (including smartphone apps) for analyzing biological data in the fields of Genomics and Medicine. See www.megasoftware.net and www.kumarlab.net for examples. All developments will be in a new institute in SERC (igem.temple.edu).	TU Main Campus	Knowledge of computer programming and/or app development	All majors	Freshman, Sophomore, Junior	
Sudhir Kumar	s.kumar@temple.edu	CST	iGEM and Biology	Personalized medicine and evolutionary link between DNA and disease	We all have many DNA differences from others. Which of these personal differences cause disease? We use computers to study disease variation in humans and compare it to differences humans show with other species. We also build predictive methods and tools. All computational research will be in a new institute in SERC (igem.temple.edu). See www.kumarlab.net for publications.	TU Main Campus	Interest in the field, knowledge of computers	All majors	Freshman, Sophomore, Junior	
Sudhir Kumar	s.kumar@temple.edu	CST	iGEM and Biology	Genomics, Medicine, and Evolution (computer based)	Students will carry out biological and biomedical research using computers with emphasis on DNA data analysis. Biomedical questions will be focused on Genome Medicine. Biological questions will be on building the tree of life. Depending on the student's background, you may conduct primary data analysis research and/or assist in developing new methods, software, and databases. See igem.temple.edu and www.kumarlab.net	TU Main Campus	Freshmen and sophomores with interest in biology, medicine, or computers. No requirements, as the projects will be tailored to the students' level of preparation.	Biology, Computers, Physics, Anthropology, Pharmacy, Chemistry		

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Sudhir Kumar	s.kumar@temple.edu	CST	Institute for Genomics and Evolutionary Medicine	Genomic Medicine and Tree of Life	Evolutionary analytics of mutations, genomes, and species is the primary focus of my research group. We use integrative and comparative approaches to make fundamental discoveries in the fields of medicine, evolution and genomics. The common theme of all our research is the use of comparative analysis to reveal genome differences that are outcomes of natural selection on novel mutations arising in all species during their propagation from generation to generation and in an individual's lifetime. The resulting patterns of conservation and divergence of our DNA enables us to conduct research investigations ranging from	TU Main Campus	Prefer freshmen or sophomores interested in devoting multiple years working in our group so they can carry out real research and development projects, including the writing of research papers and/or development of software and database tools. Successful students will be provided year-long	Biology, Computer Science, Chemistry, Physics, Biomedical engineering, and other biology-related department		
Sujith Ravi	sravi@temple.edu	CST	Earth & Environmental Sciences	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 warming and drought), collected using the unique minirhizotron root imaging system. This	TU Main Campus	interest in the project/research, critical thinking, quantitative ability - Basic statistics, interest in image processing, mostly computer-based project	Biology, Computer science, Environmental Sciences		
Susan Patterson	susan.patterson@temple.edu	CST	Biology			TU Main Campus				

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Tasuku Akiyama	tasuku.akiyama@temple.edu	TUSM	Dermatology and Anatomy & Cell Biology	Brain Processing of Itch						
Thomas Rogers	rogerst@temple.edu	TUSM	Center for Inflammation, Traslational & Clinical Lung Research	Inflammatory monocytes and macrophages in emphysema	Emphysema is a chronic inflammatory disease, and the mechanisms that are responsible for the tissue damage are not fully understood. It appears that monocytes and macrophages are critical cells for in this disease, and we will characterize their contribution to the disease.	TU Health Science Campus	Should have coursework in biology and biochemistry; prior laboratory experience desired. Must be serious, reliable, and dependable.		Juniors or Seniors	
Tomasz Skorski	tskorski@temple.edu	TUSM	Microbbiology and Immunology, Fels Cancer Research	Personalized medicine-guided synthetic lethality to eradicate tumor cells	Leukemia stem cells (LSCs), and especially quiescent LSCs, have a dual role as tumor initiating and therapy-refractory cells. Currently available anti-tumor treatments clear a disease burden consisting mostly of leukemia progenitor cells (LPCs), but they usually fail to eradicate drug-refractory quiescent LSCs and drug-resistant proliferating LSCs/LPCs. Altered DNA repair mechanisms were suggested to be responsible for	TU Health Science Campus		biology	Junior & Senior	
Tonia Hsich	sthsieh@temple.edu	CST	Biology	Control mechanisms for counting unexpected perturbations during bipedal running in lizards		TU Main Campus		Biology		

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Tracy Fischer-Smith	tracy.fischer-smith@temple.edu	TUSM	Neuroscience	Role of systemic immune alterations in the development of CNS disease	While the brain is often considered to be "protected" from the body (periphery), in reality, there is continued communication between the CNS and periphery. Under healthy conditions, this can aid the CNS, however, it may have deleterious effects to the CNS in some disease states, as well as aging. We are exploring the role of altered systemic immunity in the promotion of CNS injury in HIV infection. Our previous work suggests that in HIV infection, immune polarization in the peripheral blood and the brain is associated with, and likely contributes to AIDS progression and cognitive impairment	TU Health Science Campus	Mature, serious-minded, responsible, reliable	Biology, Biochemistry	Sophomore, Junior, Senior	
Uma Sajjan	uma.sajjan@temple.edu	TUSM	Thoracic Medicine and Surgery	Innate immune functions of airway epithelium	How does airway epithelium contributes to pathogenesis of chronic obstructive pulmonary disease (COPD) Epithelium lining the conductive zone is the first line of defense against inhaled pathogens, particulates and other enviromental pollutants. Airway epithelium which was initially thought to be physical barrier separating the environment from the lungs and to clear the inhaled pathogens via mucociliary escalator mechanism, is now recognized as an active participant in detecting inhaled pathogens and orchesterating innate and adaptive immunity in the lungs. Therefore	TU Health Science Campus	Willingness to work with small animals, such as mice Good organizational skills Good writing and communicational skills	Any science major.	Freshman, Sophomore, Junior or Senior	

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Vasily Dolgushev (new)	vald@temple.edu	CST	Mathematics	Bar-Natan's conjecture on finite type invariants of knots	A knot is a smooth embedding of the circle into the three dimensional space. It is believed that the universal finite type invariant (due to Kontsevich, Le, Murakami and Vassiliev) allows us to distinguish isotopy classes of knots. Bar-Natan's conjecture is a statement about the graph complex related to this universal invariant. If this statement is true, then the universal finite type invariant cannot distinguish orientation of knots. The student would work on this conjecture using the library SymPy for symbolic computations.	TU Main Campus	Linear algebra (preferably theoretical) is a prerequisite for working on this project. The knowledge of rudiments of graph theory and group theory is helpful. MATH 3042 or MATH 3045 math 3051	Math, Computer Science, Physics	No preference	8-10 hours
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.	TU Main Campus	Some combination of programming experience, math skills and physics knowledge are important	Math, physics, computer science and chemistry	Sophomore or Junior	
Weidong Yang	weidong.yang@temple.edu	CST	Biology	Super-resolution study of interactions and competitions in normal and cancer cells	Super-resolution light microscopy won the Nobel Prize in Chemistry in 2014. In our lab, we combine super-resolution microscopy with single-molecule tracking, fluorescence recovery and innovative molecular biology techniques to study the following projects: 1) interactions between human cells (normal and cancer cells) and viruses. 2) trafficking of RNAs, vesicles and proteins through the nuclear pore complexes in live human cells. 3) the gating mechanism for macromolecules transport into the cilium of human cells.	Main Campus		Biology, biochemistry, biophysics and the relevant	Juniors and seniors	

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Wenzhe Ho	wenzheho@temple.edu	TUSM	Pathology and Laboratory Medicine	Exoosme in Methamphetamine and HIV-associated Neurodegeneration	The proposed studies will reveal previous unidentified mechanisms by which METH and/or HIV compromise the BBB innate immunity, providing a favorable micro-environment for HIV neuroinvasion.	TU Health Science Campus	Prefer to have students with biology major, having a great interest in research (with or without experience, although research experience is preferred). Students should have attributes of paying attention to details, being a good listener, following instructions, getting along with others and	Biology, Neuroscience		
Won H. Suh	whs@temple.edu	Engineering	Bio-engineering	Live-cell microscopy and biocompatibility study of mammalian cells inside 3D hydrogels	Water soluble polymers will be utilized to make three-dimensionally structured hydrogels. Mammalian cells such as PC12 and A549 will be encapsulated and their biocompatibility will be quantified via live-cell microscopy (and biochemical) methodologies.	TU Main Campus	Having taken chemistry and biology courses (with lab) as a pair (at least) will help the student (but it is not a pre-requisite)	Chemistry and Biology - One or more basic (general) chemistry course or one or more basic biology course	Sophomore, Junior or Senior	
Won H. Suh	whs@temple.edu	Engineering	Bio-engineering	Synthesis of biocompatible photo- or ionically-crosslinked 3D hydrogels	Three-dimensional microenvironment conditions ideal for sustaining mammalian cell cultures will be developed via the conjugation of cross-linkable organic functional groups and peptides on naturally occurring polymers such as alginate, hyaluronan, and gelatin. Biochemical assays for cell viability will be utilized to assess biocompatibility.	TU Main Campus	Having taken chemistry and biology courses (with lab) as a pair (at least) will help the student (but it is not a pre-requisite)	Chemistry and Biology - One or more basic (general) chemistry course or one or more basic biology course	Sophomore, Junior or Senior	

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Won H. Suh	whs@temple.edu	Engineering	Bio-engineering	The biological properties of 3D printed polymers	Thermoplastics (e.g., polylactic acid) or photocrosslinkable polymer precursors (e.g., vinyl polymer) will be 3D-printed on two-dimensional surfaces or inside three-dimensional structures. The 3D designs will be rendered via CAD software and printed using a standard 3D printer. Testing of biological properties will focus on cell viability and cell adhesion.	TU Main Campus	Having taken chemistry and biology courses (with lab) as a pair (at least) will help the student (but it is not a pre-requisite)	Chemistry and Biology - One or more basic (general) chemistry course or one or more basic biology course	Sophomore, Junior or Senior	
Won H. Suh	whs@temple.edu	Engineering	Bio-engineering	Synthesis of cell penetrating and bioactive peptides for drug delivery	Bioactive and/or cell penetrating peptide sequences will be synthesized via solid-phase peptide synthesis (SPPS) methods. Characterization will be performed via NMR and Mass Spectrometry methods after separation of molecules via HPLC (High-Performance Liquid Chromatography). Depending on the success of the peptide synthesis, live-cell experiments will be conducted to test the peptide's bioactivity.	TU Main Campus	Having taken chemistry and biology courses (with lab) as a pair (at least) will help the student (but it is not a pre-requisite)	Chemistry and Biology - One or more basic (general) chemistry course or one or more basic biology course	Sophomore, Junior or Senior	
Xavier Grana	xgrana@temple.edu	TUSM	Fels Institute for Cancer Research	Understanding Substrate Specificity of Protein Phosphatases and their regulation in cells	There are various projects available that deal with the characterization of the substrate specificity of the B55α/PP2A holoenzyme and its regulation in cells. (1) B55α/PP2A holoenzyme substrate specificity This project focuses on determining the determinants of substrate specificity of B55α/PP2A holoenzymes using various unrelated substrates of this holoenzyme. We have and	TUSM	Motivation for Science and Research Background knowledge - Previous lab experience is NOT required	Biochemistry, Biology, Bioinformatics - Genetics and/or Biochemistry and/or Cell Biology	Junior or Senior	

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Xiangdong Wu	xiangdong.wu@temple.edu	TUSM		Protein phosphatease 5 a novel key regulator in the insulin signaling cascade in myoblasts and adipocytes						
Xiao-feng Yang	xfyang@temple.edu	TUSM	Pharmacology	Regulation of vascular inflammation and atherosclerosis	Dr. Xiaofeng Yang's laboratory, located in the MERB-10th floor-1083, Centers of Metabolic Disease Research, Cardiovascular Research, Thrombosis Research and Departments of Pharmacology and Immunology, focuses on studying the regulatory mechanisms of vascular endothelial cell, smooth muscle cell, monocyte, adipocyte and regulatory T cell immune responses related to vascular inflammation and atherosclerosis. Atherosclerosis is a chronic autoimmune inflammatory disease characterized by intense immunological activity, and is the main cause of ischemic stroke and cardiovascular disease	TU Health Science Campus		Cardiovascular Research Center		
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	TU Main Campus	Good programming skills - High GPA -Solid math background - Good communication skills - Team working skills	CS/IST/Math-CS majors	Sophomore, Junior or Senior	

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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	TU Main Campus	Good programming skills - Good communication skills Team working skills High GPA Sound math background	CS/IST/Math-CS majors	Sophomore, Junior or Senior	
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	TU Main Campus	Good programming skills High GPA Sound math background	CIS, Math		

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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	TU Main Campus	Interested in research, hard working, aptitude for careful laboratory research, fond of problem solving, motivated to learn, basic understanding of physics	physics, engineering		
Xingting Wang	xingting@temple.edu	CST	Mathematics Department	Quantum p-Groups	In this project, we are going to investigate the quantized version of p-groups in the classical group theory and to explore their classification in low dimensions using all sorts of modern mathematical tools.	Main Campus	Linear Algebra and some basic concepts of Abstract Algebra	Mathematics	Seniors	
Xuebin Qin	xuebin.qin@temple.edu	TUSM	Neuroscience	Applying a novel cell knockout model for CNS diseases	Conditional and targeted cell ablation is fast becoming a powerful approach for studying cellular functions and tissue regeneration in vivo. Taking advantage of the exclusive IL Y interaction with hCD59, I have developed a novel tool to investigate the role of specific cells in the pathogenesis of human diseases. IL Y administration to the transgenic mice expressing hCD59 in specific cells can be used to generate this cell ablation model, in which IL Y specifically damages hCD59-expressing cells in the mice. We can utilize this concept to develop a new cell ablation model to study the functions of different cell types under	TU Health Science Campus	Working hard - Genetics Cell biology	Genetics or molecular biology		

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Yang Hu	yanghu@temple.edu	TUSM	Shriners Research Center	Neuroprotection by ER stress manipulation	We are explore the therapeutic potential of ER stress modulation on neuronal soma and axon survival. The students will learn some basic bench skills, for example genotyping transgenic mouse lines using PCR and immunostaining of mouse tissues. Also the students are expected to be involved in quantification of surviving neurons and axons.	TU Health Science Campus		Neuroscience	Seniors	
Yi Rao	yirao@temple.edu	CST	Chemistry	Two-dimensional Layered Organic-Inorganic Hybrid for Photovoltaic Applications	We will synthesize novel 2D layered materials for photovoltaic applications. We evaluate and control the elementary processes that govern the properties and performance of perovskite materials in photovoltaic and optoelectronic devices illustrated by dye sensitized solar cells (DSSC) and light emitting diodes (LED). Application of these unprecedented measurement capabilities to relevant materials issues benefits from inter-dependent programs in materials design, preparation, and processing.	TU Main Campus	Physical chemistry and organic chemistry	chemistry or physics	Junior, senior	
Yi Rao	tuf42202@temple.edu	CST	Chemistry	Photovoltaic applications of multiple exciton generation from Ge nanocrystals	In this undergraduate research, we aim to investigate both Ge nanocrystal inorganic materials interactions with light and the potential for unique photovoltaic applications, including the generation of multiple carrier generations in Ge nanocrystals. It includes two parts. Part A: Characterization of linear optical properties of Ge nanocrystals using absorption, fluorescence, and Raman scattering spectroscopy. The students will investigate the optical characteristics of inorganic silicon nanocrystals using a range of available spectroscopic tools. These measurements will be performed on samples	TU Main Campus		Chemistry, physics, engineering	Sophomore, Junior, Senior	

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Yugang Sun	ygsun@temple.edu	CST	Chemistry	New Paradigm for Photocatalytic Energy Conversion	The project seeks to use a fundamentally new principle to enhance photocatalytic efficiency of nanomaterials. The photocatalysts (including metal nanocrystals and semiconductor nanocrystals) with weak optical absorption can be enhanced in their absorption by hybridizing with dielectric nanomaterials. The enhanced optical absorption will promote their photocatalytic activities to enable energy conversion reactions that cannot be driven in the past. This research will significantly enrich the library of efficient photocatalyts for energy applications	TU Main Campus		Chemistry or Physics	Junior or Senior	
Yugang Sun	ygsun@temple.edu	CST	Chemistry	Microfluidic synthesis of graphene-supported quantum dots for photocatalysis	This project seeks to use the home-built microfluidic reactor for synthesizing graphene-supported semiconductor quantum dots, which can adsorb solar energy to drive useful chemical reactions (i.e., photocatalysis). The student will use the method recently developed in my group to synthesize graphene-supported semiconductor quantum dots including CdSe and CdS	TU Main Campus	Wet Chemistry	chemistry	Seniors	
Yugang Sun	ygsun@temple.edu	CST	Chemistry	Microfluidic synthesis of graphene-supported metal nanocatalysts	This project seeks to use the home-built microfluidic reactor for synthesizing graphene-supported metal nanocrystals, which exhibit clean surfaces for catalysis with improved performance. By using the method we recently developed, nanocatalysts can be directly loaded to graphene support in the microfluidic reactor. The student will be expected to synthesize graphene-supported noble metal nanocrystals including silver, gold, platinum, palladium, and their alloys.	TU Main Campus	Wet Chemistry	chemistry	Juniors or Seniors	

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Zoran Obradovic	zoran.obradovic@temple.edu	CST	CIS - Data Analytics Center, Computer and Information Science, Statistics	Predictive analytics in big data	Predicting the system behaviors by analyzing big data. Applications include social networks, medicine, climate and environment. For more details see http://www.dabi.temple.edu/~zoran/	TU Main Campus	Interdisciplinary interests; Self-motivation; Problem solving skills; Some programming experience in any language -the projects will be tailored to the students' level of preparation.	Computer Science, Statistics, Physics, Biology, Chemistry, Pharmacy, Geology, Environmental Science		