

Temple University

College of Science and Technology

Research Scholars Program (RSP)

Research
Opportunities
Fall 2024

Why Research? Why Me?

Research creates mentorship opportunities and pathways to success and provides advanced skills and experience, enabling graduate and professional school success. There are numerous research opportunities available to the College of Science and Technology (CST) undergraduate students. All departments have research courses, coop opportunities, and internship and/or independent study courses. Funded research is available through the CST and special programs such as our *Frances Velay Fellowship* or our *National Science Foundation Louis Stokes Alliances for Minority Participation (NSF-LSAMP)* projects. These are research leadership programs for female and under-represented minority students available through a competitive selection process. Additionally, there are many funded research opportunities in other academic settings. Summer and academic year internship opportunities are coordinated through our professional development center, located in the CST Advising Center in Tuttleman Learning Center – 111.

The College of Science and Technology's **Research Scholars Program (RSP)** includes numerous professional development opportunities, hands-on laboratory experiences, and career advancement and encourages success well beyond the baccalaureate degree.

During the academic year, **RSP** students engaging in research **MUST**:

- Register for a research course for one credit and a special/designated section of CST's professional development course, SCTC 2002, or a research course for a total of two (2) credits.
- Commit a minimum of 10 hours each week to the project, and students will receive a tuition grant of \$500 upon completing the project as certified by their mentor.
- Attend monthly mandatory RSP meetings
- Attend and present your research at the 2024 Fall CST Undergraduate Research Symposium

Research students may be paid participants of CST research for two terms, after which they are encouraged to continue their research for academic credit or join another funded program.

Eligible applicants must:

- Be a current CST student,
- Have an overall GPA above 2.75, and
- Have successfully completed ten or more credit hours in Math and/or Science.

Research at Different Campuses & Locations!

Main Campus - The link below shows a map of the buildings and facilities located at Temple University's Main Campus.

https://www.temple.edu/sites/www/files/ENR_ADM_0322-Campus-Map-Tour-Feb22_RF_v1c.pdf

Ambler Campus - The link below shows a map of Temple University's Ambler Campus, including parking information. Transportation from Main Campus to the Ambler Field Station is available via the inter-campus bus/shuttle. The shuttle schedule is provided below.

https://www.temple.edu/sites/www/files/AmblerMap_Update_RB_Jan%2B2020%2B-%2Bfinal.pdf

Health Sciences Campus - This link below shows a map of the Health Sciences Campus, including the Lewis Katz School of Medicine facilities, the Kornberg School of Dentistry buildings, and the facilities for The School of Pharmacy and Allied Health. The subway and university shuttle provide convenient transportation to these locations.

https://www.temple.edu/sites/www/files/uploads/TUHSC_map.pdf

Temple University Shuttle Provided Between Main Campus, HSC, & Ambler - This link provides the Temple University inter-campus bus/shuttle schedule for ALL campus locations for the 2023-24 academic year.

<https://campusoperations.temple.edu/shuttle-services/between-main-campus-hsc-ambler>

Fox Chase Cancer Center - Fox Chase Cancer research operates out of their location in the Fox Chase section of Philadelphia. Many of their other locations are for treatment and, therefore, do not offer research opportunities. The locations for ALL Fox Chase services are provided in the link below. You should confirm the research location with your PI.

<https://www.foxchase.org/locations/fox-chase-cancer-center-main-campus>

The primary Fox Chase Cancer research location in Philadelphia, PA can be reached by SEPTA regional rail. The transit time from Temple University Main Campus to the Fox Chase station is approximately 30 minutes. The Septa Regional Rail Schedule for the Fox Chase Line can be found at the link below.

<https://www5.septa.org/travel/routes/rail-fox-chase/>

List of Research Opportunities

(Alphabetical Order by Faculty Mentor's Last Name)

CST = College of Science and Technology

LKSOM = Lewis Katz School of Medicine

FCCC = Fox Chase Cancer Center

PHARM = School of Pharmacy

CoENG = College of Engineering

Autieri, Michael

Affiliation(s): LKSOM

Email Address: mautieri@temple.edu

Research Topic: Investigation into mRNA stability in vascular disease

Description of Research Opportunity: Our lab investigates the effect of inflammatory cytokines on modulation of mRNA stability and gene expression in vascular smooth muscle cells, which comprise the cellular component of arteries. The student will learn to culture primary human vascular smooth muscle cells, isolate RNA, and perform reverse transcription and quantitative PCR. The student may also learn protein analysis and other techniques.

Special Requirements: general laboratory experience. cell culture is a plus. a willingness to learn and good communication skills are a must.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 1

Barbe, Mary

Affiliation(s): Aging + Cardiovascular Discovery Center/LKSOM

Email Address: mary.barbe@temple.edu

Research Topic: Strategies to reinnervate the bladder after injury

Description of Research Opportunity: We are engaged in improving strategies of reinnervation of the bladder after neural injury using growth factor administration combined with surgical nerve transfer methods. This project allows for learning surgical methods, animal handling, tissue processing and sectioning, and examining neuroplastic changes using fluorescence and bright field microscopy.

Special Requirements: Will teach what is needed.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Beadling, Rebecca

Affiliation(s): Earth and Environmental Science/CST

Email Address: rebecca.beadling@temple.edu

Research Topic: Investigation of Katabatic winds in climate models

Description of Research Opportunity: Regional ocean circulation patterns transporting heat across and along the Antarctic continental shelf will ultimately dictate how the Antarctic Ice Sheet will evolve in the future. Ocean circulation is highly sensitive to near-Antarctic surface winds. Characterized by easterlies over large swathes of the continental shelf and regions of intense southerly density-driven Katabatic winds, the strength and spatial patterns of near-Antarctic winds are strongly influenced and steered by the topography of the Antarctic continent. Given the role of local winds in forcing regional ocean circulation, which controls heat content on the shelf, accurate modeling and constraining future projections of potential Antarctic Ice Sheet mass loss will require improved simulations of the local wind field. The goal of this project will be to improve our understanding of how climate models represent winds near Antarctica and their role in ocean circulation patterns. The undergraduate researcher (UR) will work with results from state-of-the-science climate model simulations, performing analysis that improves our understanding of the baseline representation of Antarctic winds and correlations between Katabatic wind variability and regional ocean circulation. The UR will use the Python programming language for all analysis and become fluent in the use of Git, GitHub, and the Unix command line interface. Students should have prior experience using Python and have a general interest in understanding climate dynamics.

Special Requirements: Experience using Python. Have taken EES 2096 Climate Change Ocean to Atmosphere and preferred completion of Calc I - II.

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Behm, Jocelyn

Affiliation(s): Biology/CST

Email Address: jebehm@temple.edu

Research Topic: Spotted Lanternfly Ecology

Description of Research Opportunity: The spotted lanternfly is a very successful invasive species – you probably know this because you’ve seen them everywhere! Despite their prevalence, we know surprisingly little about them, including what plant species they eat. This project will involve documenting which plant species spotted lanternflies are feeding on in rural, urban, and agricultural habitats in and around the Philadelphia region. Students will assist in plant identification and measuring plant and spotted lanternfly abundance. Students will have opportunities to develop related independent projects if desired.

Special Requirements: Major or coursework in Biology, Ecology, Evolution, and Behavior Environmental Science, or a related field.

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Bonfim, Mariana

Affiliation(s): Biology/CST

Email Address: mariana.bonfim@temple.edu

Research Topic: Monitoring Forest Resilience to Novel Climate-Driven Disturbances

Description of Research Opportunity: While forests provide important ecosystem services such as carbon storage and the maintenance of biodiversity, these systems are in the midst of profound transformations due to human impacts and changes to disturbance regimes due to climate change. To contribute to the global effort to monitor forests through time and sustain a long-term effort in research and education, the Ambler Field Station has established a forest observatory plot following standardized protocols shared by the Smithsonian Institution through the ForestGEO network. A tornado that formed from Hurricane Ida, caused substantial damage to the Temple Forest Observatory in September 2021. The current goal of the project is to provide fine-scale field data on the plant community composition, ecosystem biodiversity, animal activity using trail cameras, novel ecosystems created after the disturbance, and document seedling growth, among other factors that help inform research about resilience and recovery to climate-driven disturbances. Students will engage in outdoor and indoor, hands-on research to understand forest recovery, while developing skills in field data collection, data analysis, and more, while also developing an independent project that complements the Temple Forest Observatory and Ambler Field Station research goals.

Special Requirements: Required skills and abilities include the capacity to carry a light pack on rough and uneven terrain and work outside in inclement weather conditions. Candidates should be able to work independently and collaboratively with other students and researchers, both in the field and in the laboratory. Strong attention to detail is essential, along with the ability to record detailed records and inventories accurately.

Location: Temple Ambler Campus

of Early Career Research Positions: 3

of Upperclassperson Research Positions: 3

Borguet, Eric

Affiliation(s): Chemistry/CST

Email Address: eborguet@temple.edu

Research Topic: Catalysis with metal oxyhydroxides

Description of Research Opportunity: Catalysis with metal oxyhydroxides. While it is known that many metal salts react in water (hydrolyze) to form small assemblies (metal oxyhydroxide clusters) that can catalyze important chemical reactions, the structure of these clusters and the mechanism of their activity are not well understood.

Under appropriate supervision, students will perform experiments and plot and analyze data. They will learn to make connections with the literature to interpret their data. They will gain skills in presenting their results to the research team and eventually at local, regional, and even national conferences. Many undergraduates have been co-authors of peer-reviewed publications.

Students will learn about catalysis, spectroscopy, and kinetics.

Special Requirements: none

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Borguet, Eric

Affiliation(s): Chemistry/CST

Email Address: eborguet@temple.edu

Research Topic: Ultrafast Laser Vibrational Spectroscopy of Molecular Species at Bio and Geochemical Interfaces

Description of Research Opportunity: Ultrafast Laser Vibrational Spectroscopy 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 less than a single layer of molecules. Students will investigate water, arguably the most important molecule on the planet, and molecular ions at interfaces of biological and geochemical relevance. Under appropriate supervision, students will perform experiments and plot and analyze data. They will learn to make connections with the literature to interpret their data. They will gain skills in presenting their results to the research team and eventually at local, regional, and even national conferences. Many undergraduates have been co-authors of peer-reviewed publications. Students will learn about optics, surface chemistry, biointerfaces, geochemistry, and laser spectroscopy.

Special Requirements: None

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Borguet, Eric

Affiliation(s): Chemistry/CST

Email Address: eborguet@temple.edu

Research Topic: Capture, detection, and destruction of toxic chemicals.

Description of Research Opportunity: Capture, detection, and destruction of toxic chemicals.

Metal-organic frameworks (MOFs) are nanoporous materials that can trap and even destroy chemical species. We want to understand how and where these molecules bind in the MOFs as well as determine the mechanisms of chemical transformation. Under appropriate supervision, students will perform experiments and plot and analyze data. They will learn to make connections with the literature to interpret their data. They will gain skills in presenting their results to the research team and eventually at local, regional, and even national conferences. Many undergraduates have been co-authors of peer-reviewed publications. Students will learn about infrared spectroscopy, mass spectrometry, and vacuum systems, as well as adsorption/desorption and diffusion kinetics.

Special Requirements: none

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Buque Martinez, Aitziber

Affiliation(s): Biology/CST

Email Address: aitziber.buquemartinez@fccc.edu

Research Topic: Breast Cancer

Description of Research Opportunity: My lab is investigating the relationship between the host's metabolic state and breast cancer development, with a focus on identifying potential therapeutic targets to improve treatment outcomes. The candidate will investigate the in vitro effects of potential anticancer agents on breast tumor cells, examining changes in:

1. Viability (cell survival and death)
2. Cell cycle (cell growth and division)
3. Immunogenicity (ability to stimulate an immune response)

To accomplish this, the candidate will employ various techniques, including:

1. Flow cytometry (analyzing cell properties using fluorescent labels)
2. ELISA (enzyme-linked immunosorbent assay for protein detection)
3. RT-PCR (reverse transcription polymerase chain reaction for gene expression analysis)
4. Immunofluorescence (visualizing protein localization using fluorescent labels)

Special Requirements: The ideal candidate for this research position should possess:

1. Practical experience in cell culture techniques, including:
 - a. Cell expansion and passaging
 - b. Cell counting and viability assessment
 - c. Maintenance of cell cultures (e.g., media changes, contamination prevention)
2. A strong passion for understanding tumor metabolism and immunology, with a desire to contribute to research in this field.

Location: Fox Chase Cancer Center

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 1

Buttaro, Bettina

Affiliation(s): Thrombosis Research Center/LKSOM

Email Address: bbuttaro@temple.edu

Research Topic: Interdependent biofilm community organization

Description of Research Opportunity: The microbiota is a complex ecology composed of bacteria, viruses, and fungi. Within this complex ecology are subcommunities of interdependent bacteria. We use subaerial biofilms as a natural model to understand the rules of spatial organization of interdependent communities. A combination of biological experiments, mathematical modeling, and machine learning are used to uncover the rules of community organization.

Special Requirements: No special requirements.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Chong, Parkson

Affiliation(s): Medical Genetics & Molecular Biochemistry/LKSOM

Email Address: pchong02@temple.edu

Research Topic: Mechanistic and Cytotoxicity Studies on the Anti-Thrombotic Liposome DPAL

Description of Research Opportunity: The goal of this research is to develop a novel anti-thrombotic agent with improved therapeutic efficacy for treating pulmonary embolism yet without serious side effects. During the past few years, our group has developed and thoroughly tested a stable liposome nanoparticle composed of 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (POPC) and a synthetic lipid analogue Zn(II)-bis-dipicolylamine cyanine 3 [22,22] (abbreviated DPA-Cy3[22,22]), which can bind preferentially to phosphatidylserine (PS)-rich surfaces such as the surface of activated platelets. Such Zn-DPA-containing liposome nanoparticles are termed DPAL. Using the mouse model, our research collaborative team demonstrated that DPAL exhibits anti-thrombotic effects on mice, with negligible bleeding. This finding led to a US patent entitled “Anti-thrombotic agents and methods of use thereof” (US patent number 11,090,309; issued in 2021). While the in vivo physiological study on mice and the in vitro stability study in solution were extremely promising, we need to conduct studies to gain a mechanistic understanding of the DPAL’s anti-thrombotic effect and to demonstrate that DPAL lacks cytotoxicity. To address these issues, students will use liposome methodology, cytotoxicity assays, dynamic light scattering, and fluorescence spectroscopy.

Special Requirements: Students majoring in chemistry, biology, biochemistry, and biophysics are welcome to apply. No special coursework or experience is required.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Constantinou, Martha

Affiliation(s): Physics/CST

Email Address: marthac@temple.edu

Research Topic: Numerical simulations in nuclear physics

Description of Research Opportunity: The proposed projects fall under the field of theoretical nuclear physics. More precisely, they will investigate the rich and complex internal structure of fundamental particles like the proton, the pion, and the kaon, collectively called hadrons. Thus, this research field is known as "hadron structure." The key formulation for the project is numerical simulations of the theory of Quantum Chromodynamics (QCD). QCD is the foundational theory governing the strong interaction responsible for binding quarks and gluons into composite particles known as hadrons, the core of the visible matter. My research can incorporate up to two undergraduate students who will be involved in the analysis of data that are related to the physical characteristics of the particles, such as their mass, spin, energy, and momentum. The analysis tool is primarily Python (or similar). The students will also get access to the "QCD" cluster, which is part of the Temple Owlsnest Computational facility and is dedicated to this research under Constantinou's group.

Special Requirements: Experience with computational programming languages such as Python is needed. Physics experience would be useful for physical motivation. However, purely computational and algorithmic research on data analysis is possible without knowledge of physics.

Location: Temple Main Campus

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 2

Cukierman, Edna (Eti)

Affiliation(s): Greenberg Pancreatic Cancer Institute/FCCC

Email Address: Edna.Cukierman@fcc.edu

Research Topic: The Pancreatic Tumor Microenvironment

Description of Research Opportunity: The Cukierman Laboratory is dedicated to understanding the complex interplay between desmoplasia, the dense mesenchymal microenvironment of solid tumors, and tumor progression. Utilizing a unique 3D culturing system that mimics the in vivo mesenchymal stroma, the laboratory investigates the functional roles of desmoplasia in tumorigenic behaviors, including invasive spread, metabolic support, and immune suppression. Leveraging a multifaceted approach that integrates cell biological and bioengineering techniques, the Cukierman team has developed Harmonic Output of Stromal Traits (HOST), a novel method for identifying tumor microenvironment (TME) cells and HOST-Factor, a numerical metric that quantifies their functional states. These tools enable the laboratory to assess the relative contribution of the main functional unit composed of cancer-associated fibroblasts (CAFs) and CAF-generated extracellular matrix (ECM), as well as the units' interaction with other TME cells to impart tumor-supportive or tumor-suppressive functions. Ongoing research within the Cukierman Laboratory seeks to uncover key mechanisms of CAF/ECM unit functions, identify new stromal targets, and develop stroma targeting modalities. Additionally, the laboratory is investigating whether HOST-Factor values can serve as TME-based prognostic indicators for patient outcomes and predict or inform on drug efficacy. Moreover, the team is exploring the potential influence of macro-environmental factors, such as residing in low socioeconomic status (nSES) neighborhoods, in exacerbating the pro-cancer TME function.

Special Requirements: n/a

Location: Fox Chase Cancer Center

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Daws, Stephanie

Affiliation(s): Neural Sciences/LKSOM

Email Address: stephanie.daws@temple.edu

Research Topic: Molecular mechanisms of opioid seeking

Description of Research Opportunity: The undergraduate researcher will perform gene and protein expression measurements to define molecular neuroadaptations associated with long-lasting opioid-seeking behavior.

Special Requirements: Basic chemistry, biology. Neuroscience courses are advantageous.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Dolgushev, Vasily

Affiliation(s): Mathematics/CST

Email Address: vald@temple.edu

Research Topic: The action of Grothendieck-Teichmueller shadows on child's drawings

Description of Research Opportunity: Grothendieck-Teichmueller (GT) shadows are tantalizing objects that connect topology, geometry, and number theory. Students will need to master the introductory material on braid groups, child's drawings the material of the paper "GT-shadows for the gentle version of the Grothendieck-Teichmueller group" by V.A. Dolgushev and J.J. Guynee. After that, they would work on open questions related to the action of GT-shadows on children's drawings. Students would also contribute to a SageMath software package for working with GT-shadows for the gentle version of the Grothendieck-Teichmueller group.

Special Requirements: Math 3098. Some coding experience would be helpful.

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Duy, Cihangir

Affiliation(s): LKSOM/FCCC

Email Address: cihangir.duy@fccc.edu

Research Topic: Identifying and targeting therapeutic vulnerabilities in aggressive leukemia

Description of Research Opportunity: The overarching goal of the Duy lab (<https://www.foxchase.org/cihangir-duy>) is to make discoveries that benefit leukemia patients and gain a deeper understanding of leukemia biology. The lab's interests range from bioinformatic projects to functional projects using CRISPR tools. In addition, we utilize high-throughput drug screening techniques coupled with sophisticated cell culture models and immunotherapy to kill leukemia cells. Motivated and productive students will be part of a highly collaborative and dynamic team, earn co-authorships on papers, and participate in local and national meetings.

Special Requirements: Experience in Molecular and Cell Biology, Immunology, Bioengineering, Computer Science, or Math will be beneficial.

Location: Fox Chase Cancer Center

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 2

Feitelson, Mark

Affiliation(s): Biology/CST

Email Address: feitelso@temple.edu

Research Topic: Mechanisms of chronic inflammatory disease

Description of Research Opportunity: critical thinking project aimed at understanding the mechanisms of pathogenesis that drive chronic liver disease and a new therapeutic approach effect treatment and cure.

Special Requirements: 3.3 GPA or higher; willing to work semi-independently and be available for weekly meetings to discuss progress; synthesis a cell/molecular model based on research findings

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Fleming, Steven A.

Affiliation(s): Chemistry/CST

Email Address: sfleming@temple.edu

Research Topic: Development and Assessment of Interactive Organic Reaction Animations

Description of Research Opportunity: The big idea of this proposal is to develop and assess a free, downloadable, easy to use, interactive smartphone application called Interactive Organic Reaction Animations (iORA). The software provides 3D visualization of reactions taught in organic chemistry class. The animated reactions are based on quantum-mechanical simulations. Assessment of the application in both classroom and laboratory settings is needed because it is unknown if the teaching tool will impact student attitudes, 3D perspective, and/or chemical understanding. This application provides both a qualitative and a quantitative virtual model that allows visualization of reaction mechanisms based on transition states for the most common organic reaction mechanisms. It draws student attention to changes that occur during a chemical reaction. The iORA application provides key qualitative and quantitative details that are not available in textbooks. Assessment of this application will provide new knowledge about how qualitative and quantitative information of organic reactions impacts teacher and student motivation as well as specific and general knowledge of organic chemistry.

Special Requirements: Chem 2201 (Organic Chemistry)

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Ghosh, Jayashri

Affiliation(s): Fels Cancer Institute for Personalized Medicine/LKSOM

Email Address: jayashri.ghosh@temple.edu

Research Topic: Epigenetic changes in ART and cancer disparities

Description of Research Opportunity: My lab studies epigenetic changes, especially DNA methylation. We have currently two projects: Assisted Reproductive Technology (ART) and Colorectal cancer (CRC). In both projects, we employ epigenetic techniques to assay DNA methylation, expression, and microbiome (CRC). In the ART project, our major focus is to analyze the effect of different clinical manipulations involved in the ART process on the epigenome. In the CRC project, our aim is to study the role of epigenetic changes on cancer disparities pertaining to Black/ African American population.

Special Requirements: Basic biology

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Glassman, Patrick

Affiliation(s): Pharmaceutical Sciences/PHARM

Email Address: patrick.glassman@temple.edu

Research Topic: Engineering Improved Anti-Thrombotic Drugs

Description of Research Opportunity: Many drugs affecting coagulation are limited due to rapid elimination from the body or safety considerations. Our lab is focused on developing tools to address these key limitations and develop more effective therapies. The student will have the opportunity to work with lab members to engineer anti-thrombotic drugs for improved pharmacological properties. Training and experience will be provided in protein expression and purification, bioconjugation, chromatography, and in vitro clotting assays.

Special Requirements: It would be desirable to have a background in biochemistry and/or molecular biology.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 1

Gould, Alison

Affiliation(s): Biology/CST

Email Address: alison.gould@temple.edu

Research Topic: Microbial Symbiosis

Description of Research Opportunity: This project seeks to characterize and compare the whole genomes of the luminous bacterial symbionts of several species of bioluminescent fish in the *Siphamia* genus from Australia. The researchers will be responsible for culturing the bacteria, extracting DNA, screening for unique genotypes using a PCR-fingerprinting method, and potentially whole genome sequencing and assembly using various bioinformatic tools, depending on skills and interest.

Special Requirements: Microbiology experience preferred (Microbiology Lab).

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Grabovsky, Yury

Affiliation(s): Mathematics/CST

Email Address: yury@temple.edu

Research Topic: Maximizing figure of merit for two-phase thermoelectric composite materials

Description of Research Opportunity: The undergraduate researcher will be engaged in the mathematical analysis to guide the design of two-phase thermoelectric composite materials of maximal efficiency (called figure of merit) converting thermal energy into electricity. The researcher will learn the basics of the theory of composites and a bit of thermodynamics. The project is expected to culminate in a paper to be published in a peer-reviewed journal. Please, don't hesitate to contact me directly for more specifics about the project.

Special Requirements: Access to and familiarity with a computer algebra system, such as Mathematica or Maple. Calc. I-III

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Grattepanche, Jean-David & Sanders, Robert

Affiliation(s): Biology/CST

Email Address: jd.grattepanche@temple.edu & robert.sanders@temple.edu

Research Topic: Microbial ecology

Description of Research Opportunity: In this project (a collaboration between Dr. Sanders and Dr. Grattepanche), you will study the growth of two microbial eukaryotes – Chrysolepidomonas and Ochromonas. The main objective will be to assess the impact of nutrient loading and bottle effect on the growth of these two chrysophyte cultures. This will require the use of inverted microscopy and potentially epifluorescence microscopy.

Special Requirements: N/A

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Grattepanche, Jean-David

Affiliation(s): Biology/CST

Email Address: jd.grattepanche@temple.edu

Research Topic: Antarctic Phytoplankton ecology

Description of Research Opportunity: Within the aquatic microbes, phytoplankton consume CO₂ and produce organic matter using photosynthesis. Globally, phytoplankton are responsible for half of the Oxygen production and are considered as a Carbon sink. For this project, you will investigate phytoplankton diversity from samples collected during three cruises in Antarctica. You will learn bioinformatics using DNA sequences from previously generated high-throughput data and statistics to analyze beta diversity and understand the environmental parameters shaping the Antarctic phytoplankton community.

Special Requirements: N/A

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Grattepanche, Jean-David & Buttaro, Bettina

Affiliation(s): Biology/CST & Biomedical Education/LKSOM

Email Address: jd.grattepanche@temple.edu

Research Topic: Composition and structure of biofilm on monuments

Description of Research Opportunity: In this project, you will learn Fluorescent In-situ Hybridization (FISH) to assess the composition and structure of biofilm on monuments (we collected samples from the roof of Federal Hall in NYC). The work will combine bioinformatics to design oligonucleotide probes (Dr. Grattepanche, Biology department) and confocal microscopy (Dr. Buttaro, Medical School).

Special Requirements: N/A

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Grattepanche, Jean-David

Affiliation(s): Biology/CST

Email Address: jd.grattepanche@temple.edu

Research Topic: Single-cell 'omics

Description of Research Opportunity: Microbial eukaryotes provide important functions in aquatic ecosystems. However, there is still a gap between what we know using morphology (shape, color, ornamentation), genetics (DNA sequences), and the identity of these microbes (taxonomy). In this project, you will learn to isolate single cells, photodocument them and assess the DNA sequences from fixed samples. This project will involve microscopy to isolate single cells, molecular skills to assess DNA, and bioinformatics to analyze the DNA sequences.

Special Requirements: N/A

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Green, Herbert A.

Affiliation(s): Mathematics/TUteach/CST

Email Address: herbgreen@temple.edu

Research Topic: Which factors increase enrollment of minority/underrepresented groups in higher-level mathematics in high school and college?

Description of Research Opportunity: The researcher will investigate factors that influence the percentage of minority/underrepresented groups enrolled in higher mathematics courses in the School District of Philadelphia high schools and in several area colleges, including Temple, Bryn Mawr/Haverford, Drexel, LaSalle, Arcadia, UPenn, West Chester.

Special Requirements: Experience in developing interviews of leaders and students, statistical methods, and data analysis would be preferred.

Location: Temple Main Campus

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 2

Helmus, Matthew

Affiliation(s): Biology/CST

Email Address: mrhelimus@temple.edu

Research Topic: Ecology, Conservation, Invasive Species, Climate Change

Description of Research Opportunity: The Integrative Ecology Lab (iecolab.org) is looking for research interns with an interest in making a difference in our world. The mission of iEcoLab is to integrate biodiversity science with human ecology to understand contemporary patterns of biodiversity and its functioning within ecosystems. Students can work on a variety of projects in the lab, out in the field, and on the computer. We work on spotted lanternflies, Caribbean reptiles, Philly trees, and mathematical models. We focus on how Earth systems respond to climate change, land development, and international trade. We provide students with the leadership and technical skills to lead impactful lives. Students who intern with us regularly go on to graduate school, med school, and get employed by major sustainability, environmental, and technology firms. Check out our recent activity on our news page and on Facebook, Instagram, and YouTube (iecolab.org).

Special Requirements: None, send us your resume and a letter of interest.

Location: Temple Main Campus

of Early Career Research Positions: 5

of Upperclassperson Research Positions: 5

Isenberg, Derek

Affiliation(s): Emergency Medicine/LKSOM

Email Address: derek.isenberg@tuhs.temple.edu

Research Topic: Emerging Infectious Disease Surveillance

Description of Research Opportunity: CRASHED is an observational study that is part of Emerging Infectious Disease Network (EIDNET) with the goal of surveying Mpox in the emergency department setting. Findings of the study would impact ongoing public health efforts to control the spread of this infection.

ESCAPED is an observational study that is part of EIDNET. Its goal is to quantify the prevalence of MRSA and to survey its antibiotic resistance. The study's findings could impact ongoing public health efforts to combat its spread and mitigate MRSA's antibiotic resistance.

Role of the undergraduate researcher:

The undergraduate researcher will help screen potential participants in the ER and assist in data collection (i.e., conduction of survey, interviewing patients, photographing lesions, sample collection). As this role involves patient contact, they must be cleared to work with patients in the hospital (i.e., AYS volunteers).

Special Requirements: Undergraduate student must be cleared to work with patients in the hospital setting, i.e. AYS volunteers.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 2

Isenberg, Derek

Affiliation(s): Emergency Medicine/LKSOM

Email Address: derek.isenberg@tuhs.temple.edu

Research Topic: Pre-hospital delay in Acute ischemic stroke patients

Description of Research Opportunity: This is a cross-sectional, descriptive study which aims to determine factors associated with pre-hospital delay in patients with acute ischemic stroke in Philadelphia. Findings of this study could potentially elucidate modifiable factors to help guide program synthesis to reduce pre-hospital delays.

Role of the undergraduate researcher:

The undergraduate researcher will help screen potential participants in the ER and assist in data collection (i.e., interviewing patients, conducting the survey). As this role involves patient contact, they must be cleared to work with patients in the hospital (i.e., AYS volunteers).

Special Requirements: Interested undergraduate student must be cleared to work with patients (i.e., AYS volunteers).

Location: Temple Health Sciences Camp

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 1

Kane, Mamadou

Affiliation(s): Mathematics/CST

Email Address: mamadou@temple.edu

Research Topic: Improving the teaching and learning of intermediate algebra

Description of Research Opportunity: Improving the teaching and learning of developmental mathematics is imperative to creating pathways to quantitative majors for college students. COVID caused fragmented instruction in mathematics, leaving gaps in knowledge and skills. This study aims to investigate and improve developmental mathematics students' retention rate and academic achievement at a large urban community college and intends to encourage successful persistence in quantitative majors across the disciplines.

Special Requirements: None

Location: Temple Main Campus

of Early Career Research Positions: 5

of Upperclassperson Research Positions: 0

Karhadkar, Sunil

Affiliation(s): Surgery / LKSOM

Email Address: sunilk@temple.edu

Research Topic: Clinical outcomes in the context of disparities in access to Kidney and Liver Transplantation

Description of Research Opportunity: Kidney transplantation is a life-saving treatment for those with end-stage renal disease (ESRD), yet it is known that there are stark disparities in access to transplantation. Barriers to transplantation exist at every step of evaluation, as various socioeconomic and geographic factors are associated with delayed referral for transplant candidacy and increased time on the waitlist. The COVID-19 pandemic has been shown to have reduced access to care for those with chronic medical conditions, yet there is limited understanding on the effect that the pandemic has had on existing disparities for those with ESRD in a pre vs post COVID era. Using the largest national transplant registry, we are interested in evaluating the effect of the pandemic on known barriers to transplantation, and how that may influence surgical outcomes after kidney transplantation.

The Abdominal Organ Transplant team in the Department of Surgery at Temple University Hospital is accepting applications to select two highly motivated undergraduate students in the Fall 2024 Research Scholars Program. The position includes opportunities to lead your own research project alongside medical students, present at national research conferences, publish in prestigious journals, and shadow transplant surgeons throughout the organ procurement and transplantation processes. The program will provide one-on-one mentorship with surgical attendings and upper-classperson medical students. You will learn to approach a research question from scratch, analyze large databases, and improve your academic writing abilities. For examples our research team's projects and presentations, please visit the website (aotresearch.org).

Special Requirements: Previous coursework/knowledge of computer programming and statistics is recommended but not required. Please list relevant coursework/skills in your application.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 2

Khan, Mohsin

Affiliation(s): Cardiovascular Sciences/LKSOM

Email Address: mohsin.khan@temple.edu

Research Topic: Cardiac Repair and Regeneration

Description of Research Opportunity: The project aims to develop novel therapeutics for heart repair and regeneration that will be tested in animal models of heart disease and aging. A significant focus is to understand the role of metabolism in regulating cardiac repair and regeneration. Students will be able to learn latest techniques in cardiac regeneration, molecular biology and metabolic assays and including data analysis.

Special Requirements: Special Requirements: Biology, Biochemistry and Mathematics (Computational Modeling)

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 3

Kim, Bojeong

Affiliation(s): Earth and Environmental Science/CST

Email Address: bkim@temple.edu

Research Topic: Sustainable urban agriculture

Description of Research Opportunity: (a) help PI to create a survey form and conduct a survey for the type of food/yard waste for home-made compost; (b) perform the analysis of the survey results; and (c) help PI with planned outreach activities with high school students and/or local urban gardeners.

Special Requirements: Interests and/or experiences with (urban) gardening/farming

Location: Temple Main Campus

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 2

Kim, Daniel

Affiliation(s): Chemistry/CST

Email Address: danielkim@temple.edu

Research Topic: Development of Light-Mediated Reactions for use in Synthetic Organic Chemistry

Description of Research Opportunity: Develop new light-mediated transformations and methodologies. Working closely with a graduate student mentor, undergraduates are expected to help develop new synthetic transformations with the use of transition metal catalysis and photoredox catalysis. No prior knowledge or expertise required. Highly recommended to have taken CHEM 2201/2202 with goals to take CHEM 4201, 4202, or 4207. Interested applicants should reach out directly to Professor Kim by email and submit a resume/cv. One-on-one meetings will take place on a case-by-case basis to discuss synergistic fit and available research opportunity.

Special Requirements: Completed CHEM 2201/2202 with passing grade. Special preference for those who have taken or plan to take one upper division Organic Chemistry Course. (CHEM 4201, CHEM 4202, CHEM 4207)

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 0

Kumar, Sudhir

Affiliation(s): Biology/CST

Email Address: s.kumar@temple.edu

Research Topic: Evolutionary Bioinformatics: Computational Discoveries and Tool Development for Genomes, Tumors, and the Tree of Life

Description of Research Opportunity: Big data in genomics and biology is now ubiquitous, spanning practical to basic biomedicine, personal to population genomics, and local to global biodiversity. Our computational laboratory is focused on developing scalable, efficient, and effective methods to harness the knowledge embedded in the growing collections of genome sequences and genetic variation. Specifically, our research focuses on data science at the intersection of evolutionary and functional genomics, computational biology, and big data. We employ a holistic Pattern-Process-Prediction-Product (P4) paradigm, starting with the discovery of evolutionary and genomic patterns through comparative analysis of large datasets. These patterns reveal underlying biological processes, which we use to develop predictive models, translating fundamental knowledge into actionable information. Our innovations, and those of others, are made widely accessible through user-friendly software and database products (www.megasoftware.net and www.timetree.org).

The researcher will play an integral role in our research program, gaining hands-on experience in cutting-edge computational biology and big data analysis. They will participate in (a) Data Analysis: Conducting comparative analysis of genomic datasets to identify evolutionary and genomic patterns, (b) Model Development: Assisting in the development of predictive models that utilize evolutionary knowledge to provide actionable insights, and (c) Tool Development: Contributing to the development and testing of user-friendly software tools and databases that make our innovations accessible to the broader scientific community. This opportunity will not only provide valuable skills in data science, bioinformatics, and computational biology but also prepare students for advanced study or careers in these rapidly evolving fields, fostering personal and professional growth.

Special Requirements: Freshman and sophomore students interested in this research opportunity should ideally have some basic understanding of sequence data and an interest in learning about genomics and diseases. Those interested in tool development should have familiarity with a programming language.

Location: Temple Main Campus

of Early Career Research Positions: 5

of Upperclassperson Research Positions: 1

Lee, Hayan

Affiliation(s): Fox Chase Cancer Center

Email Address: hayan.lee@fccc.edu

Research Topic: Generate reports using LLM API and epigenome profile

Description of Research Opportunity: Building an automation system to generate human-readable and personalized html/pdf reports. We will try various LLM models.

Special Requirements: Python, Unix/Linux bash commands

Location: Fox Chase Cancer Center (Remote, Hybrid, In-Person)

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Lee, Hayan

Affiliation(s): Fox Chase Cancer Center

Email Address: hayan.lee@fccc.edu

Research Topic: Telomere counting and visualization

Description of Research Opportunity: From sequencing data, counting telomere length per chromosome and visualizing them.

Special Requirements: Python, Unix/Linux bash commands

Location: Fox Chase Cancer Center (Remote, Hybrid, In-Person)

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Lee, Hayan

Affiliation(s): Fox Chase Cancer Center

Email Address: hayan.lee@fccc.edu

Research Topic: Kernel density estimation

Description of Research Opportunity: Using the kernel density estimation algorithm, infer the distribution of methylation ratio.

Special Requirements: Mathy/Stats, Python, Unix/Linux bash commands

Location: Fox Chase Cancer Center (Remote, Hybrid, In-Person)

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Liu-Chen, Lee-Yuan

Affiliation(s): Department of Neural Sciences/LKSOM

Email Address: lee-yuan.liu-chen@temple.edu

Research Topic: 3D genomics and cancer

Description of Research Opportunity: The kappa opioid receptor (KOR) is one of the three opioid receptors. Activation of the KOR produces analgesic and anti-pruritic effects and water diuresis. However, development of KOR agonists for clinical use has been limited by dysphoria, psychotomimesis, and sedation, except nalfurafine and difelikefalin. At therapeutic doses, these two drugs do not produce the aforementioned side effects. We have obtained novel KOR agonists with different chemical backbones from collaborators. We will characterize pharmacological profiles of these KOR agonists, and in particular, we will determine if these KOR agonists at therapeutically relevant doses cause hypolocomotion and conditioned place aversion in mice, tests for sedation and dysphoria in humans. In addition, we will examine if the non-aversive and aversive KOR agonists differentially activate brain regions using c-Fos as the marker of neuronal activation.

Special Requirements: n/a

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Liu, Yu

Affiliation(s): Fox Chase Cancer Center

Email Address: yu.liu@fccc.edu

Research Topic: 3D genomics and cancer

Description of Research Opportunity: Our lab focuses on two primary research directions.

The first project investigates the role of cohesin in organizing genome structures. This project requires a background in biochemistry and cell biology. The student researcher will be expected to independently perform experiments such as cell culture, Western blots, CRISPR, PCR, and molecular cloning.

The second project explores the interplay between the epigenome and genome folding. This project requires expertise in both experimental techniques and bioinformatics, including molecular biology and some skills in R and Python programming.

We offer training opportunities in both experimental and computational biology for both projects.

Special Requirements: Cell biology, biochemistry, genomics or genetics and molecular biology

Location: Fox Chase Cancer Center

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Ma, Grace

Affiliation(s): LKSOM

Email Address: grace.ma@temple.edu

Research Topic: Structural Racism and Discrimination's Impact on High-Risk Asian American Liver Disease Disparities

Description of Research Opportunity: This study identifies structural racism and protective factors in relation to liver disease disparities and impact of SRD on health outcomes by Asian Americans.

Special Requirements: Introductory courses to public health or relevant field.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Ma, Grace

Affiliation(s): LKSOM

Email Address: grace.ma@temple.edu

Research Topic: Cancer Prevention and Awareness Community Outreach Campaign

Description of Research Opportunity: The overall goal of the Community Outreach Core is two-fold: (1) strengthen community engagement in cancer outreach research through evidence-based community cancer education initiatives and outreach activities to reduce cancer disparities among underserved African Americans (AA), Asian Pacific Americans (APA) and Hispanic populations (HA) in the PNN region, and (2) provide a robust and sustainable community-based participatory research infrastructure for the TUFCCC/HC Partnership. For more information, visit our website: <http://www.speechregionalpartnership.org/cores/community-outreach-core/>

Special Requirements: None

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Ma, Grace

Affiliation(s): LKSOM

Email Address: grace.ma@temple.edu

Research Topic: A Multilevel HPV Vaccination Intervention in African American Community

Description of Research Opportunity: The overall goal this study is to develop and pilot test the feasibility and efficacy of an evidence-based intervention to increase the awareness/knowledge of HPV vaccination and the rate among African American adolescents age 9-18 through a multilevel educational intervention to their parents in the greater Philadelphia area. The specific aims of the proposed study are:

Aim 1. Use CBPR approach and evidence-based strategies to develop a culturally appropriate family-centered intervention to increase HPV vaccination among African American adolescents.

Aim 2. Evaluate the feasibility and efficacy of this multilevel educational intervention in changing awareness/knowledge, attitudes, beliefs and intents to vaccinate against HPV among parents of African American adolescents as well as enhancing compliance with receiving HPV vaccination among the target African American adolescents.

Special Requirements: Introductory course to public health or related field.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Ma, Grace

Affiliation(s): LKSOM

Email Address: grace.ma@temple.edu

Research Topic: MOSAIC Study

Description of Research Opportunity: The Multi-ethnic Observational Study of American Asian and Pacific Islander Communities (MOSAIC) is a community-based, longitudinal cohort study that aims to enroll at least 10,000 diverse AmAsNHPI individuals aged 18-64 across the United States. The study is structured around five Clinical/Community Field Centers (CCFCs) that will collaboratively engage with local communities to collect comprehensive data on various health-related factors, conduct baseline assessments, and monitor changes in health over time through annual follow-ups, ultimately seeking to enhance understanding of health disparities, develop targeted interventions, and inform better healthcare strategies and policies for these under-researched populations.

Special Requirements: Introductory courses to public health or related topics.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Martoff, C.J.

Affiliation(s): Physics/CST

Email Address: martoff@temple.edu

Research Topic: Low background gamma ray counting with HPGe

Description of Research Opportunity: Temple has a High Purity Germanium gamma ray spectroscopy facility built by me and my former students which rivals the best in the world for earth's surface facilities. This enables sensitive assays of construction materials for the DarkSide-20k experiment, as well as investigations of double-electron capture decays and other interesting physics beyond the standard model.

Special Requirements: Will train.

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

McNeil, Stephen

Affiliation(s): Computer Science/CST

Email Address: stephen.macneil@temple.edu

Research Topic: Tools for Just-in-Time Data Literacy Learning

Description of Research Opportunity: Have you ever wondered how people form opinions on critical issues like climate change or vaccinations? Our project, Expert Goggles, aims to bridge the gap between data and understanding by helping individuals with limited data literacy see visualizations through the eyes of an expert. By using machine learning to automatically annotate visualizations with key insights and scaffolding for interpretation, we ensure that everyone can make informed decisions based on accurate data. Join us to make data more accessible and understandable for all.

Special Requirements: None.

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

McNeil, Stephen

Affiliation(s): Computer Science/CST

Email Address: stephen.macneil@temple.edu

Research Topic: Social Computing Tools for OwlHacks Hackathon

Description of Research Opportunity: Creating tools for civic designathons and hackathons. Our research team hosts the OwlHacks hackathon. For these events, our research team has developed a technology platform that collects the ideas that emerge across teams to summarize activities, provide cross-team inspiration, and facilitate real-time feedback exchange. You will learn to design social computing systems and will have opportunities to develop web applications.

Special Requirements: None.

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

McNeil, Stephen

Affiliation(s): Computer Science/CST

Email Address: stephen.macneil@temple.edu

Research Topic: Antagonistic Generative AI Systems

Description of Research Opportunity: What if AI systems were designed not just for efficiency, but to challenge users and foster deeper critical thinking? Our lab is pioneering the development of AI systems that intentionally create friction in the user's experience. By doing so, we aim to provoke critical reflection and enhance the quality of work produced. If you're interested in exploring the ethical dimensions of AI and creating tools that prioritize human values over mere productivity, this project is for you.

Special Requirements: None.

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Mitrea, Irina

Affiliation(s): Mathematics/CST

Email Address: imitrea@temple.edu

Research Topic: Real, Complex, and Harmonic Analysis

Description of Research Opportunity: The undergraduate researcher will be introduced to fundamental results in Real, Complex, or Harmonic Analysis, not covered by the undergraduate curriculum. The main goal is build competency in a mathematical direction that leads to consideration of open problems, and to professional presentations at Temple University and regional and national mathematics conferences. The undergraduate student is expected to spend 5 hour per week learning new mathematical concepts and results, and interact with graduate students in the area as guided by the faculty advisor.

Special Requirements: Basic Concepts

Advanced Calculus Sequence

Undergraduate Complex Analysis

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Queisser, Gillian

Affiliation(s): Mathematics/CST

Email Address: queisser@temple.edu

Research Topic: Virtual Reality-driven computing to simulate neuronal signal processing

Description of Research Opportunity: The student's research project will advance the tool Neuro-VISOR, which immerses the user in a virtual lab world where brain cells can be visualized, interacted with, and stimulated. Real-time simulations of neuronal activity can be analyzed and interacted with, making Neuro-VISOR a unique tool in the area of computational neuroscience, used in an instructional and scientific context. The project revolves around the development of novel virtual reality-based computational tools, applied to neuroscientific modeling and simulation, and is co-advised by Dr. Seibold and Dr. Queisser. Students will have the opportunity to work in a team that covers a broad range of research, from mathematical modeling, numerical and visualization methods, to optimizing computational scalability for large problems.

Special Requirements: Ideally, students have programming skills and/or knowledge of Unity3D

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 2

Seibold, Benjamin

Affiliation(s): Mathematics/CST

Email Address: seibold@temple.edu

Research Topic: User-Intuitive Visualization of Real-Time Simulation and Traffic Data

Description of Research Opportunity: In this research students explore novel ways to conduct the visualization of simulated and real-world data in an interactive fashion. Leveraging the use of virtual reality and user-interactive environments, students will develop and explore novel ways to intuitively visualize traffic flow data (including control via automated vehicles) or neuroscience or radiotherapy simulations. Projects can range from a focus in mathematics (numerical analysis, differential equations), over computer science (Unity software development, high-performance computing, human-machine interfaces), to life science application (neuroscience, radiotherapy).

Special Requirements: Broad programming skills are desirable. Experience in Unity3D is particularly welcome. For a mathematical project focus, success in the Calculus sequence is needed, and experience in Differential Equations and/or Numerical Analysis is welcome.

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 2

Sewall, Brent

Affiliation(s): Biology/CST

Email Address: bjsewall@temple.edu

Research Topic: Bat susceptibility to white-nose syndrome

Description of Research Opportunity: White-nose syndrome is an emerging infectious disease of hibernating bats caused by an invasive fungal pathogen. Since its first detection in New York, it has caused extensive mortality of bats during hibernation, and has spread across much of North America. In this project, we will use statistical approaches, image analysis, and other tools to document infection and improve understanding of factors influencing both the impacts and spread of the disease, and means to conserve bat populations in light of this ongoing threat.

Special Requirements: Experience with statistics or other quantitative methods preferred.

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Sewall, Brent

Affiliation(s): Biology/CST

Email Address: bjsewall@temple.edu

Research Topic: Field Studies of Spotted Lanternfly Impacts on Native Plants
- Ambler Campus

Description of Research Opportunity: The spotted lanternfly is an invasive insect that poses an emerging threat to native forest ecosystems. In this project, the student will work as part of a team, using field surveys, standardized field experiments, greenhouse studies, mesocosm studies, and laboratory work to understand the ecology of spotted lanternflies and the effects they have on forest ecosystems. Research will occur at the Temple Ambler Field Station, located on the Temple Ambler Campus. Transportation from Main Campus to the Field Station is available via the inter-campus bus.

Special Requirements: The ability to work outdoors is required. Coursework in ecology is preferred.

Location: Temple Ambler Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Smutzer, Gregory

Affiliation(s): Biology/CST

Email Address: smutzerg@temple.edu

Research Topic: The suppression of bitter taste perception

Description of Research Opportunity: New delivery methods for administering nutritional supplements to the oral cavity represent an important goal for improving human health. This study will develop a new oral delivery method that exploits Vitamin E as a model nutritional supplement. Vitamin E is a biologically important dietary supplement that is a water-insoluble oil at room temperature, which precludes its delivery in tablet form. This supplement is generally administered as large soft gels, and ingesting these soft gels may be problematic for individuals who suffer from dysplasia or have a fear of swallowing these gels. A second reason for developing a new delivery method is that many oral supplements have both an aversive tactile response and an aversive taste response that may be perceived as oily or bitter. This aversive taste may decrease compliance, especially in young children. Rapidly dissolving edible films are a relatively new approach for oral delivery that minimizes choking hazards in both the young and the elderly. In addition, these rapidly dissolving films can be tailored to mask or block unpleasant taste and to minimize tactile responses. However, edible films are limited by the amount of additive that can be loaded within these films. In particular, the bioavailability of water insoluble vitamins in edible films is highly problematic. Bioavailability can be dramatically increased by complexing the supplement with a long-chain fatty alcohol. This approach generates solid microparticles that can be embedded within edible films as the films dry. This novel approach for delivering supplements to the oral cavity will decrease choking hazards and will also include excipients that successfully mask the aversive taste of supplements. In summary, this oral delivery method represents a unique model system that has the potential to increase the amount of biologically important compounds within edible films while increasing compliance in both young children and the elderly.

Special Requirements: Willingness to recruit test subjects with edible films.

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Snyder, Nathaniel

Affiliation(s): Cardiovascular Sciences/LKSOM

Email Address: NateWSnyder@temple.edu

Research Topic: Metabolism

Description of Research Opportunity: The Snyder Lab works to quantify, understand, predict, and manipulate the connections between metabolism, exposures, and health outcomes. We conduct a wide range of fundamental research and quantitatively study the metabolism of drugs, the metabolic fate of environmental exposures in the human body, and the normal and pathologic adaptations of human metabolism. We also conduct disease focused research, which includes metabolic conditions, many types of cancer, and investigating modifiable risk factors for autism spectrum disorder. To accomplish these goals, the lab uses cutting edge analytical chemistry, most notably liquid chromatography- high resolution mass spectrometry, and works with a wide net of collaborators.

Special Requirements: Ideally but not required: general and organic chemistry, biochemistry.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 4

of Upperclassperson Research Positions: 4

Spigler, Rachel

Affiliation(s): Biology/CST

Email Address: rachel.spigler@temple.edu

Research Topic: Impacts of urbanization in butterflies

Description of Research Opportunity: We are currently living in the middle of an unprecedented and unintended experiment, wherein species living in urban environments are facing intense, parallel selection due to shared selective pressures. Butterflies may be especially sensitive to urbanization, placing in jeopardy not only their populations but critical pollination services as well if they are unable to adapt to urbanization. This project will examine patterns of phenotypic & genomic differentiation in wing pigmentation in *Pieris rapae* (the cabbage white butterfly) in response to urbanization across multiple American cities. To do so, the undergraduate researcher will 1.) use ImageJ, an image processing software, to measure pigmentation; 2.) perform data analyses to test hypotheses on wing melanization; 3) assist in DNA extraction and other lab work. This work fits into a larger project focused on parallel evolution in wild populations.

Special Requirements: Students must have completed the introductory chemistry laboratories and introductory biology series

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Spigler, Rachel

Affiliation(s): Biology/CST

Email Address: rachel.spigler@temple.edu

Research Topic: How does land use impact how long flowers can live?

Description of Research Opportunity: Species that face low pollinator visitation rates tend to have longer lived flowers, which provides extra time to receive and export pollen, thereby ensuring successful reproduction. The need for longer-lived flowers may be exacerbated in areas transformed by human land use because of subsequent negative impacts on pollinator populations. The student will work on a project that will take advantage of thousands of photos from iNaturalist to measure metrics of flower lifespan and relate them to surrounding land use. The student will learn to use imaging software and test hypotheses.

Special Requirements: Interest in plants, attention to detail, strong organizational skills

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 2

Sproviero, Eduardo

Affiliation(s): Chemistry/CST

Email Address: e.sproviero@temple.edu

Research Topic: Organic Chemistry, Cheminformatics

Description of Research Opportunity: The project involves searching for inhibitors of the HIV-1 reverse transcriptase (RT). There are drugs in the market that lost some of their potency due to mutations of the protein receptor. We use a complex approach based on published inhibitory properties, which fragments the molecule with “synthetic organic chemistry” sense and evaluates how each fragment contributes to the receptor inhibition. With that information we identify a lead compound, which is effective against both the wild-type and mutants of the HIV-1 RT. The next step is to propose, or use an already planned, retrosynthetic route to obtain this lead compound. We then test the route until we are confident that the compound can be prepared in the necessary amount and time frame for the biological tests.

Each reaction step can be represented by a specific template via atom mapping. The idea is to generate a set of modified structures that can be prepared following the given retrosynthetic route pattern. In our approach, the sequence and type of reactions specified in the lead pathway are preserved, while structural changes to generate the analogues are introduced via exchange of only the retrosynthetic tree leaves. These leaves are taken from commercially available building blocks, such as Enamine. The last step is to apply a series of filters, including QSAR applicability domain, Glide XP scores and ADMET predictors. The resulting set of refined drug candidates are the proposed chemicals to synthesize in this project.

This straightforward-synthetic approach and biological relevance is intended to speed up the production of analogs and may be proper projects for UG to work in the lab. We collaborate with Prof. Chin-Ho Chen from Duke Medical School, who could run the biological tests.

Special Requirements: Organic Chemistry I & II

Location: Temple Main Campus

of Early Career Research Positions: 2

of Upperclassperson Research Positions: 1

Stanley, Robert

Affiliation(s): Chemistry/CST

Email Address: rstanley@temple.edu

Research Topic: Light-driven repair mechanism in DNA photolyase - the role of internal electric fields.

Description of Research Opportunity: The student will be involved in exploring the mechanism of light-driven DNA repair by the enzyme DNA photolyase. This will include making the enzyme by overexpression in E coli followed by state of the art FPLC purification as well as making mutant proteins using molecular biology techniques. These mutants will test the role of amino acid-induced electric fields on catalysis. Characterization will include repair assays and fluorescence spectroscopic studies.

Special Requirements: Two semester of organic chemistry, calculus, and one semester of physics. CHEM 3105 is a plus, as well as BIOL 2297.

Location: Temple Main Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

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Tian, Ying

Affiliation(s): Aging + Cardiovascular Discovery Center/LKSOM

Email Address: ying.tian@temple.edu

Research Topic: Lung Development

Description of Research Opportunity: Engage in hands-on research involving mouse lung tissue sectioning, immunostaining, fluorescent microscopy, and confocal imaging. This opportunity includes learning advanced imaging techniques and performing data analysis.

Special Requirements: Commitment of 10-20 wet-lab hours per week.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 0

Tilley, Douglas

Affiliation(s): Aging + Cardiovascular Discovery Center/LKSOM

Email Address: douglas.tilley@temple.edu

Research Topic: GPCR regulation of cardiac function and remodeling

Description of Research Opportunity: In response to the failing myocardium, immune cells become activated and traffic to the heart, where they modulate repair processes. G protein-coupled receptors (GPCRs) control many behaviors of immune cells. We aim to manipulate GPCR expression and/or signaling to improve outcomes during the development or progression of heart failure. Additionally, adhesion GPCRs (aGPCRs) are a newer class of receptor that have not been studied previously in the heart, but their high levels of expression suggest they may play important roles in homeostasis and/or heart failure development. Our lab has a long-standing interest in defining the novel roles of GPCRs in the regulation of cardiac function, remodeling and immune cell responsiveness following acute injury or during chronic heart failure. The students will be involved in aspects of the project related to the processing and evaluation of the impact of GPCR/aGPCR modulation on cardiac tissue remodeling parameters and immune cell function, including immune cell infiltration, fibrosis and cardiomyocyte death.

Special Requirements: formaldehyde training from EHRS

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Unterwald, Ellen

Affiliation(s): Neural Sciences/CSAR/LKSOM

Email Address: ellen.unterwald@temple.edu

Research Topic: Preclinical studies of the neurobiology of addiction

Description of Research Opportunity: Research in the Unterwald Lab is investigating biological causes and mechanisms of addiction-related behaviors using rodent models. Students will assist laboratory staff with performing rodent behavioral testing, pharmacological testing, and/or biological assays to measure proteins or gene expression in brains from experimental animals. Students will assist with data documentation and analysis.

Special Requirements: none

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Wang, Lynn

Affiliation(s): Fox Chase Cancer Center

Email Address: yuelynn.wang@fccc.edu

Research Topic: Tumor signaling pathways and microenvironment in lymphoma drug sensitivity and resistance

Description of Research Opportunity: Wang Lab focuses on developing novel therapies for lymphoma based on the understanding of its underlying biology. Lymphoma is the cancer affecting the lymphatic system (lymph nodes, bone marrow and spleen). It is the 6th most common cancer in the world. According to the National Cancer Institute, more than 800,000 people had non-Hodgkin lymphoma (the common type of lymphoma) in 2021 and >80,000 people obtain a new diagnosis of lymphoma in 2024. We tackle this disease by studying signal transduction pathways in tumor cells and how cells surrounding the tumor (tumor micro-environment) promote tumor and tumor resistance to drug intervention. The lab has made a significant contribution to the understanding of drug resistance mechanisms in the last 10 years. Interested students are invited to read our research profile at <https://www.foxchase.org/y-lynn-wang>
The student will be involved in small projects compatible with his/her schedule.

Special Requirements: The PI is a physician-scientist, the projects are of translational science nature. Students (Juniors and seniors) with prior bench work experience are encouraged to apply.

Location: Fox Chase Cancer Center

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 1

Wang, Ross

Affiliation(s): Chemistry/CST

Email Address: rosswang@temple.edu

Research Topic: Chemical Biology

Description of Research Opportunity: Research project lies at the interface of chemistry and biology, with an eye towards understanding and treating human diseases. We use interdisciplinary approaches such as chemical synthesis, biochemistry, cell biology, and molecular imaging to investigate the biological mechanisms underlying post-translational modifications that are key to cancer, neuron degeneration, and immune disorders. In particular, we are interested in either protein engineering and cell biology; or synthetic chemistry methodology for novel bioorthogonal reactions, and resulting from this the related chemical or protein probe design and application for dissection of post-translational modifications on proteins. Students will be trained to design and prepare probes but also to characterize these molecular agents using instrumental analysis such as LC-MS, NMR, HPLC, high resolution MS/MS fragmentation. Following this, students will learn and utilize the self-designed probes in biochemical enzymatic assays and cell biology assays including cell-based imaging or quantitative proteomics to reveal novel protein substrates of post-translational modifications and the related protein-protein interactions. The probes of high activity could be novel diagnostics and therapeutic tools in the future as well.

Special Requirements: Must have finished general chemistry, organic chemistry I, Biology courses including the lab sections for the freshman and sophomore years.

Location: Temple Main Campus

of Early Career Research Positions: 3

of Upperclassperson Research Positions: 3

Wei, Juncheng

Affiliation(s): Center of Metabolic Disease Research/LKSOM

Email Address: Juncheng.wei@temple.edu

Research Topic: Molecular Biology

Description of Research Opportunity: We will test the roles of stress granules in inflammasome by using CRISPR-Cas9 method

Special Requirements: Molecular Biology

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1

Wong, Ho-Lun

Affiliation(s): Pharmaceutical Sciences/PHARM

Email Address: holun@temple.edu

Research Topic: Nanomedicine for treatment of infectious diseases

Description of Research Opportunity: Our group focuses on the development of nanocarriers to deliver anti-bacterial or anti-viral therapeutic agents for treatment of challenging drug-resistant diseases including antibiotic-resistant bacterial infections and HIV infections. Our research encompasses formulation and characterization of nanoformulations and evaluation of their therapeutic activities and toxicities.

Special Requirements: Experience of cell work studies is preferred but not required.

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 0

Yu, Jun

Affiliation(s): Cardiovascular Sciences/LKSOM

Email Address: jun.yu@temple.edu

Research Topic: Novel molecular target(s) regulating Arteriovenous fistula (AVF) maturation

Description of Research Opportunity: Dialysis is a common treatment for people with end-stage chronic kidney disease (CKD). Reliable and matured AVF is a “gate of life” for patients who need dialysis. However, the primary AVF failure rate is as high as 30-70%, which largely attribute to pathological vascular remodeling. This project is aimed at uncovering molecular mechanisms in vascular smooth muscle cells, a major cell type in the vessel wall, that regulate AVF maturation in CKD. We have been in close collaboration with the surgeons at the Department of Vascular and Endovascular Surgery on this ongoing project.

In the projects, the student will gain hands-on experience in variety of techniques in histology, biochemistry, molecular biology, and/or bioinformatics.

Special Requirements: Have taken biology, molecular biology, or biochemistry. Previous lab work experience is desired.

Location: Temple Main Campus

of Early Career Research Positions: 0

of Upperclassperson Research Positions: 1

Zhu, Lin

Affiliation(s): LKSOM

Email Address: lin.zhu@temple.edu

Research Topic: Linking Social-Behavior Contextual Factors and Allostatic Load to Chronic Diseases in Diverse Asian Americans: A Socioecological Approach to Advancing Precision Medicine and Health Equity

Description of Research Opportunity: Asian Americans (AA) are the fastest growing and most diverse racial/ethnic group in the US, recording a 81% growth from 2000 to 2019. Counter to the “model minority myth,” the AA has broad variations in income, education, and nativity status by subgroups. AAs also have unique and unequal patterns of health behaviors, cardiometabolic conditions, endocrine dysfunction, cancer, and mental illness. We must also acknowledge the lived experiences of the diverse AA populations: historical trauma, racism, re-adjusting to life in a new country as immigrants or refugees, and navigating unfamiliar healthcare systems. Unfortunately, lack of disaggregated data limited our understanding of allostatic load (AL) in the diverse AA populations. Therefore, we propose a paradigm shift towards understanding the cumulative toll of chronic stress through the concept of allostatic load, its behavioral and social-contextual correlates, and how AL manifests as chronic diseases among AAs, by Asian ethnic subgroups. AL is a complex clinical construct that offers a unique lens into the cumulative toll of stress and how it manifests as physiological and psychological dysfunctions (i.e. chronic conditions). Analyses of disaggregate data are needed to uncover specific risk patterns by AA subgroups and reduce health disparities through tailored interventions. The All of Us (AoU) Research Program provides unprecedented opportunities for us to close the gaps in literature and advance scientific knowledge. Leveraging the diverse and inclusive AA subsample (N = 12,408), we seek to model AL as a complex system to capture a more comprehensive extent of health risk in AA subgroups, identify high-risk groups, and explore how AL as various chronic illnesses. All analyses will be conducted in aggregate AA sample first and then in 4 ethnic/regional subgroups: East Asian (Chinese, Japanese, Korean), Southeast Asian (Vietnamese, Cambodian, Hmong), South Asian (Indian, Pakistan), and Filipino. The proposed analyses will help identify clinically and socio-demographically important subgroups of AAs at high risk for physiological and psychological dysregulation. With dissemination activities jointly led by researchers and clinical/community stakeholders, this study will ultimately guide future lifestyle and behavioral interventions to improve resilience in AAs and provide clinical implications for a more personalized medicine for stress mitigation and chronic disease prevention.

Special Requirements: Intro courses in public health or medical sociology

Location: Temple Health Sciences Campus

of Early Career Research Positions: 1

of Upperclassperson Research Positions: 1