

Provost's Undergraduate Research Mentoring Program Project Descriptions Summer 2013

Application and instructions at <http://www.upenn.edu/curf/research/grants/purm>

Unless otherwise noted, current freshmen and sophomores may apply for any listed project.

Students are encouraged to learn more about faculty interests by reviewing faculty webpages and recent publications to determine your interest level in particular projects. To avoid confusion, students are asked not to contact faculty about their projects until you are contacted for an interview or the PURM selection process has been completed.

Table of Contents

[Annenberg](#)

[Annenberg School for Communication](#)

[Arts and Sciences](#)

[Anthropology](#)

[Biology](#)

[Chemistry](#)

[Cinema Studies/English](#)

[Classical Studies](#)

[Criminology](#)

[Earth and Environmental Science](#)

[Economics](#)

[English/Africana Studies](#)

[Germanic Languages and Literatures](#)

[History](#)

[History and Sociology of Science](#)

[History of Art](#)

[Return to top of document](#)

[Linguistics](#)

[Music](#)

[Philosophy](#)

[Physics and Astronomy](#)

[Political Science](#)

[Psychology](#)

[Sociology](#)

[South Asia Studies](#)

[Theatre Arts](#)

[Design](#)

[Architecture](#)

[Fine Arts](#)

[Design - Fine Arts](#)

[Fine Arts](#)

[Education](#)

[Applied Psychology--Human Development Division \(APHD\)](#)

[Educational Linguistics](#)

[Teaching, Learning, and Leadership Division](#)

[Engineering and Applied Sciences](#)

[Bioengineering](#)

[Chemical and Biomolecular Engineering](#)

[Electrical and Systems Engineering](#)

[Mechanical Engineering and Applied Mechanics](#)

[Law](#)

[Law](#)

[Law, Sociology, and Africana Studies](#)

[Medicine](#)

[Anesthesiology](#)

[Anesthesiology and Critical Care](#)

[Return to top of document](#)

[*Return to top of document*](#)

[**Biochemistry and Biophysics**](#)

[**Cancer Biology**](#)

[**Cardiovascular Medicine**](#)

[**Cell and Developmental Biology**](#)

[**Dermatology**](#)

[**Epidemiology and Biostatistics**](#)

[**Family Medicine and Community Health**](#)

[**Genetics**](#)

[**Medicine**](#)

[**Medicine - Cardiology**](#)

[**Medicine - Gastroenterology**](#)

[**Medicine - Pulmonary, Allergy & Critical Care**](#)

[**Neurology**](#)

[**Neuroscience**](#)

[**Obstetrics and Gynecology**](#)

[**Orthopaedic Surgery and Bioengineering**](#)

[**Orthopaedic Surgery-Pediatric**](#)

[**Pathology and Laboratory Medicine**](#)

[**Pediatrics**](#)

[**Pediatrics / Cardiology**](#)

[**Pharmacology**](#)

[**Psychiatry**](#)

[**Psychiatry and Obstetrics/Gynecology**](#)

[**Radiology**](#)

[**Surgery**](#)

[**Transplant Surgery**](#)

[**Nursing**](#)

[**Biobehavioral Health Sciences**](#)

[**Social Policy and Practice**](#)

[**Veterinary Medicine**](#)

[*Return to top of document*](#)

[*Return to top of document*](#)

[**Animal Biology**](#)

[**Wharton**](#)

[**Business, Economics, and Public Policy \(BEPP\)**](#)

[**Health Care Management**](#)

[**Legal Studies and Business Ethics**](#)

[**Management**](#)

[**Operations and Information Management \(OPIM\)**](#)

[*Return to top of document*](#)

Annenberg

ANNENBERG SCHOOL FOR COMMUNICATION

John Jackson (with Deborah Thomas)

Project 1: BAD FRIDAY in Africa: Roots, Rights, Reparations

BAD FRIDAY IN AFRICA: ROOTS, RIGHTS, REPARATIONS Deborah A. Thomas, Departments of Anthropology and Africana Studies John L. Jackson, Jr., Annenberg School and Departments of Anthropology and Africana Studies This project is part of an ongoing research project on postcolonial violence, in which we have been investigating how communities are actively grappling with legacies of Western imperialism, racial slavery, and political nationalism – the historical foundations of contemporary violence throughout the Americas. We have been particularly interested in forms of state violence against particular groups of citizens. As such, we have explored the changing relationships between Rastafari and the Jamaican state by examining how one instance of state violence against Rastafarians – what is now known euphemistically as the Coral Gardens “incident” of 1963 – has been memorialized. This research has been published, but was also developed into a film, *Bad Friday: Rastafari after Coral Gardens*, which was released in November 2011 and is being distributed in the United States and Canada by Third World Newsreel.

The film focuses on a community of Rastafari in western Jamaica who annually commemorate the 1963 Coral Gardens “incident,” a moment just after independence when the Jamaican government rounded up, jailed and tortured hundreds of Rastafarians. It chronicles the history of violence in Jamaica through the eyes of its most iconic community, and shows how people use their recollections of past traumas to imagine new possibilities for a collective future. We have presented the film to various audiences in the United States and Canada, and it has also been screened in Europe and elsewhere in the Caribbean, both within the context of film festivals and in academic and community-based settings. This year marks the 50th anniversary of the incident in question, as well as the 50th anniversary of the OAU, which was established first in 1963 in Addis Ababa, Ethiopia with Emperor Haile Selassie I (the Rastafari Messiah) as the first chairperson.

Because of the confluence of these events, and because societies throughout the Caribbean and sub-Saharan Africa have been struggling with the continuation of forms of colonial violence during the post-colonial period, we will travel to London and South Africa for three weeks during the summer of 2013 to use the film as a springboard for broader discussions about violence in our communities, and about film as both a methodological and analytic tool. During this tour, we will: 1) Screen *Bad Friday: Rastafari after Coral Gardens*, in conjunction with

[Return to top of document](#)

performances by Ancient Vibrations and post-screening discussions that include members of the Rastafari Coral Gardens Committee; and, 2) Conduct ethnographic media workshops that bring together faculty, as well as graduate and undergraduate students, from the University of Pennsylvania with their counterparts at institutions of higher education South Africa.

Our goals are threefold: 1) To promote cultural and political awareness and exchange between African and African diasporic communities through a discussion of forms of violence that have been foundational to these societies, and the implications of these forms of violence for the present; 2) To use expressive cultural forms and ethnographic methods to facilitate political linkages among and between these communities and organizations working through the languages of social justice and human rights to counter these legacies; and, 3) To strengthen Penn's relationships with South African universities while creating opportunities for students from the University of Pennsylvania to collaborate with students and faculty at these institutions, as well as with community members beyond the University.

The Penn undergraduate student will be involved in all activities with the group, will work alongside the graduate students to document the trip itself, and will participate in the ethnographic media workshops. These workshops will address questions such as: • How can film be both an object and method of study and theorization?

- How do we think through issues related to authority, reflexivity, objectivity and representation when working with communities through the rubric of film?
- How do we translate research findings into the language of film?
- What do film and video give us that texts don't, and what are the limitations of the visual as a medium for communicating both scholarship and political alliances?

Background in film production and/or coursework in Africana Studies is desirable but not mandatory, but the student should have an informed interest in African Diaspora studies.

Devra Moehler

Project 1: Comparing Media Bias across States and Sources ***Rising Juniors only***

The ultimate goal of the project is to build a cross-national and cross-regional dataset on media bias during election campaigns. The dataset will collate comparable evidence from media content analyses that were already conducted as part of donor-funded election monitoring missions. Most of these media monitoring exercises use similar protocols for measuring the amount, and tone, of coverage of each candidate. They monitor a number of media organizations per country, including newspapers, television channels, and radio outlets. The dataset will allow us to evaluate how national-level factors (such as wealth, quality of democracy, level of

[Return to top of document](#)

[*Return to top of document*](#)

governance, media laws, and electoral systems) as well as media-level attributes (such as ownership, medium, and market share) influence partisan media bias during elections. There is no central archive of media monitoring data and publication of specific results varies across monitoring mission. Additional resources are needed to obtain the raw data from each monitoring mission. This summer we will prepare a National Science Foundation (NSF) grant application. As part of the preparation for the grant application, we will create a pilot database from media monitoring reports available online. With faculty assistance, the student research assistant will be asked to create the pilot database by searching for available media monitoring reports and entering the data. If the student has statistical training they will also be asked to do basic analysis. Finally, the student will assist in preparing the NSF grant by finding relevant literature and assisting with the statement drafts.

[*Return to top of document*](#)

Arts and Sciences

ANTHROPOLOGY

Harold Dibble

Project 1: Archaeological Excavation at a Neandertal Site in France

The student will participate in an archaeological project in southern France, at the Neandertal site of La Ferrassie. As with all participants, they will rotate through the full range of activities, including excavation, washing and labeling artifacts, photography, etc. There will also be opportunities to visit the local sights in the area.

Eduardo Fernandez-Duque

Project 1: Monogamy, pairbonds and infant care in titis and saki monkeys of Ecuador

Study: Monogamy, pairbonds and infant care in titis and saki monkeys Location: Tiputini Biodiversity Station, Amazonia, Ecuador Duration: 8 weeks sometime during May-August Language: Spanish not required The study is part of a long-term research program that Dr. Fernandez-Duque and Dr. Anthony Di Fiore (Anthropology, UT-Austin) conduct to investigate monogamy and parental care in primates of the Ecuadorian Amazon. Titi monkeys live in small, monogamous groups in which the male and female form a very strong bond. Unlike any other known primate, males provide most infant care, and the infant develops a stronger bond with its father than with its mother. Some of the questions we plan to address are: How do male and female titi monkeys share the care of their offspring? How do they maintain the pair bond between them? Is there aggression and competition among males and females of this monogamous species? The students will assist Amy Porter (Ph.D. candidate, Anthropology, UC Davis) in collecting behavioral data from three radiocollared groups of titi monkeys and two of sakis. They will participate in all-day follows of the groups that begin at dawn and finish at dusk. They will also assist Amy conducting playback experiments that simulate the intrusion of individuals in the group's territory. They will also collaborate in the processing of samples and organizing of data. In the field students will receive training in demographic, behavioral, and ecological data collection, capturing, sampling and radio-collaring of individuals, radio-tracking, data summary, analysis and management. They will also benefit from being exposed to the complexities of running an international multidisciplinary field project, through looking over the shoulder of those running the administrative and accounting aspects of the project.

[Return to top of document](#)

Project 2: The Energetics of Biparental Care in the Monogamous Owl Monkeys of Argentina

Location: Guaycolec Ranch, Formosa Province, Argentina Duration: 8-10 weeks during May-August Language: some knowledge of Spanish would be a plus, but not required Students will participate in a 3-year NSF study as part of the Owl Monkey Project of Argentina directed by E. Fernandez-Duque (Anthropology, Penn). The Owl Monkey Project of the Argentinean Chaco offers a relatively novel situation to evaluate hypotheses on the evolution of allo-parental care, monogamy and pair-bonds. This summer we will begin work in the field to evaluate the hypothesis that paternal care in owl monkeys functions and is maintained because of the energetic benefits that the parenting couple accrues from the male's assistance. During our field work we will generate data on foraging and activity patterns, we will capture individuals for morphometric measurements and for fitting them radio-collars, we will collect fecal samples for hormonal analyses and food samples for nutritional analyses. Results from this study will likely transform the manner in which we examine reproductive strategies in human and non-human primates and they will allow us to reevaluate preconceptions derived from a long history of observations biased toward considering competition and conflict as the driving mechanisms of social relationships. In the field, students will receive training in demographic, behavioral, and ecological data collection, capturing, sampling and radio-collaring of individuals, radio-tracking, data summary, analysis and management. They will also benefit from being exposed to the complexities of running an international multidisciplinary field project, through looking over the shoulder of those running the administrative and accounting aspects of the project.

Project 3: Olfactory Communication in Pair Bonded Owl Monkeys

Location: Owl Monkey Breeding & Research Resource, Bastrop, TEXAS Duration: 8-10 weeks during May-August Language: Spanish not required Students will assist Andrea Spence-Aizenberg as she begins her doctoral research. The study will investigate the role of olfactory communication in the maintenance of pair bonds in a captive population of owl monkeys, located in Bastrop, Texas (about 30 minutes from Austin, TX). There is growing evidence that primate body odor communicates important information, and that olfactory signals may be used as mechanisms to maintain social bonds. This study will collect data from male-female owl monkey pairs to determine the extent to which owl monkey scent contains biologically relevant information, with particular emphasis on how odors communicate female reproductive status. In the primate lab, students will be trained for non-invasive sample and data collection. Specifically, students will assist with collection of fecal and urine samples to use in hormonal analyses, scent gland samples to use in chemical analyses, and habituation and collection of behavioral data to evaluate pair bonding behavior. The students will have the opportunity to work in a large primate facility and to work closely with owl monkeys in a captive colony, which houses approximately 400 individuals. Students will also benefit from being exposed to the complexities of conducting primate research in a laboratory, and learning how to collect and

[Return to top of document](#)

[Return to top of document](#)

manage data. There is the potential for students to collaborate in future data analysis at the University of Pennsylvania.

Louise Krasniewicz

Project 1: The Women's Pavilion at the 1876 Centennial Exhibition

In 1876, Philadelphia was the site of the Centennial Exhibition, a world's fair celebrating the 100th anniversary of the Declaration of Independence. For the first time at an international exhibition, women had their own building. Here they displayed patented inventions, paintings and photographs, crafts, literature, and a kindergarten that introduced the 10 million Americans who visited to early childhood education. This project is documenting and recreating the Women's Pavilion and its contents and activities, including a woman steam engineer who powered the steam engine that ran the pavilion's machines. The first part of the summer's research will involve organizing archival information already collected and then supplementing that with archival materials found in several Philadelphia resources. The second step involves helping design a proposal for an archaeological excavation of the Women's Pavilion site on Belmont Avenue in Fairmont Park. The third segment will focus on beginning a scale model recreation of the interior of the Women's Pavilion and its exhibits. If there is time, some of the information collected will be prepared for the beginnings of an online exhibit celebrating the Women's Pavilion of 1876. An interested student does not need any previous experience but needs to be enthusiastic about women's history and should be comfortable organizing both digital and paper data sources. Experience with basic image processing, word processing, and the use of Evernote (an online data organizing tool) would be helpful but training will be provided to any interested applicant. A description of some aspects of the project can be found at:
<http://womansworkisneverdone.wordpress.com/>

Deborah Thomas (with John Jackson)

Project 1: BAD FRIDAY in Africa: Roots, Rights, Reparations

BAD FRIDAY IN AFRICA: ROOTS, RIGHTS, REPARATIONS Deborah A. Thomas, Departments of Anthropology and Africana Studies John L. Jackson, Jr., Annenberg School and Departments of Anthropology and Africana Studies This project is part of an ongoing research project on postcolonial violence, in which we have been investigating how communities are actively grappling with legacies of Western imperialism, racial slavery, and political nationalism – the historical foundations of contemporary violence throughout the Americas. We have been particularly interested in forms of state violence against particular groups of citizens. As such, we have explored the changing relationships between Rastafari and the Jamaican state by examining how one instance of state violence against Rastafarians – what is now known

[Return to top of document](#)

[*Return to top of document*](#)

euphemistically as the Coral Gardens “incident” of 1963 – has been memorialized. This research has been published, but was also developed into a film, *Bad Friday: Rastafari after Coral Gardens*, which was released in November 2011 and is being distributed in the United States and Canada by Third World Newsreel.

The film focuses on a community of Rastafari in western Jamaica who annually commemorate the 1963 Coral Gardens “incident,” a moment just after independence when the Jamaican government rounded up, jailed and tortured hundreds of Rastafarians. It chronicles the history of violence in Jamaica through the eyes of its most iconic community, and shows how people use their recollections of past traumas to imagine new possibilities for a collective future. We have presented the film to various audiences in the United States and Canada, and it has also been screened in Europe and elsewhere in the Caribbean, both within the context of film festivals and in academic and community-based settings. This year marks the 50th anniversary of the incident in question, as well as the 50th anniversary of the OAU, which was established first in 1963 in Addis Ababa, Ethiopia with Emperor Haile Selassie I (the Rastafari Messiah) as the first chairperson.

Because of the confluence of these events, and because societies throughout the Caribbean and sub-Saharan Africa have been struggling with the continuation of forms of colonial violence during the post-colonial period, we will travel to London and South Africa for three weeks during the summer of 2013 to use the film as a springboard for broader discussions about violence in our communities, and about film as both a methodological and analytic tool. During this tour, we will: 1) Screen *Bad Friday: Rastafari after Coral Gardens*, in conjunction with performances by Ancient Vibrations and post-screening discussions that include members of the Rastafari Coral Gardens Committee; and, 2) Conduct ethnographic media workshops that bring together faculty, as well as graduate and undergraduate students, from the University of Pennsylvania with their counterparts at institutions of higher education South Africa.

Our goals are threefold: 1) To promote cultural and political awareness and exchange between African and African diasporic communities through a discussion of forms of violence that have been foundational to these societies, and the implications of these forms of violence for the present; 2) To use expressive cultural forms and ethnographic methods to facilitate political linkages among and between these communities and organizations working through the languages of social justice and human rights to counter these legacies; and, 3) To strengthen Penn’s relationships with South African universities while creating opportunities for students from the University of Pennsylvania to collaborate with students and faculty at these institutions, as well as with community members beyond the University.

The Penn undergraduate student will be involved in all activities with the group, will work alongside the graduate students to document the trip itself, and will participate in the ethnographic media workshops. These workshops will address questions such as: • How can film be both an object and method of study and theorization?

[Return to top of document](#)

- How do we think through issues related to authority, reflexivity, objectivity and representation when working with communities through the rubric of film?
- How do we translate research findings into the language of film?
- What do film and video give us that texts don't, and what are the limitations of the visual as a medium for communicating both scholarship and political alliances?

Background in film production and/or coursework in Africana Studies is desirable but not mandatory, but the student should have an informed interest in African Diaspora studies.

BIOLOGY

Ted Abel

Project 1: Sleep deprivation-induced changes in actin dynamics and memory

Millions of people regularly obtain insufficient sleep and one of the major effects of sleep deprivation is to produce memory deficits in hippocampal-dependent learning paradigms. Thus, understanding the cellular and molecular pathways affected by sleep deprivation is of social and clinical importance. The goal of this project is to examine a novel finding that sleep deprivation leads to changes in the actin cytoskeleton of hippocampal neurons and the molecular mechanisms mediating those changes in actin dynamics. We hypothesize that sleep deprivation induces changes in hippocampal actin dynamics by modifying activity of proteins such as the actin depolymerizing protein cofilin. We will elucidate the mechanism by which sleep deprivation alters actin dynamics by looking at actin-interacting proteins in the hippocampus of sleep deprived and non-sleep deprived mice. The student would also learn how to use a variety of biochemical techniques – such as Western blotting, immunohistochemistry, immunoprecipitation, and ELISA – to examine sleep deprivation-induced changes in the hippocampal actin dynamics. Students should have completed introductory biology and chemistry.

Michael Lampson

Project 1: Structural insights into nucleosome stability and epigenetic inheritance

Chromosome inheritance depends on an element within each chromosome known as the centromere. The location and function of the centromere are defined epigenetically by a DNA-binding protein known as CENP-A, which is a histone H3 variant. CENP-A propagation from one cell to its progeny is crucial to maintain centromere identity. A key element of this process is

[Return to top of document](#)

[Return to top of document](#)

the remarkable stability of CENP-A within a protein complex bound to DNA, the nucleosome. The goal of this project is to test a hypothesis for how structural features of the CENP-A nucleosome contribute to its stability. The student will design targeted mutations in CENP-A based on the known protein structure, implement cell and molecular biology techniques to create cell lines expressing these CENP-A mutants, and measure stability using fluorescence microscopy and digital image analysis. We anticipate that the student's work will lead to authorship on a publication. Some background in biology and chemistry, at least at the introductory level, is desirable.

Timothy Linksvayer

Project 1: Genetic basis of ant foraging behavior

Ant colonies are composed of related individuals that specialize on different tasks such as reproduction, foraging, nursing, and defense. The pharaoh ant has "pathfinder" individuals that specialize on exploring, detecting and producing chemically based foraging trails. Using a genetically variable ant stock population, the project will characterize the genetic basis of pathfinder traits.

Project 2: Collective decision making in ants

Ant colonies are composed of groups of individuals that often function as a unit to make collective decisions and complete large tasks. This project will use social network approaches and behavioral observation to determine how collective decision making concerning nest choice is regulated at the individual- and group-levels.

Project 3: Ant genetics and breeding

Ants are considered to be models for studying the genetic basis and evolution of social behavior, but progress has been hampered by the fact that controlled breeding is impossible in most species. This project will combine breeding experiments, genotyping, and quantitative genetics using a unique ant system that is readily bred and has short generation time.

Marc Schmidt

Project 1: Neural recording and analysis in the respiratory-thalamic pathway of singing birds

Behavior is typically viewed as controlled in a top down manner with higher-order centers, such as cortex, generating the commands that directly drive the brainstem or spinal motor centers. In this hierarchical view, brainstem circuits such as those controlling breathing are viewed simply

[Return to top of document](#)

[Return to top of document](#)

as being driven by these higher order centers. The primary objective of this project is to use a highly stereotyped behavior, singing in the zebra finch, to investigate how the respiratory brainstem might actually shape the generation of cortical motor commands in a bottom-up fashion. In songbirds, the respiratory brainstem contains a distinct population of neurons that projects up to cortex via the intermediary of a small thalamic nucleus (nucleus Uva). A student working on this project would be involved in the collection and analysis of neural recordings from singing zebra finches. By recording from Uva, this work directly addresses the nature of the motor commands that are sent from the brainstem to cortex. The student would learn various electrophysiological techniques (in both awake and anesthetized birds), song quantification as well as analysis of neural data. Students should have completed introductory neuroscience and physics, have some experience handling animals (ideally birds) and have a working knowledge of Matlab.

CHEMISTRY

Donald Berry

Project 1: Non-Innocent Ligand Complexes for Activation of C-H Bonds

Student will work with a graduate student mentor to prepare new transition metal complexes of electronically "non-innocent" organic ligands. The activity of the new complexes for the cleavage and functionalization of C-H bonds in simple organic hydrocarbons will ultimately be explored. Although completion of organic chemistry and organic chemistry lab is preferred, students having completed the honors chemistry sequence (Chem115 and 116) may also be considered.

E. James Petersson

Project 1: Studies Toward the Development of LexA Inhibitors to Combat Antibiotic Resistance

Semi-synthesis of fluorescently-labeled LexA protein and studies of the mechanism of self-cleavage. Chemical synthesis of unnatural amino acids and peptides, expression of proteins containing unnatural amino acids by molecular biology, in vitro fluorescence assays to monitor structural changes and cleavage. No prior experience necessary.

Project 2: Studies of the Misfolding and Amyloid Formation by the Parkinson's Disease Protein alpha-Synuclein

[Return to top of document](#)

[Return to top of document](#)

Semi-synthesis of fluorescently-labeled alpha-synuclein protein and studies of the mechanism of aggregation. Chemical synthesis of unnatural amino acids and peptides, expression of proteins containing unnatural amino acids by molecular biology, in vitro fluorescence assays to monitor structural changes. No prior experience necessary.

CINEMA STUDIES/ENGLISH

Timothy Corrigan

Project 1: Cinematic Value: Film Emerging from Converging Cultures

The most dramatic and significant change in media practice and media theory over the last decade has been the expansion and proliferation of what has been deemed a “convergence culture,” defined by Ipads, iPhones, mash-ups, YouTube, and the many other Internet/technological circulations today. A product of the digital revolution that has transformed film production, distribution, and exhibition since the 1990s, the new convergence cultures have reconfigured traditional relationships with the technological image, so that now the experience of films and other media events takes place as part of a continual, broad, and interactive “circulation” of information and material, a circulation that, for many, has leveled the fields of aesthetic, social, and historical value. In this new landscape defined by the Internet, iPhones, and other digital vehicles, hierarchies of value and worth have, if not fully disappeared, dissipated beyond recognition. As the central character in *Clueless* makes clear at one point in that film, knowing and valuing Hamlet may today be less about understanding Shakespeare than about understanding Mel Gibson. Without discounting the impact of this new age and its new technologies, my current book project aims to discover how and where filmmakers are attempting to rediscover the terms of value within a cultural circulation that seems antithetical to such measures. My most recent book, *The Essay Film: From Montaigne, After Marker*, looked at one key practice in contemporary cinema to argue how these films work to generate a specific kind of thinking in a media culture that tends to resist active thought. This new work will broaden and expand that focus to investigate how certain films and filmmakers struggle to locate and generate the terms of value within contemporary convergence cultures.

[Return to top of document](#)

CLASSICAL STUDIES

John Mulhern

Project 1: Politeia in Aristotle's Politics: A Catalogue of Uses

The last half-century has seen a remarkable international revival of interest in Aristotle's Politics. Still, many questions about it remain unresolved. One of the chief is the meaning of the word politeia, most commonly translated into English here by a single expression, usually 'constitution', similarly in other languages. This word, however, actually has four main senses in Greek literature—citizenship, the citizen body, the arrangement of offices or constitution, and the regime (those who actually rule). Using the Thesaurus Linguae Graecae, which lists 522 occurrences in this work, I am preparing an annotated catalogue which gives the main sense of each occurrence of the word in its context, with reasons, where the text is sufficiently explicit, in an attempt to put the discussion on a firmer footing. I have presented papers recently on this material and project two further conference papers for the fall—one on Book VI and one on Books VII-VIII, which are the last books. In his 1870 Index Aristotelicus, which is published with the main critical edition of Aristotle's works, the 1831 edition of Immanuel Bekker, Hermann Bonitz dealt systematically with about 190 of the 522 occurrences. With the benefit of computers and information systems, this catalogue should complete Bonitz's work, doubtless with some modifications. The student who assists me with this project must have some Greek (and will learn more), will gain practice in using the on-line TLG, will be exposed to related issues and to other classical and post-classical authors, and will help me check the pieces of the project for completeness and consistency. Working on a masterpiece in the literature of politics, legislation, and constitutionmaking, the student will be engaged in the exact interpretation of a complex text, which is excellent preparation for law school, a graduate research program, or another career direction.

Peter Struck

Project 1: Divine Signs and Human Nature: A Cognitive Approach to Divination in Antiquity

Across the whole ancient world, it was commonly understood that the gods sent us messages through birds, oracles, entrails, lightning, strange births, dreams, and countless other means. I am working on a book on the ancient philosophers' attempts to figure out how such divine signs work. While they have different views, the philosophers were unsatisfied with the common understanding. They did not think anthropomorphic gods sent person-to-person messages to their favorites. Instead they looked at the whole tradition of divination as a way of talking about how some humans are just really good at picking up vibey information from their surroundings. They

[Return to top of document](#)

theorized it as a special mode of intuitive knowing that was available to humans, and more available to some than others. In the project I am comparing their theories about certain kinds of human dispositions that make some people more intuitive than others.

CRIMINOLOGY

Charles Loeffler

Project 1: Geospatial Distribution of Criminal Careers

A significant body of research has been conducted on the stability of the geospatial distribution of crime within cities. A similarly large body of research has examined the continuity and change in criminal offending across the lifespan of individual offenders. To date, little research has been conducted on the geospatial distribution of criminal offending within the criminal careers of individual offenders. This project will examine the concentration of offending within individual criminal careers as well as the changes in concentration that result from exogenous shocks to the underlying built environment. Prerequisites: Coursework or other relevant training with data management and spatial model building in ArcGis/Python or Matlab. Familiarity with scripting and basic spatial statistics is expected. Duties/Responsibilities: (1) Write code to clean, geocode, and calculate spatial statistics from raw data. (2) Conduct literature review on three related topics: a. Criminal Careers of Places b. Longitudinal Criminal Careers Research c. Crime Travel Distance Studies (3) Assist in the collection of primary data on exogenous shocks to build environment from newspapers, court records, and other administrative sources as needed.

EARTH AND ENVIRONMENTAL SCIENCE

Irina Marinov

Project 1: Future climate warming and the spread of ocean anoxia

Ocean circulation changes the oxygen distribution. This project aims to understand how and why it does so. Oxygen has a direct role in the ocean cycling of carbon, nitrate and other elements (P, Fe, Mn, etc.) and is fundamental for aerobic life in the ocean (e.g., fish). Oxygen enters the ocean from the atmosphere and is produced by photosynthesis in the top 100m layer. Below the top 100m, oxygen reflects the balance between supply from the surface via physical mechanisms and biological oxygen consumption via decomposition of organic matter. Weak physical ventilation and oxygen consumption lead to mid-depth oxygen minimum zones at depths between 400 and 1200 m. Oxygen minimum zones or OMZs are particularly important and not well understood. Significant deoxygenation and expansion of OMZs has been observed in the North Pacific and

[Return to top of document](#)

[Return to top of document](#)

tropical oceans over the past 50 years, but it is unclear whether this trend will continue into the 21st century. In this project the student will analyze the results of climate simulations run with global climate models. The goal is to explore the links between climate driven changes in physical parameters (ocean temperature, stratification, ocean currents, atmospheric circulation) and potential future expansion of oxygen minimum zones. A background in basic sciences, statistics and programming is ideal for the student on this project. In this project, the student will learn how to analyze climate data in Matlab and the oceanographic software Ferret, and will be broadly exposed to oceanography and climate modeling.

ECONOMICS

Jesus Fernandez-Villaverde

Project 1: Global Economic History

I am writing a very innovative textbook on Global Economic History based on a class I currently teach at Penn. I need help with background material, data gathering, and fact checking. It is an exciting project that links many different areas of history, economics, and politics, and offers students a global view.

Project 2: Demographic Transitions over Time and Space

I am collecting a dataset of demographic transitions over time and space: how similar/different were the demographic transitions in England and in Iran? Or in Mexico and in France? I need help to collect data and do basic manipulations with it.

Jeremy Greenwood

Project 1: Evolving Households: The Imprint of Technology on Family Life

The goal of the project is to analyze how family life has changed over the last 100 years or so. The project is broken down into five segments, which will make up a research monograph. The first will analyze the rise in female labor-force participation. The decline in fertility is the subject of the second segment. The third segment addresses the rise in divorce and the decline in marriage. Changes in culture will be studied in the fourth segment. In particular, the granting of new rights to women and the rise in premarital sex will be examined. Trends in health and retirement are the subject of last segment. The student working on the project will collect and process the required data for each of these segments. This will be done using Excel and a graphics/data analysis package called Origin. Additionally, some graphs illustrating the economics underlying each of these trends will be prepared. These will done in either

[Return to top of document](#)

[Return to top of document](#)

Powerpoint or Adobe Illustrator. None of these programs are hard to use. The student involved in the project should have a keen interest in economics and should enjoy using a computer.

ENGLISH/AFRICANA STUDIES

Herman Beavers

Project 1: The Uncertainty of Blackness *Rising Juniors only*

I am in the midst of completing revisions on a scholarly monograph that utilizes chaos and systems theory to create a critical practice that is attentive to manifestations of turbulence, entropy, [dis]equilibrium, and noise as they manifest themselves as metaphors or symbols in canonical texts by African American writers in the years 1940-2005. In lifting the critical terminology from systems theory and using it to reframe how we talk about works by African American writers, we come away with a larger sense of how those writers conceived their respective literary projects and what sort of impact they hoped to foment in the various reading publics they sought to engage. I seek to understand the ways that these writers worked to imagine a space characterized by inclusiveness, dialogue, and cross-cultural engagement that could only be reached by thinking outside the proverbial box to embrace the kinds of instability social transformation can create.

A student working with me on this project would be required to spend time in an archive at Penn, which has compiled a vast collection of materials from the interface between systems theory and cultural practice (most notably literary practices) and become facile enough in the discipline to be able to assist me in locating as many resources pertinent to my project as possible. But their ultimate responsibility would be in helping to compile a working bibliography for the project and running down disparate sources. I am open to having a student with a background outside of English or Africana Studies, but for obvious reasons, a student with such a background will have an easier time navigating the critical sources.

Project 2: Jazz Studies in the 21st Century *Rising Juniors only*

I am currently working to complete a monograph on the relationship between jazz, 20th Century African American literature and the politics of racial conduct. Jazz has often been a source of both controversy and cross-cultural collaboration. In the community that has grown up in response, we find that there are a number of associations between musicians, club owners, record company executives, and promoters on the one hand but on the other, people involved with organized crime and illegal drugs. The jazz musician's lifestyle is often fraught with the constant struggle to find consistent employment, playing music they love, which is weighed against the necessities that accompany life outside music that take the form of family or relationships.

[Return to top of document](#)

[Return to top of document](#)

The student involved with this project will have the task of surveying journalistic sources, i.e. the mainstream press, the jazz press, black newspapers, etc. across approximately 80 years of writing for articles that provide a sense of how the press created windows into the jazz community and how they, in their turn, created vehicles for understanding for a music with such transformative potential.

Project 3: Representing Morbidity and Mortality in African American Literature

I am beginning to conceptualize a project that will seek to bring African American literary, photographic, and musical texts into conversation with the vast materials to be found in the fields of public health and epidemiology. As epidemiologists become more interested in looking at the sorts of vectors that intersect with the conditions in African American urban and rural communities, it becomes clear that their concern for violence, health policy, and crime has led to new understandings of how we conceptualize issues of morbidity and mortality in the black community. I hope to find a link between these relatively recent discourses in the field of public health and epidemiology and contemporary representations of black communities in both the Northern and Southern U.S.

The first part of the research, which dealt with historicizing the field of public health has already been begun, but a student working on this project would be expected to conduct research across a range of scholarly disciplines, including anthropology, health policy, literary and cultural studies, and the history of science.

GERMANIC LANGUAGES AND LITERATURES

Simon Richter

Project 1: From Operetta to Silent Film

Scholarship has long been aware that one of the ways in which studios and directors adjusted to the introduction of sound film technology was to adapt operettas (light romantic musicals) to film. But the relationship between operetta and film is older than that. There are cases where operettas were adapted for silent film. Insofar as the operetta is a musical medium and silent film is, well, silent, this form of adaptation is immensely interesting. Of course, silent film isn't really silent--there was always live musical accompaniment. The goal of this research project is to establish a corpus of silent films based on musicals and to work up case studies of a handful of films that adapt operetta in instructive ways. Research will be local, but will probably also entail research and screening trips to the Library of Congress in DC, the Harvard Theater Collection and the NY Public Library. Students should have taken CINE 101, 102 or 103, or otherwise be able to indicate familiarity with the basic tools of film analysis.

[Return to top of document](#)

[Return to top of document](#)

Project 2: From Noah to New Orleans: Cultural Responses to Rising Seas

The long-term goal of this project is to gather information about cultural responses to catastrophic flooding events in the form of elaborate case studies, whether historical or contemporary. How do the people affected explain the flood to themselves? What are flood events kept alive in cultural memory? How do people inhabiting delta regions culturally negotiate their relation to the sea and river? How are flood events represented in various media (film, fiction, monuments and memorials, etc.)? What lessons can be learned from culturally conditioned practices? I am particularly interested in working with students who are able to conduct research in non-English languages spoken in regions where catastrophic flooding occurs. This is however not a prerequisite. Participation in this project will essentially amount to faculty-mentored research and should result in a research paper.

HISTORY

Kathy Peiss

Project 1: Print Culture, Intelligence, and Cultural Reconstruction in the World War II Era

This is a history of American librarians, collectors, and information handlers during World War II. Some were involved in intelligence gathering, serving strategic and military aims; others worked toward the preservation and renewal of learning and intellectual culture in the wake of war's destruction. Their work involved not only rebuilding libraries, restocking collections, and restoring the book trade, but also a massive effort of restitution, to return displaced and looted books. Why and how did such collecting matter at this time of global conflict and devastation? What are the longer-term implications of these acquisitions? And how did those engaged in the world of print culture understand themselves in a cataclysmic war? I am writing a book that seeks to answer those questions. The research assistant for this project will gain extensive experience in historical methods and archival research. Research materials focusing on American cultural policy in 1940s are on microfilm and online; a trip to the National Archives in Washington is an option. There will also be bibliographic work on recent secondary sources. The best candidate for this position will have good library skills, careful note-taking ability, and background or interest in WWII, international history and/or cultural policy/heritage. History major preferred; reading knowledge of German a plus but is not necessary.

[Return to top of document](#)

HISTORY AND SOCIOLOGY OF SCIENCE

David Barnes

Project 1: Philadelphia's Lazaretto, Forgotten Monument to a Hidden History

The oldest surviving quarantine facility in the Western Hemisphere lies dormant and forgotten on the banks of the Delaware River just downstream from the Philadelphia International Airport. In the nineteenth century, the Lazaretto acted as Philadelphia's first line of defense against invasion from yellow fever, cholera, and other epidemic diseases. Uncovering its history, mostly ignored by scholars, reveals a lost world of acute fears and hidden dangers, bitter conflict and tragic suffering, punctuated by thankless caregiving and even heroism. Students' research for this project will contribute to the history of everyday life, medical care, and death in nineteenth-century America. It will also shed new light on the nation's long and conflicted history of immigration and public health, and contribute to scholarly debates in the history of contagionism, quarantine policy, and public health. Moreover, unlike most historical research, this work will contribute to the documentation and preservation of the historic site, and will pave the way for its restoration as a museum or other historic attraction for visitors

Students will work in various archives and specialized libraries in Philadelphia and beyond, as well as with online resources. A book manuscript is nearing completion, and the final stage of research is crucial. Where were Philadelphia's paper mills located in 1885? Which physicians believed yellow fever was contagious in 1804? Can we identify present-day descendants of immigrants who arrived on the ship "North Star" in 1847? Answering questions like these quickly and thoroughly will require a nimble, flexible, and curious mind. Experience with historical research is desirable but not required.

David Caruso

Project 1: A History of Biomedical Research in the United States

Private foundations play a significant role in the trajectory of biomedical research in the United States: scientists often rely on them to provide critical start-up funds to pursue new areas of inquiry. But the money is only a small part of the value of the award; being selected an awardee from a private foundation brings with it scientific recognition and prestige. After private foundation award recipients use the start-up funds to demonstrate the feasibility of their work and the clear need for its further development, the scientists then apply for, and often get, large government grants—and they do so more frequently than colleagues who have not received a private foundation award. Thus, in many respects, private foundations are sculpting the landscape of modern biomedical science. The Chemical Heritage Foundation (CHF) has a vast

[Return to top of document](#)

collection of oral histories with the recipients of one of the most esteemed private foundation grants, the Pew Scholar in the Biomedical Sciences award. CHF is looking for an undergraduate researcher interested in working on this oral history collection to detail the various networks of interaction and the funding history for the Pew Scholars and the impact that they and their research has had on the scientific community. The student will be working closely with a CHF staff historian to develop material for publication in academic and non-academic journals related to the history of (bio)medicine. Strong research and writing skills are a must. Students with an interest in history, history of science, and/or digital humanities are encouraged to apply.

Project 2: Oral History Online Exhibition Researcher

The Oral History Program (OHP) at the Chemical Heritage Foundation (CHF) maintains a collection of over six hundred oral histories detailing various aspects of the history of science in America in the twentieth and twenty-first centuries. As part of our efforts to reach a wider, public audience, the OHP created and launched two online exhibits, Rubber Matters and Critical Mass, both of which utilize material from our oral history collection. We are looking for an undergraduate researcher to assist us with developing a new exhibit based on one of two subsets in our oral history collection, both of which are ripe for use: the Toxic Substances Control Act oral histories and the Ambler REACH oral histories. These subsets of our collection focus on the development of legislation regarding the safety of use of chemical products and the effect of asbestos on a local community, respectively. The researcher will conduct background research on the oral history collection(s), work with oral history transcripts, and develop exhibit content (narrative, audio, and video). This is an excellent opportunity to be part of the process of translating historical and scientific research into public history. Strong research and writing skills are a must. Students with an interest in history, public history, history of science, and/or digital humanities are encouraged to apply.

Jody Roberts

Project 1: History of Materials Science

The development of new materials as a science is a relatively new phenomenon. Researchers at CHF are currently conducting a multi-year project examining the origins and institutionalization of the early materials science laboratories and academic departments (including the Univ. of Pennsylvania's LRSM). CHF seeks a student researcher to participate in the project. The student researcher will conduct historical research on a handful of institutions following the flow of people – industry researchers, academic faculty, students, and postdocs – into and between these early laboratories in order to understand the social and cultural dimensions of developing a new scientific and engineering discipline. The student researcher must have basic skills in conducting historical research, possess strong writing skills, and be able to work independently. Students with backgrounds in history, history of science, public history, sociology, and STS are

[Return to top of document](#)

[Return to top of document](#)

encouraged to apply. Results of this research will be incorporated into academic papers and a white paper report on interdisciplinary research funding to be submitted to the National Science Foundation.

HISTORY OF ART

Gwendolyn Shaw

Project 1: Art Collection Research

The student will assist the professor in conducting archival research on a select group of art works from an important museum collection for inclusion in a special exhibition and catalogue. Research will be conducted in Philadelphia and Washington DC. The student will be responsible for producing and organizing digital files for approximately 100 works of painting, sculpture, photography, and prints. The student will assemble biographies for each of the artists and collect published materials on each of the works of art. This curatorial research will be essential in producing the content of the exhibition and catalogue.

LINGUISTICS

Gene Buckley

Project 1: Kashaya Lexical Database

I am developing an electronic database of the lexicon of the native California language Kashaya, along with analyzed texts. These will serve as the basis of two kinds of dictionaries, for scholars and for language learners, as well as pedagogical materials such as lists of semantically related words. The student would assist with various aspects of this project, such as the hierarchical relations among dictionary entries, completeness and consistency of definitions, semantic categorization of entries, and analysis of words in the texts. In doing so, he or she will learn about a very complex and interesting language, as well as techniques of linguistic analysis. The student should have some background in linguistics, with knowledge of phonetic transcription and morphology, as well as the ability to pay careful attention to detail.

[Return to top of document](#)

Julie Anne Legate

Project 1: Semantic Case, Grammatical Case, and Subjects

While English has only a very impoverished case system (She saw me versus I saw her), many languages have a rich system of case morphology encoding not only grammatical function (subject versus object) but also meaning. Cases may encode semantic information that is expressed with prepositions in English, e.g. "towards", "away from", or adverbs, e.g. "intentionally". An important issue in linguistic theory is to what extent cases with rich meaning behave similarly to or differently from cases that encode only grammatical function. This project aims to improve our understanding of the crosslinguistic behaviour of these two types of cases. The project may take two forms, depending on the student researcher: (A) If the student is a native speaker of a language with a rich case system (and/or a language with special case morphology for the subject of transitive verbs, i.e. ergative case), the student will investigate the behaviour of semantically-rich cases in his/her own language. (B) If the student is not a native speaker of a language with a rich case system, the student will access grammars of understudied languages (with guidance from the professor) to investigate the behaviour of semantically-rich cases in these languages. For both (A) and (B), topics to be considered include: Can the grammatical subject of a sentence bear a semantically-rich case? If so, does the object then bear a case more standardly associated with subjects? (e.g. nominative) What conditions the use of a semantically-rich case on the subject? (e.g. meaning, grammatical aspect) Can subjects appear in clauses that are not finite (e.g. infinitives, nominalizations)? Do subjects that bear a semantically-rich case behave differently from subjects that bear purely grammatical case in clauses that are not finite? Can transitive verbs be causativized? If so, what case does the causee bear? etc.

Project 2: Austronesian Object Voice

Austronesian languages are (in)famous for a sentence-type that, on the one hand, is like a passive in that the object of the active verb becomes the subject of the passive verb (cf English: I read the book -- The book was read), but on the other hand, is unlike a passive in that the subject of the active verb does not appear in a prepositional phrase in the passive (contrary to English: I read the book -- the book was read by me). This sentence-type is unusual in the world's languages, and is not yet clearly understood. This project aims to further our understanding of this sentence-type. The professor and student will work together to probe the properties of this sentence-type -- e.g. how it interacts with questions, how it interacts with reflexives (cf English: I cut myself), what types of subjects it allows, etc. The student must be a native speaker of an Austronesian language.

Charles Yang

Project 1: How children learn words

How children learn words The mother says "Cat!" while pointing to the kitten in the backyard. Common sense tells us that children learn words by attending to the associations between words and the objects they refer to. Indeed, the English philosopher John Locke speculated that to teach children words, "people ordinarily show them the thing whereof they would have them have the idea; and then repeat to them the name that stands for it, as "white", "sweet", "milk", "sugar", "cat", "dog." (An essay concerning human understanding 1690). Modern research on how children learn language has largely discredited the common sense. The associations between words and objects turn out to be not reliable at all. For instance, one study finds that when the word "open" is uttered by the mother, an open object (such as a door), or an observable act of opening, is only present 50% of time. When the child is instructed to "see" something, the intended object is perceivable only 30% of time (think "see the movie"). That is not to mention that many words--such as the verb "believe" and the noun "idea"--are not directly observable. Even when "grandma" is brought up, she might as well be in Canada. Despite these seemingly insurmountable challenges, children are expert word learners, capable of learning on average 20 words on a single day. And they rarely make mistakes. How do they do that? This project is a formal and empirical study of word learning by children that is poised to break new ground on several fronts. The first component of the word learning project is to understand exactly how much ambiguity of the type mentioned earlier children have to face in language learning. There is now a relatively large collection of video recordings of mother-child interactions available in the public domain. Surprisingly, no work has been done to quantify the informational complexity of the data. This research component will annotate a significant amount of the video data and provide paired transcript-observation data in each scene, along with the gestural (e.g., pointing) and prosodic cues (e.g., stressed words) that accompany the presentation of words. We can immediately address the question, Why are some words learned earlier than others? One hypothesis is that the earlier words are more frequent ones but another hypothesis is that these are words with lower degrees of ambiguity, which can be measured as the number of non-target objects that are co-present in the environment. Furthermore, by quantifying the extent of informativeness, we can tackle the long standing question whether the speech patterns of "baby talk", which many parents in the Western world naturally adopt when speaking to children, use less ambiguous words--in comparison to adult-to-adult conversations--that would facilitate language learning by young children. The annotated data will be released back into the public domain so that language researchers around the world can make use of this invaluable database. The second component of the word learning project is computational in nature. There has been extensive debate on how the child makes use of word-meaning associations in the environment, however partial and noisy they may be. One school of thought holds that the child keeps track all, or many, co-occurrence correlations between words and their potential words: it is hoped that in the long run, dogs, rather than cats, are more likely to be present when the word "dog" is

[*Return to top of document*](#)

uttered. Another view holds that the child only entertains only one candidate meaning of a word; she holds on to that meaning as long as it is confirmed (e.g., when "dog" is heard, there is indeed a dog in the environment) but abandons it when it is disconfirmed (no dog when "dog" is heard) and adopts a new meaning. Experimental research in the laboratory has not decisively favored either theory, largely because the stimuli were created such as only strategy could be at play with the other completely neutralized ("control condition") so that any effect of learning can be attributed to the strategy under test. Previous work in our research group has implemented both learning models as computer programs. The second component of the current project will test these models on the language learning data from the annotation component and compare their effectiveness in a realistic setting. Requirement: The student researcher must be "computer literate" and should be comfortable learning and using specialized computer software under the faculty guidance. The data annotation project requires rigorous documentations on the methods of annotation and progress reports at regular intervals such as future replication is possible. The computational project requires basic programming skills (e.g., CIS110). All majors are encouraged to apply; background in linguistics, psychology, cognitive science and computer science is desirable but not necessary.

Project 2: Words and Mechanical Turks

When we see a complex and uncommon word like categorizability, even if we have not heard it before, we have a good idea of what it means. Our ability to do so means that we are capable of dividing it into its component parts (category, -ize, -able, -ity). We can also form novel words in this way; even if we don't actually know what blicketizability means, it seems like a plausible word of English if there was such a thing as a blicket. In these extreme cases it is easy to see that we are able of decomposing words and understanding what they are made of. But for a common word like played, while we can think of it as being constructed as play and -ed, we could just have memorized the word as a whole as we hear it often enough. Based on this possibility, it's an open question as to whether when we hear words like played whether we treat them as whole words or made up of pieces (morphemes) like play and -ed. This question is important as it has implications for how we understand how adults process words, how children acquire words, and how linguistic theory should represent words. One way that researchers in psycholinguistics have approached this question is through experimental work in a paradigm called lexical decision. In a lexical decision experiment, participants are asked to decide whether a set of letters they are presented with is a word, for example to tell the difference between played and blayed. There has been a long tradition of lexical decision experiments that have tried to determine how words are represented and processed in the mind, but unfortunately despite three decades of experiments many of the results have been entirely contradictory. Recently submitted work to come out of our group suggests that these contradictory findings are caused by methodological issues of two types. The first is that the modeling techniques used were relatively crude, and over the past few years we have brought more modern statistical modeling techniques to the problem to address this. The second issue is that the number of words and subjects used in these experiments are

[*Return to top of document*](#)

[Return to top of document](#)

simply too small to detect the subtle effects that are in question. To address this, we propose to use Mechanical Turk to administer lexical decision experiments to large groups of subjects over the internet. Mechanical Turk is an Amazon service that allows small tasks to be offered to for participants to perform for compensation. Mechanical Turk is becoming popular for psycholinguistic experiments as it allows studies to be run quickly with large numbers of subjects at relatively low cost, and in the Computer and Information Science department here at Penn studies of how users communicate to each other toward a shared goal have been performed. To produce and run this experiment, we require an undergraduate with programming experience, preferably in Java. The student would be responsible for writing the software that would administer the experiment, submitting it to Mechanical Turk, and monitoring the response of participants to the study and assembling the data they provide. They would work with faculty and graduate students on the data analysis and learn about how psycholinguistic data is analyzed.

MUSIC

Carol Muller

Project 1: West Philadelphia Music Research

For about a decade Penn graduate and undergraduate students have been conducting research, making films, and establishing community partnerships in West Philadelphia's Islamic and Christian communities. Some of that material is available on our website, as above, there is plenty that needs to be loaded onto the site. Students must know html or be willing to learn it to load all materials onto our site. Links to recent Wordpress projects are also to be created with the current site.

Project 2: South Africa: The National Arts Festival 2013

This project requires two students to travel with Music 56, Penn in Grahamstown, (a course taken for credit), attend the festival, and follow up with research on South African performance as it is presented at the festival. They will spend time at the International Library of African Music, a major archive of traditional music at the festival site, and interview various people involved in the festival--directors, artists, festival goers. This will contribute to a paper co-authored with Dr. Muller Time spent in South Africa is a minimum of two weeks (festival runs from end of June for 12 days).

Project 3: Listening to World Music on a MOOC with a Book

Dr. Muller is currently writing a textbook to expand on her lecture materials already available on the Penn-Coursera Listening to World Music site. The student in this project will be involved in helping her to collate all publication materials--audio, video, images etc.--secure permissions and

[Return to top of document](#)

[Return to top of document](#)

so forth. The book will be used for both regular undergraduate students and COURSERA MOOCS.

Naomi Waltham-Smith

Project 1: A comparative study of urban street sound and aural flânerie

While modernity has long been tied to vision and spectacle, this project explores how sound and modes of hearing affect our engagement with our built environment, and seeks to conceptualize philosophically how sound/hearing structure socio-political relations. Besides conducting fieldwork to document urban space through sound recordings (supplemented by photos/videos), the student will collate and edit sound, video and image files for presentation at an end-of-summer conference, and assist in designing a blog (an aural equivalent to Bill Cunningham's street-style vlog <http://www.nytimes.com/video/landing/on-the-street/1247463985977/index.html>). Because the project is in its early stages, the student will have the invaluable opportunity to witness close-up and even shape how research questions/methodology are reformulated in response to initial data collection, thereby gaining insights into how they might develop their own projects. I would be delighted to mentor independent research coming out of this work, which could be critical-theoretical, ethnographic or creative, and which might be presented alongside this project during Penn's Year of Sound. The location/timing of the project is open to negotiation to accommodate the student's interests and travel plans. Most of the work may be conducted from any location. The student may either opt to base themselves at Penn for a period, making 4–5 day trips to New York to conduct fieldwork, or use CURF funding to travel abroad to conduct fieldwork in another sonically-vibrant urban center. The project will appeal to students with interests in sound studies, music, urban studies, architecture, Continental philosophy and comparative literature. No prior knowledge or musical abilities are required—just avid curiosity, keen observation and a thoughtful imagination.

Project 2: Mozart and Haydn at the intersection of teaching and research

This project, which involves close engagement with the music of the Classical style and listening habits in the late eighteenth century, has a twofold aim. First, the student will assist in preparing materials, including a packet and an interactive website, for a new music theory course—materials which I hope to develop into a textbook (the student's role would receive full acknowledgement). The student will also evaluate existing textbooks and contribute suggestions for explanations and practical exercises. Second, the student will examine and collate texts and examples for two chapters in my current book project that build upon the course's theoretical perspective. For any student who is, or hopes to be, involved in music pedagogy, the project will provide a useful opportunity to reflect upon—and influence—teaching practice and music's role in education. Further, it will allow the student to witness first-hand the important cross-

[Return to top of document](#)

fertilization between teaching and research, as well as the contrasting issues arising in publishing pedagogical and scholarly texts. The work may be conducted from any location provided that copies of some materials are made prior to leaving Penn. The student also has the option of using CURF funding for a brief research trip to London's Public Record Office to examine documents concerning Haydn's relations with publishers and the courts. The project is ideally suited for music majors or minors with theoretical, compositional or historical interests. The student should have Music 170 or equivalent background such that they are comfortable with the fundamentals of music theory.

PHILOSOPHY

Adrienne Martin

Project 1: Conscientious objection in healthcare

Federal and state laws, institutional and organizational policies provide increasing protection for medical providers who refuse to provide treatments otherwise sanctioned by the medical community, on the grounds that such provision conflicts with their "conscience"--or moral or religious principles. Familiar examples include obstetricians who refuse to provide abortions, pharmacists who refuse to provide emergency contraception, and oncologists who refuse to provide terminal palliative sedation. The student who takes this job will, first, assist me in reviewing the existing literature on this subject: locating, reading, summarizing, and discussing published articles and books; this research will be interdisciplinary, but will focus on philosophical and normative publications. After completing this research, the student will assist me in drafting an original article on the subject, through discussion, reading and commenting on drafts, and fact-checking against the literature review. If we are in sufficient agreement on the subject, co-authorship of this article is a possibility. If not, the student has the option of drafting his or her own independent article, and I will mentor this project. This is an opportunity for a student interested in medical ethics to develop skills in research and writing, and to learn about the distinctive approach philosophers take to an interdisciplinary field. There are no specific prerequisites, but the student must be self-motivating, capable of training him or herself in database research, and a reasonably good writer.

Project 2: The ethics of fantasy

Many people entertain vivid and extended fantasies—both about the way they would actually like events to unfold, and about things they would never want to actually happen. Some people think fantasy is an moral free-zone. They think, for example, that there is nothing wrong with fantasizing about performing immoral actions, as long as it does not actually increase the chances that you will perform those actions; or that there is nothing wrong with fantasizing about

[Return to top of document](#)

another person in a way he or she should would find objectionable, as long as it does not actually increase the chances that you will treat him or her objectionably. Other people have an intuition that moral values or principles do apply to fantasies, although perhaps not in exactly the way they apply to our behavior outside of our fantasies. The student who takes this job will assist me in reviewing the existing literature on this and related subjects: locating, reading, summarizing, and discussing published articles and books. This research will be somewhat interdisciplinary, but will focus primarily on the philosophical literature. Not a great deal has been written specifically on the ethics of fantasy, therefore much of the research will involve identifying and reviewing subjects that are relevant and have been more thoroughly explored (such as the nature of respect and the relation between imagination and other mental faculties). This is an opportunity for a student interested in philosophy to develop skills in research and writing, and to work closely with a professor. There are no specific pre-requisites, but the student must be self-motivating, capable of training him or herself in database research, and a reasonably good writer.

Project 3: The reactive attitudes in moral philosophy

In his landmark 1962 paper, “Freedom and Resentment,” P.F. Strawson identified a number of emotional attitudes that, he argued, play a constitutive role in interpersonal relations: to relate to people as people rather than as things or objects is in part to experience a specific range of attitudes—such as resentment, indignation, and gratitude—in reaction to their behavior. A substantial literature has grown from this idea. The student who takes this job will assist me in reviewing this literature: locating, reading, summarizing, and discussing both published and unpublished articles and books. Once we have completed the literature review, the student will then assist me in creating a syllabus for an advanced undergraduate seminar. This is an opportunity for a student to work closely with a professor to learn about a topic at the heart of some of the most interesting work done in recent moral philosophy and moral psychology. The successful applicant will be comfortable engaging with difficult philosophical texts, will be highly organized and self-motivating, and will be a reasonably good writer.

PHYSICS AND ASTRONOMY

Masao Sako

Project 1: Cosmic Supernova Explosions in the Dark Energy Survey

Penn is involved in an exciting cosmology project called the Dark Energy Survey (DES), which will study the acceleration of the Universe and help understand the nature of the mysterious dark energy. In the summer of 2012, we installed a new high-throughput 520-Megapixel camera on the Blanco 4m telescope in Chile. Over the next 5 years, this camera will measure the detailed properties of over 300 million galaxies and discover thousands of supernova explosions billions

[Return to top of document](#)

[Return to top of document](#)

of light years away. The student will help run and test a pipeline software developed by our group that efficiently finds new supernova detections from the several 100 GB of data collected every night. Some experience in UNIX/Linux is helpful. Motivated students with strong computing background can develop new pieces of the pipeline that will help improve the performance of the supernova search. More information about the project can be found here -- <http://www.darkenergysurvey.org/>

POLITICAL SCIENCE

Julia Gray

Project 1: The Internal Politics of International Organizations

International organizations have been on the rise, and many scholars have theorized as to their benefits for international cooperation. Yet very little is understood about their internal workings, their decision-making processes, and the structure and hierarchy of their staff. This project seeks to expand our understanding of the politics of international organizations through the creation of a database that examines, on a comparative basis, the structures and histories of international organizations across the world. Students will be asked to research a subset of international organizations scattered throughout the world and create comparative data on their managerial structures, their decision-making processes, the qualifications of their staff and of their management, and their activities. These will be used to create a dataset of the IO structures, so that a framework for their performance and their influence can be developed. As these organizations are international, students with strength in languages (particularly Spanish, Russian, and French) are desired. Students will use newspaper databases and library resources as the basis of their research.

Project 2: Life, Death, or Zombies? The Endurance of Inefficient International Organizations

Since the 1960s, regional economic organizations (REOs) have proliferated, not least in the developing world. Yet many of these agreements are among countries with few factor complementarities and little to trade, and recent research shows that many of them do not live up to their own goals. Many organizations end up in one of three situations. They might die off altogether, though this is infrequent, since politicians are usually reluctant to exit from or disband agreements. A large group of them become "zombies," where they exist in name alone, particularly if they are unable to attract and retain talented staff . A third category includes organizations that are alive and functioning. This proposition will be explored using new data on the effectiveness and activities of regional economic organizations, from 1982 to 2007. Around 30% the organizations in the sample are alive and functioning;

[Return to top of document](#)

[Return to top of document](#)

around 20% are essentially dead, and nearly 50% are zombies. The ability of the secretariats to attract and retain talented staff (as proxied by hardship compensation associated with the secretariat's location) as well as to autonomously enact policy are associated with whether organizations truly stay active, or whether they simply endure or die off. These effects dominate those of economic predictors, such as levels of wealth, trade, or trade potential in an economy. Students will be asked to create timelines of international organizations' activities, so as to track their activities over time and to see whether they can be truly considered alive, dead, or dormant. This will require historical research on the activities of international organizations across time. As these organizations are international, students with strength in languages (particularly Spanish, Russian, and French) are desired. Students will use newspaper databases and library resources as the basis for their research.

Project 3: Beware of Greeks Bearing Gifts: Presidential

How can we measure alliances between states, or the influence -- both intended and actual -- that one country has on another? This project centers on a novel way of quantifying relations between states, through the gathering of a dataset of gifts given to US presidents and state dinners held at the White House. These gifts can serve as a potential proxy for the relationship dynamics between a given pair of leaders. US presidential libraries contain extensive details on these gifts (Theodore Roosevelt once received a coyote and two Nubian lions from Ethiopia, for example). Researchers will be asked to contact presidential libraries and create a database of the gifts received by US presidents and the details of state dinners across time. They will then compile these data into a usable dataset. These data will then be used to see if gifts indeed helped strengthen alliances or increase influence.

Jeffrey Green

Project 1: The Uses and Abuses of History for Political Thought

In 1874, Friedrich Nietzsche published an essay—"On the Uses and Abuses of History for Life"—that examined both the benefits and drawbacks of the study of the past for a healthy mind. This research project applies Nietzsche's framework to examine the advantages and disadvantages of historical scholarship for the study of politics. It aims to understand and resist the claim, made by some leading political theorists, that political theory should be conducted in a purely historical manner: that the political theorist's job is to engage with intellectual works from the past only in order to understand the intentions of the authors who wrote them and not, say, to have these works illuminate contemporary issues, problems, and concerns. This project will contribute to an essay on this topic I have been commissioned to write for the Annual Review of Political Science, which is due in 2014. No prior experience in political theory is required.

[Return to top of document](#)

Project 2: Democracy, Inequality, and Justice

This projects calls for wide-ranging social-scientific and philosophical research on the endurance of political inequality within the world’s most advanced liberal-democratic regimes. Topics include: (a) the persistence of plutocratic structures not just in the United States (where the question of plutocracy has been widely discussed and researched), but in European and even Scandinavian polities often upheld as exemplars of political and economic equality; (b) whether it is impossible in practice to fully achieve a society where similarly talented and motivated children have equal prospects of “success” in life regardless of their family and class background, and if so how the commitment to democracy with regard to civic education might be reconceived; (c) whether it is impossible in practice to fully achieve a society where similarly talented and motivated citizens have equal prospects of influencing elections regardless of their economic background, and if so how the commitment to political equality might be reconceived; (d) how the most advantaged (e.g., superrich) members of society, often overlooked in contemporary liberal-democratic philosophies and tax structures, might have a special role to play as part of a liberal-democratic society’s commitment to justice; (e) analysis of historical regimes, like Rome’s plebeian democracy, which combined plutocratic and egalitarian elements; and (f) the psychopolitical dilemmas of ordinary citizens fated to live in imperfectly democratic regimes. I expect this research to contribute to my current book project: *The Plebeian Addendum to Liberal Democracy*. No prior experience in political theory is required.

Project 3: Epicurean Political Philosophy

2. Epicurus, founder of the one of the most influential philosophical schools of the ancient world, taught to “live unnoticed”—and this teaching usually has been understood to indicate an antipolitical or apolitical ethical standpoint. In resisting this understanding, our project will involve turning to some of the key exponents of Epicurean philosophy—Epicurus himself, Lucretius (whose *On the Nature of Things* is perhaps the single greatest Epicurean work), Atticus (with whom the anti-Epicurean Cicero exchanged a lifelong correspondence), as well as contemporary sources—in the hope of extracting a substantive, positive Epicurean political philosophy. Why? Given that ordinary citizens in contemporary mass democracies already to a certain extent live unnoticed, there is a potential value in turning to the Epicurean tradition not as a call to live this kind of life, but as a set of political strategies for enduring it. I expect this research to contribute to my current book project: *The Plebeian Addendum to Liberal Democracy*. No prior experience in political theory is required.

[Return to top of document](#)

Guy Grossman

Project 1: Ethnic Diversity and Judicial Influence on Appeal Courts in Israel

The student will prepare an annotated bibliography and take an active part in drafting a pre-analysis plan and some of the paper's sections (e.g. intro and literature review)

Project 2: Does Information Technology Flatten Interest Articulation? Evidence from Uganda

The student will travel to Uganda in the summer to help coordinate a large enumeration (data collection) project. The student will be moving in Uganda with a survey team to ensure the quality of the data collection.

Nancy Hirschmann

Project 1: The Relationship of Freedom to Justice in Disability Social Rights

I am writing a paper on the place that freedom plays in the ways that disability rights are defined, pursued, expressed in law, and litigated. Most thinking about rights gives primacy to the concept of "justice," but I believe that distorts the ability of excluded groups to claim rights. Freedom, I believe, is a better framework. Emphasis will be both on US and international. Student will do literature searches, write summaries of primary research, examine court cases. The question of how a focus on justice rather than freedom may distort rights discourse, and the difference between legal rights and social rights, may also be part of the project. Some prior familiarity with political theory is preferred.

Project 2: Rethinking the Body: Feminism and Disability

Feminist theory has long examined the concept of "the body" as a social construction--how we talk and think about bodies influences how we treat them in medicine, sports, law, etc., and vice versa. But disability experience suggests a different perspective on this: although it is clear that how disabilities are interpreted and viewed are socially constructed, the body exerts certain absolute demands that cut across cultural context--impaired mobility might have different social significance in different societies, but it also may have certain empirical features that cross all societies. I want to examine how this affects fundamental ideals within theory: for instance, we talk about "will" as a function of the mind, and the will rules the body; but might the body have a "will" as well? Might the body shape and even determine the will? Students will do literature searches, primary research, write summaries. Familiarity with neuroscience and biology would be a plus, as would some familiarity with feminist theory, but I don't expect you to know both!

[Return to top of document](#)

Marc Meredith

Project 1: Moneyball and Politics

Do you enjoy using data to understand how the world works? Are you like Billy Beane in that you frequently question the conventional explanation for how the world works? Did you find yourself checking fivethirtyeight.com every day during the 2012 election cycle? If so, you may be interested in the PURM project. My research focuses on using data to try and understand why people vote and who they vote for if they do vote? I am looking for students to assist me over the summer in collecting data and building models that try improve our collective understanding political behavior. We'll try to understand why factors like the order that candidates appear on the ballot affect who people vote for and what role political parties play in affecting how people vote in prominent races like city council and school board elections. I am particularly interested in candidates who are organized and who are willing to learn new computing skills.

Project 2: The Causes and Consequences of Felon Disenfranchisement

More than two hundred years after this country was founded on the principle of equality, felons are the only class of citizens still disenfranchised from the vote. Felon disenfranchisement has become a contentious and significant public policy issue as of late, a response to both the unprecedented rise of the carceral state and mounting questions of fairness in American democracy. Recent estimates by the Sentencing Project suggest that over five million citizens are ineligible to vote on the basis of a criminal conviction. This project seeks to understand why states adopt the policies that they do with respect to felon voting rights. In doing so, we also will analyze the extent to which ex-felon vote once they are eligible to do so. In particular, we would like to try and understand whether getting ex-felons to reintegrate in the political process is a useful tool for reducing recidivism.

Brendan O'Leary

Project 1: Political Violence in Belfast 1969-72 and 1969-72

Data-collection, and coding. No prior knowledge of Northern Ireland required. GIS skills would be great, or willingness to acquire them.

Project 2: Christians in Iraq since 2003

Collection of English language media materials on the impact of conflict on the Christians of Iraq - inside Arab Iraq, the disputed territories and the Kurdistan Region since 2003. Organization, collation and coding. Ideally the student might have one of the following languages: Aramaic, Kurdish, Arabic and Farsi

Rudra Sil

Project 1: Labor Politics and Industrial Relations in an Enlarged Europe

This research is part of a larger book project examining changes in labor movements, worker protests, and trade union behavior in former communist countries that have joined the European Union. This part of the research focuses on three Central European countries: Poland, the Czech Republic, and Hungary. The ideal research assistant will help compare the labor codes across the countries in terms of the extent to which workers have employment protection, and the extent to which unions are able to effectively engage in collective bargaining in firms, sectors, or on a national scale. The research will also involve delving into the background history of the trade union movements since the fall of communism, gathering data on trade union membership, their available resources, their relations to political parties, and their role in preserving some guarantees for workers and unions in debates over labor legislation. Most of the research will focus on information available in scholarly articles and books as well as in relevant websites (e.g. trade union websites, labor publications, and reports compiled by the International Labor Organization).

Project 2: Labor Politics and Industrial Relations in China and Vietnam

The student will assist in collecting information on labor legislation, trade union activities, and workers' protests in authoritarian countries that are nominally under the rule of a "communist" party but are fully engaged in market-oriented economic reforms. The two most important cases in this regard are China and Vietnam. The research will focus on comparing the two countries on issues related to labor politics and industrial relations, focusing on some of the common challenges faced by the two countries given their similar regime characteristics, while also laying out differences in the space available for official and unofficial debates over social policy and economic policy. This research is part of a larger book project examining changes in labor movements, worker protests, and trade union behavior in former communist countries in all parts of the world.

Project 3: The Nature of Comparative Analysis Across Regions and Civilizations *Rising Juniors only*

The student is expected to assist in the preparation of a manuscript focused on the interaction between "the comparative method," as generally understood in social science disciplines, and the actual act of comparing locales and countries situated in different geographic regions marked by distinct civilizational histories. The point is to explore how the practical requirements of empirical research - such as language training and accumulated expertise - shape the choice of cases in comparative research, often sacrificing analytic leverage in order to maximize use of geographically limited expertise. The student will look for examples of multi-case (small-N) comparative studies, comparing them in terms of how much they rely on fieldwork and whether

[Return to top of document](#)

the cases are chosen with particular regions, languages, or civilizations in mind. This is a crucial part of the current debate over just how much the social sciences can afford to neglect the development of area-experts while pushing the development of general theories.

PSYCHOLOGY

David Brainard

Project 1: Color Perception in Action

Color provides information about object identity and physical properties. For color to be useful, it needs to correspond to stable properties of objects and should not change when the conditions under which we see the objects changes. For example, it should be equally easy recognize whether an apple is ripe when we see it on a sunlit tree in the orchard or under fluorescent supermarket lights. How the visual system extracts information about object color from the light that enters our eye is a fundamental open question. We designed a task in which we ask the observers to choose a target object based on color from a set of test objects presented under a different illumination. This task captures the way color is used in everyday tasks, but differs from the tasks that have typically been used to study color perception in the laboratory

In this project, we will explore whether there are systematic differences in observer performance across our task and more traditionally used tasks. Student duties include recruiting subjects, administering vision tests, conducting behavioral experiments and assistance with data analysis. The student will learn how to control and display experimental stimuli and analyze data using appropriate statistical methods (via Matlab or Excel). The student will gain in-depth understanding of the theoretical background of the project and an insight into all stages of the research process - from hypotheses generation to interpretation of results. Applicants should have completed introductory courses in i) cognitive psychology or neuroscience and ii) statistics.

Project 2: Color Perception in Real and Simulated Scenes

To study color perception one can create experimental stimuli using real objects and illumination or, with the aid of computer graphics programs, simulate scenes consisting of illuminated objects that observers view on a computer screen. While real objects are more natural stimuli for the visual system, computer simulated scenes allow for careful experimental control and easy stimulus manipulation. However, few studies have carefully explored whether there is a difference in observers' performance in perceptual tasks that involve real vs. simulated stimuli. To explore whether there are systematic differences between real and simulated stimuli, we will create a series of real stimuli and computer simulations of these same stimuli, and compare performance across the two. We will start by measuring perceptual effects for simple two-

[Return to top of document](#)

[Return to top of document](#)

dimensional stimuli (like the famous simultaneous lightness contrast illusion) and gradually move toward more complex three-dimensional scenes.

Student duties include recruiting subjects, administering vision tests, conducting behavioral experiments and assistance with data analysis. The student will learn how to control and display experimental stimuli and analyze data using appropriate statistical methods (via Matlab or Excel). The student will gain in-depth understanding of the theoretical background of the project and an insight into all stages of the research process - from hypotheses generation to interpretation of results. Applicants should have completed introductory courses in i) cognitive psychology or neuroscience and ii) statistics.

Lori Flanagan-Cato

Project 1: The effect of estrogen on synaptic plasticity in the hypothalamus

Students will assist in histological and behavioral studies. Responsibilities will include animal handling, immunostaining of brain sections, data analysis and presenting results in graphs.

Prerequisites: BBB109

Project 2: The brain pathways that control sodium appetite

Students will assist in histological and behavioral studies. Responsibilities will include animal handling, immunostaining of brain sections, data analysis and presenting results in graphs.

Prerequisites: BBB109

Project 3: The neural links between song perception and mating behavior in female birds

Students will assist in histological and behavioral studies. Responsibilities will include animal handling, immunostaining of brain sections, data analysis and presenting results in graphs.

Prerequisites: BBB109

Joseph Kable

Project 1: Project 1: Behavioral dissociation of learning and exploration

Our daily lives are often punctuated by dramatic environmental changes that force us to reevaluate the current behavioral contingency in order to thrive in a new environmental context. For example, changing schools might lead a student to adopt a new set of study habits, hobbies, or even preferences in order to effectively meet his academic and social goals. In theory and in practice such change-points lead to a period of exploratory behavior geared toward collecting information about a new context, as well as a period of rapid learning during which each new piece of information collected has a greater impact on ensuing behavior. Consequently, many

[Return to top of document](#)

[Return to top of document](#)

mechanistic accounts of the boosted exploration and learning following environmental changes have focused on a neural system thought to mediate both effects. However, learning and exploration may not always go hand in hand. For example, an increase in the rate of change-points should lead an observer to learn more from each piece of information (as old information is more likely to have become obsolete) but seek less information (as new information, too, will become rapidly obsolete). The two projects in our lab will focus on testing whether this dissociation occurs in human behavior (project 1) and brain activity (project 2) when the rate of change-points is varied systematically. Project 1: Behavioral dissociation of learning and exploration We will test whether learning and exploration by varying the rate of change-points in a task where both learning and exploration can be measured. The PURM student will be involved in collection of human behavioral data, generation of computational modeling data, and statistical analysis of both sources of data. Familiarity with matlab would be helpful for this project.

Project 2: Neural dissociation of learning and exploration

Project 2: Neural dissociation of learning and exploration We will test whether fluctuations in learning and exploration are encoded in separate activity networks by using fMRI to measure brain activity while human subjects complete the task described above. The PURM student will be involved in the collection, processing, and statistical analysis of neural imaging data. A strong background in statistics or computer programming would be helpful for this project.

Jared Piazza

Project 1: Animal Minds and Human Stomachs

This research project aims to develop and test a psychological intervention for increasing the moral concern people have towards animals used as food. An undergraduate research assistant is needed to help recruit participants, and collect data in the psychology labs. This lab experience will entail obtaining participants' informed consent, explaining and administering computer-based lab procedures, and debriefing participants about the study. Students with an interest in experimental and moral psychology desired. Previous lab experience desired but not necessary.

Ayelet Ruscio

Project 1: Sensitivity to Threat in Anxiety and Depression

Research suggests that the core feature of pathological anxiety is a heightened sensitivity to threat. For example, anxious individuals pay increased attention to threatening stimuli and tend to interpret ambiguous stimuli in a threatening manner. Paradoxically, frightening images that are traditionally used as threat stimuli in the laboratory do not elicit a heightened response in

[Return to top of document](#)

individuals with generalized anxiety disorder, who suffer from excessive and uncontrollable worry. This has led some theorists to speculate that generalized anxiety disorder is not a true anxiety disorder. Our research group recently proposed an alternate explanation: that threatening images are a poor match to the worry found in generalized anxiety disorder, which involves verbal processing of possible future catastrophes rather than sensory processing of immediate threat. We hypothesize that threat stimuli matching the concerns of persons with generalized anxiety disorder will distinguish them not only from healthy individuals, but also from depressed individuals, who are expected to show a blunted response to threat. To test these hypotheses, we will present verbal scenarios of future threatening events to anxious, depressed, and healthy adults while their psychophysiology, thoughts, and emotions are assessed. Our primary aim is to see whether anxious individuals can be distinguished from depressed and healthy individuals by their reactivity to imagined threat. This project is ideally suited for a student interested in clinical psychology or the biological bases of behavior. The student will receive training in psychophysiological and behavioral data collection and will be involved in screening and recruiting clinical research participants, running the experiment, managing data, and assisting with preliminary data analysis.

Project 2: Repetitive Negative Thinking in Anxiety and Depression

More than half of depressed individuals also suffer from anxiety and more than half of anxious individuals suffer from depression at some point in their lives. What accounts for the frequent co-occurrence of anxiety and depression? One possibility is that both involve similar styles of repetitive negative thinking. Theorists have long assumed that negative thoughts are future-focused in anxiety and past-focused in depression, with the focus of the thoughts predicting whether anxiety or depression is experienced. However, our research has shown that a sufficiently aversive past event (negative feedback on a performance task) leads to intrusive negative thoughts about the past in anxious as well as depressed individuals. In the current study, we will examine whether the same pattern emerges when persons with anxiety and depression anticipate, and then experience, an aversive future event. Anxious, depressed, and healthy adults will participate in a socially threatening task in the laboratory while their thoughts, emotions, and peripheral physiology are assessed. Our primary aim is to see whether reactions to the upcoming negative event are shared by, or distinguish, clinically anxious and depressed individuals. This project is ideally suited for a student interested in clinical psychology or the biological bases of behavior. The student will receive training in psychophysiological and behavioral data collection and will be involved in screening and recruiting clinical research participants, running the experiment, serving as a “judge” in the socially threatening task, managing data, and assisting with preliminary data analysis.

Project 3: Goal-Striving Behavior in Depression

Many people who suffer from depression experience decreases in the motivation to pursue rewards. Recent advances in neuroscience have allowed researchers to map the neural and

[*Return to top of document*](#)

behavioral components of approach motivation and begin to understand the ways in which these processes are disrupted in depression. Most of this work has tested deficiencies in depressed individuals' motivation to pursue monetary rewards. Our lab is working to understand the relationship between symptoms of depression and more meaningful and applicable types of rewards, particularly social rewards like having close interpersonal relationships, receiving positive feedback or praise, and feeling accepted by others. In the current study, we will continue to develop a visualization paradigm measuring the motivation to pursue both monetary and social rewards. In addition, we will develop an original computerized paradigm assessing behavioral differences in the motivation to pursue these categories of reward. An important component of this study will be to test patterns of physiological response to the pursuit of goals by assessing participants' heart rate and skin conductance while they complete the paradigms. Our goal is to better understand the behavioral and physiological dysregulation of approach motivation in depression. This project is ideally suited for a student interested in clinical psychology. The student will be involved in developing the visualization and computerized paradigms, recruiting participants, collecting behavioral and physiological data, and managing the data for analysis.

Sharon Thompson-Schill

Project 1: Effects of non-invasive stimulation of human brain on thought, language, and memory

Students will learn how to design and administer an experiment involving either Transcranial Magnetic Stimulation or Transcranial Direct Current Stimulation to human volunteers, in order to assess the effects of transient alterations of neural activity on complex cognitive functions. This project is supported by the National Institute on Deafness and Communicative Disorders. Applicants should have some coursework in psychology, cognitive science, or neuroscience (preferably all of the above) and should be comfortable with both Mac and PC computer systems.

Project 2: Imaging Human Thought

Students will learn how to decode thought patterns from data obtained while human volunteers are undergoing Functional Magnetic Resonance Imaging. This project is supported by the National Eye Institute. We use analysis of brain patterns to understand brain changes associated with learning and memory in humans. Applicants should have some coursework in psychology, cognitive science, or neuroscience (preferably all of the above) and should be comfortable with both Mac and PC computer systems. For this particular position, the applicant must also be comfortable with basic statistical concepts and also must have some programming ability (e.g., Matlab).

[*Return to top of document*](#)

Deena Weisberg

Project 1: Investigating the seductive allure of neuroscience explanations

People seem to find explanations that include neuroscientific elements especially persuasive --- even when those elements do not actually add anything to the value of the explanation. Why? For example, saying that some area of a criminal's brain is damaged is seen as a more persuasive argument than saying that the criminal has a mental disorder, even though these statements are essentially equivalent. This project will investigate this phenomenon in a variety of domains and explore potential reasons for it. The student will assist the professor in all aspects of conducting and running psychological studies on this topic. Duties will include creating stimuli, recruiting subjects, compiling subjects' responses, and managing and analyzing data. Applicants should have completed some coursework in psychology, cognitive science, and/or neuroscience.

Project 2: Playful persuasion: Can pretend play help children understand other people's perspectives?

In order to have effective social interactions, children must learn to understand that others may have different thoughts and beliefs than they themselves do. In addition, children must learn that other people's thoughts and beliefs may be different from each other --- that is, that multiple people can have different perspectives on the same thing. How do children learn this? One possible answer to this question comes from looking at what children do when they play make-believe. When children pretend, they are forced to take multiple perspectives. For example, a banana is actually a fruit, but one person can pretend that it's a telephone while someone else can pretend that it's a ray gun. Part of understanding pretend play situations thus crucially involves understanding that other people can see the same situation differently. This project investigates whether training children in pretend play can help them to better understand the multiplicity of perspectives that exist in the social world. Because this project is in its earliest stages, the student's primary duty will be to assist the professor in developing and piloting a measure of children's abilities to understand multiple perspectives. This measure will be used in later stages of the project to determine whether the play training is successful. Applicants should have completed some coursework in psychology, cognitive science, and/or neuroscience. Previous experience with children is desirable but not required.

SOCIOLOGY

David Grazian

Project 1: Where the Wild Things Aren't: Investigating the Cultural Production of Nature

For this project we will be investigating the design and use of public displays of the natural world in zoos, science museums, and other public environments, with attention paid to how such places exhibit nature while balancing educational goals with entertainment opportunities. Sites may include the Philadelphia Zoo, Academy of Natural Sciences, Adventure Aquarium, and other local institutions. Students will be trained and gain experience conducting sociological research using one or more qualitative methodological approaches in the social sciences, including observing and documenting public life, and analyzing both cultural artifacts and online resources. All students are welcome to apply.

Dorothy Roberts

Project 1: Interracial Marriage in Chicago and the Civil Rights Revolution

I am conducting an interdisciplinary book project on interracial marriages in Chicago during the civil rights movement. I inherited from my father, an anthropologist at Roosevelt University, numerous boxes containing original interviews he conducted in Chicago between 1937 and 1986 with hundreds of interracial couples, as well as notes, articles, and other related materials. I plan to use this archive to write a book interrogating the relationship between interracial marriage and the civil rights movement, asking questions such as: what role did laws and taboos banning interracial marriage play in the segregationist racial regime in the North as well as the South?; what were the experiences of interracial couples in Chicago during the 1940s, 1950s, and 1960s?; did they see their marriages as contesting Jim Crow and furthering racial justice?; how did litigation challenging anti miscegenation laws figure in the civil rights agenda?; how should we think about the role of intimate relationships in the struggle against racism? Students will help me to organize and analyze my archive on interracial marriages; conduct additional research related to this topic; and accompany me on a trip to Chicago to explore archives at University of Chicago, Roosevelt University, and other venues.

Students will learn how to conduct and analyze original research, including ethnographic, legal, and archival data. This position would be especially helpful to students interested in careers in law, sociology, anthropology, Africana Studies, political science, and history. It requires excellent organizational skills, creative thinking, and care with original documents.

Melissa Wilde

Project 1: American Religious Denominations' Views of Birth Control, Eugenics, and Immigration circa 1930

An undergraduate research assistant is needed to transcribe and code American religious groups' views about birth control, and/or eugenics (a white-supremacist pseudo-science that believed that the human race was deteriorating because of differential birth rates), and immigration. The work will include accessing, skimming and summarizing denominational periodicals and yearbooks as well as transcribing and coding those materials. A strong work ethic, literacy, diligence and care are the only skills needed, although preference will be given to applicants with previous historical, archival or library research experience.

Project 2: American Religious Denominations and Homosexuality

An undergraduate research assistant is needed to conduct research on American religious groups' views about homosexuality. The work will include accessing, skimming and summarizing denominational periodicals, yearbooks and websites, as well as transcribing and coding those materials. A strong work ethic, literacy, diligence and care are the only skills needed, although preference will be given to applicants with previous historical, archival or library research experience.

Project 3: American Religious Denominations and Abortion

When how and why did abortion become the polarizing issue it is today for American religious groups? An undergraduate research assistant is needed to conduct archival and library research on the timing and nature of pronouncements regarding abortion by the most important religious groups in the US. The work will include accessing, skimming and summarizing denominational yearbooks and periodicals. A strong work ethic, literacy, diligence and care are the only skills needed, although preference will be given to applicants with previous historical, archival or library research experience.

Tukufu Zuberi

Project 1: Timbuktu

Undergraduate student would assist and support Prof. Zuberi and staff with the Timbuktu documentary film project. Duties and responsibilities include, but are not limited to, assisting with social media including updating and monitoring social media sites, blogs, and website as well as assisting with the development of supporting materials and production of the film. The student must be able to work independently, have excellent communication skills, as well as an

[Return to top of document](#)

interest in film and documentary film making. The student must have experience using social media sites, blogging, and other multimedia sites.

SOUTH ASIA STUDIES

Deven Patel

Project 1: Yoga and Visual Culture *Rising Juniors only*

Leading up to an international seminar to be held at the Freer Gallery at the Smithsonian in Washington D.C. in November of 2013 [CFP Yoga & Visual Culture: An Interdisciplinary Symposium, Washington, DC, Nov. 22-23, 2013], I am proposing a presentation on the uses of visual aids in the practice of meditation in early South Asia. I would need a student who has interest in the history of religious traditions of South Asia and a special interest in visual cultures. The student would be required to gather data, help collate materials for me, and also travel with me and others to several museums in Washington D.C. and New York City, in addition to the Philadelphia Museum of Art.

Project 2: Text and Textile: A Multilingual Scroll Manuscript from 14th century Western India

I am completing a manuscript for publication by the Freer Gallery on a scroll from fourteenth century Gujarat (India) that is both a multilingual poem and an important work of art from that period. The scroll manuscript is housed at the Freer Gallery in Washington D.C. and the student who assists me with this project may need to travel there with me occasionally, collect books from our library collection relevant to the project, and help organize notes and materials.

THEATRE ARTS

Marcia Ferguson

Project 1: Performance and Culture: tracing the shifting sands of a critical approach

How can (or does) the field of Performance Studies accommodate continually shifting technologies, viewer positions, and ever-changing categories of Performance, while still maintaining a recognizable, viable intellectual approach to its subject? From its Anthropological origins, when critics such as Cultural Anthropologist Victor Turner first advanced the notion, that familiar and predictable cultural events (e.g., rituals, symbols) were essentially performative, this field has quickly evolved in the face of the proliferation of new media, technologies, commodifications, and viewer positions. From reality TV to cooking shows to robotic, talking

[Return to top of document](#)

cars, new areas for this kind of critique are evolving all the time. Performance studies must continually react to the proliferation of performance in culture generally. But how must this critical positioning itself evolve, as it accommodates all these new materials for, and subjects of, analysis? What kinds of new tools have been, and must be in the future, used or invented, both technologically and intellectually, for an ongoing, comprehensive, critical/analytical perspective on our Performance-drenched society? This project aims to uncover the discipline's own evolutions, as well as the evolutions of what constitutes "Performance" in 2013 and beyond.

Project 2: Patience in the Arts

My husband and I were talking about Henry James recently. He is reading James' last novel, *The Golden Bowl*, and he's getting to the end - "Unfortunately," as he put it, because he is finding it a transformative experience. He is so taken with James' intricate sentences, which go on at great length about something as simple as one character saying "hello" to another. "The layers of communication, the delicacy of exchange, the subtleties of behavior, discernment and language," my husband observed, "there are layers in James. I bet this is too hard to read for most people nowadays. They wouldn't have the patience." I translated this discussion into theatrical terms, since I am a theatre teacher and tend to do that. I had just taught a three-hour class that afternoon using an exercise based on Jaques LeCoq's techniques, and the exercise reminded me of our discussion of Henry James. It involves learning 6 types of behaviors, ranging in intensity from catatonic to melodramatic to tragic, then improvising by giving an impromptu speech and switching between modalities of intensity. I recently earned a certificate in the Neutral Mask from the London International School of Performing Arts, where I learned the exercise, and it occurred to me that, in some ways, the layering of expression, the juxtaposition of subtext with text – in the dialogue and in the silences between it – is a key ability of great actors.

Layers need patience. They need to be peeled back one by one to be understood adequately. They're best understood in relationship to how much time exists between them, in how much is revealed in the context of what has gone before. Like a classic well-made play, these layers of exposition and thematic furtherance add up to greatness in the right hands. Indeed, the kind of spatial and temporal dislocations within the word "peel" point to the ephemeral patience I am talking about. I propose to investigate what it means to have patience in the arts, as both as receiver of the work of art, and its maker. We will look at original texts by artists and critics in their descriptions of this phenomenon, we will interview performers of all kinds – musicians, theatre artists, filmmakers – about their take on the notion of patience in their work, and our goal will be to come to some conclusions regarding the role and function of patience in the arts.

[*Return to top of document*](#)

Rosemary Malague

Project 1: Empowering Scenes for Women

For a planned anthology of acting scenes that I am compiling with a colleague from Davidson College, I am seeking a student to read contemporary plays by women, seeking scenes for women. The task will likely involve summarizing the action of the play, and identifying possible scenes for the anthology; depending upon how quickly we move, it may also involve securing permissions from publishers for reprinting this material in a collection. Students from Gender Studies, Cinema Studies, English, Writing, and/or Comp Lit might find their interests align with this project.

Project 2: Biography: Stella Adler

Last summer, I embarked on a biographical study of the American acting teacher, Stella Adler, also a member of a famous family of the Yiddish stage. I am interested in the impact of her gender and Jewish identity on her career. A student who chooses this project will aid me by conducting newspaper searches from the date of her birth, 1901, to approximately 1961. (I am most interested in the period of 1941 - 1951, but am charting the trajectory of her career.) I also have compiled photographs of her correspondence from this period, and could use assistance organizing and digesting it. Students interested in mid-twentieth century American History, Women's Studies, Jewish Studies, and the theatre might find that this project aligns with their interests.

[*Return to top of document*](#)

Design

ARCHITECTURE

Mario Gentile

Project 1: Insulated Living Wall

The proposed project will blend design, environmental systems and sustainability as it relates primarily to retrofit buildings. The call is to aid in the creation of a Living Vegetated Wall product that integrates insulation material and values. Analysis of our company's existing Living Wall system, new proposed systems and typical building construction and structural systems will be researched. This will include research into industry standardization for R-value insulation, material science and sustainable applications. Shift Space Design is a Philadelphia-based company that designs and manufactures environmentally- attuned products that enable the creation of outdoor environments. The products respond to ecological imperatives, are aesthetically modern, and tailored to work as modular systems. The company core is within its design lab where industrial designers, architects and fabricators create products based on mass customization, flat pack shipping and material engineering. Through a blend of precision technologies and traditional fabrication, these products facilitate a way of living that brings sustainable practices into daily life. www.shiftspacedesign.com

Project 2: Integrated Design for Passive Products

The proposed project is a call to aid in the creation of a suite of sensors to be used to monitor and collect data for both existing product systems and new stand alone systems. Areas of research and design to include soil analysis, storm-water management, energy efficiency and product design. Concurrently, this research will be the ground work to develop applications for both logged and real time performances for web and mobile based platforms. In addition to user interface design, engineering may be used to actuate device and products. The research will require undergraduate support to develop an application to receive and collect environmental factors. Shift Space Design is a Philadelphia-based company that designs and manufactures environmentally- attuned products that enable the creation of outdoor environments. The products respond to ecological imperatives, are aesthetically modern, and tailored to work as modular systems. The company core is within its design lab where industrial designers, architects and fabricators create products based on mass customization, flat pack shipping and material engineering. Through a blend of precision technologies and traditional fabrication, these products facilitate a way of living that brings sustainable practices into daily life. www.shiftspacedesign.com

Yun Kyu Yi

Project 1: Real time simulation with the smartphone

After a long gestation period, the smartphone, in recent years, has become ubiquitous. Smartphones go beyond mere telephony, as they take on the capabilities of both camera and handheld computer. Thus smartphones are equipped with both an array of sensors, responding to stimuli from light to sound to motion, and processing power. Having such sensors and processing power in a ubiquitous handheld device offers an intriguing, new possibility for understanding the quality of our living environments. The smartphone offers the potential for dynamic mapping interior environmental quality, measuring the changing environmental qualities, such as light levels, acoustics, and even air quality and thermal comfort, over the course of days, weeks and years. Data could be generated non-invasively, through utilizing office workers' smartphones as measurement instruments. The resulting three-dimensional environmental map of the interiors of our cities could be an invaluable aid in several respects. On one hand, this could provide students of the built environment with a new way to learn about the interior environment. On the other, it could provide municipalities and building owners with a means of assessing interior environmental conditions in relation to their efforts to reduce carbon footprints and increase comfort. Thus, the resulting data of this kind of measurement could provide raw material for future renovations, calibration for building simulation studies, and insight into indoor climatic conditions for workers. This research will be the ground work to develop application to be utilized for real time simulations. The research needs undergraduate support in following area: The research needs undergraduates to develop application to receive and collect environmental factors such as temperature, illuminance, and wind speed. During the main research, undergraduate will observe, learn and support modeling application. In the validation stage, undergraduates will be engaged to collect and analyze real measured data to compare with the simulation outcome. This research will allow undergraduates an opportunity to explore building simulation modeling which is an outstanding skill for architectural and building engineering careers.

Project 2: Performance Based Parametric Design Tool Development

The use of computers in architecture has extended beyond computer-aided design systems (CAD) to include dynamic modeling and animation software. The use of this technology moves beyond the rendering and refining of ideas to the generation of form. These programs are no longer mere tools, but have become collaborators in the creative process. However, using new software as a morphogenetic strategy does present potential problems. In a time-based process, an endless flow of geometric transformations gives rise to the problem of selection. Building simulation offers the potential to provide an alternative method for generating architectural forms. Simulation programs are utilized to assess and predict many aspects of building performance. This project develops module to plug-in with architectural CAD tool (NURB) that

able to integrate environmental performance analysis and the design process, with an emphasis on parametric methods. Performance analysis techniques can provide enormous amounts of information to support the design process, acting as feedback mechanisms for improved performance. Further parametric design tool will be combined with decision-making methods to achieve more complete integration. This research will be the ground work to develop application. The research needs undergraduate support in various stages. Undergraduate will participate to write CAD scripting that will further developed as a plug-in for CAD tool, this includes populating geometry information, connecting with simulation program and decision making tool. Undergraduates will have an opportunity to explore NURB tool and building simulation modeling which is an outstanding skill for architectural and building engineering careers.

Project 3: Integrating Building Energy Modeling with the Stochastic Human Behavior Model

People respond differently to their surroundings. These responses influence energy consumption in buildings. Capturing human behavior and representing it in energy simulations to predict building energy consumption has been a difficult task. Previously, human behaviors have been taken in to consideration by subcategorizing their different actions and activities using statistical sampling. Based on these deterministic algorithms, different schedules are developed to capture human behavior. The HVAC system and lighting respond to indoor set points which correspond to such schedules. This preset deterministic model does pose a problem of uncertainty to capture diverse human responses to their surroundings such as different tolerance levels and corresponding actions. This research is to develop a method that captures diverse human reactions by integrating a stochastic model with energy simulation. This research will develop a human behavior model which will be integrated with energy simulations to yield a more accurate energy simulation. This research will be the ground work to develop human behavior model that integrates with energy simulations in a dynamic time step base manner. The research needs undergraduate support in different stages. The research will need in-depth information to relate to the test building such as; material properties, the buildings HVAC system, building operations and lighting schedules. This field data collection will allow undergraduates to understand the complexity and uncertainty behind energy simulations. During the main research, undergraduate will observe, learn and support building energy modeling. In the validation stage, undergraduates will be engaged to collect and analyze real measured energy data to compare with the outcome of this research. This research will allow undergraduates an opportunity to explore energy simulation modeling which is an outstanding skill for architectural and building engineering careers.

FINE ARTS

Joshua Mosley

Project 1: Stop-motion animation using motion control digitally assisted devices.

A studio assistant needed to work with me to develop analog and digital tools and techniques for computer animation. Student would assist with pre-production and production of a stop-motion animation shoot on Penn's Campus. Responsibilities include a range of interesting and repetitive tasks related to model-making, lighting, rigging and repairing sets, and painting. If student has certain skills such as computer programming, animation, Photoshop retouching, fabrication, research, writing, etc. these could be made applicable to the duties.

Orkan Telhan

Project 1: Design Research for Electronic Textiles

Electronic Textiles (eTextiles) are fabrics with embedded electrical and computational capabilities. Part of a new research initiative between the Penn's School of Design, Graduate School of Education and the Franklin Institute, we are developing new kinds of educational eTextile designs—wearables, accessories, collectibles—that can be used for teaching digital media design, computer science and informal science education. These artifacts are themed based on local and nationwide cultural events—such as the Philadelphia Science Festival”, the Astronomy Night, Design Philadelphia—and used during a number of educational workshops facilitated by our research team. Students will have the opportunity to work with graphic and media designers; learn and apply basic electronics, programming, and screen printing skills; design and prototype a number of artifacts that will have broad communal outreach in Philadelphia.

Project 2: Designing for eCrafting Circles

“Ecrafting Circles” is an online community associated with a group located in Philadelphia. The group brings together expertise from learning sciences, digital media design, computer science and informal science education. “Ecrafting Circles” integrates engineering and technology into science education using e-textiles to catalyze online creative collectives. With “Ecrafting Circles,” we want to bring together groups with very diverse participant groups, ages 8 to 80; develop an online community for sharing eTextile designs; and provide a new model for public science events that can include groups inside and outside of schools and science museums and could be scaled up locally and nationwide. Students will join the web design and development team and help on designing unique features for the website such as visualizations, widgets, and a

[*Return to top of document*](#)

phone app that connects eTextile designs to the website. Students with basic visual design and web design skills are preferred but not required.

Project 3: Design Research for Augmented Paper and Printed Electronics

Paper is one of the most versatile media that is deeply rooted in the culture of design. It is a very expressive medium that allows the design of a wide variety of artifacts—from posters to packaging, clothing, furniture, and buildings. Today, it is also possible to ‘print’ electronic chips, display elements, batteries, solar cells, and sensors onto ‘paper’ to design low-cost, sustainable products with computational capabilities. ‘Augmented paper products’ can harvest their own energy, display static or animated graphics, and combine sound and interactivity with real-time information. These products not only find applications as display systems, smart labels, interactive posters, books, toys, games but also open new possibilities for artistic expression. Students joining this research will focus on identifying new concepts, product ideas and applications that will demonstrate the practical and expressive potential of augmented paper products. The goal is to develop both product and application prototypes, and utilize them to attract further academic collaborations, corporate sponsorships, and commercialization opportunities. Students with basic visual design skills are preferred but not required.

[*Return to top of document*](#)

Design - Fine Arts

FINE ARTS

Andrea Hornick

Project 1: Painting Studio Assistant

This project involves working in a professional artist's studio to research content and learn, and implement skills needed in the production of art work. This will be an opportunity to see and learn how a professional studio is run. It is akin to a traditional painting workshop and entails learning an invaluable set of skills needed to become a professional contemporary artist. The project entails using, "old master's," painting technique which will be taught to the student. These skills are basic and applicable to any style of painting and relevant to contemporary art practice. Basic drawing skills are preferred, though they may be skills that have been acquired informally or outside of Penn. The student will take part in the entire process of art making from conception, to the research of ideas, techniques, and supplies, and the execution of the resulting product. After the techniques are learned, they will be used to create underpainting layers on several paintings that will be shown in an exhibition. The project involves reproducing and altering Renaissance portraits. If appropriate, the student may also choose to research art historical images, use Photoshop skills for research/source images used by the studio, learn and use graphic design skills to help with the design of a related book, and learn and assist with other technical studio practices such as preparing solvents, maintaining supplies, and preparing finished pieces for exhibition. The project is ongoing and there is the possibility for continuing the research and development.

Education

APPLIED PSYCHOLOGY--HUMAN DEVELOPMENT DIVISION (APHD)

Helen Garinger

Project 1: Media Clips2

Utilizing popular culture to enhance & reinforce class lectures Description I value the significance that popular culture can contribute to a lecture. Clips from YouTube, videos, and movies, have enhanced my classes training students to become mental health professionals and school counselors. Select clips, obscure or familiar snippets from popular culture, demonstrate and reinforce key points in numerous aspects of counselor training such as: Relationships between therapist and client, trust, disclosure, and the use of humor. To gain an understanding of the context and purpose of the clips used in my classes, the student and I will spend time discussing courses I teach. Aim The goal of this research project is to expand my knowledge of popular culture, library of clips, and prepare them for use in class. The undergraduate researcher will share his/her knowledge with me regarding resources. Duties The student researcher will find appropriate TV, theatrical motion picture, documentaries, and additional media sources relevant to the subject. Required skills An interest in the topic, a sense of humor, good writing skills, a creative outlook, knowledge of current, popular, and classic TV shows, and skills searching social media sites for video content. Student Gain There is potential to transform this research into a paper for publication. The student would have to be willing to research what has been written on this subject, review articles and books, and assist me in writing the article.

Project 2: Counseling skills & techniques for teachers

Description Instructing regular education teachers and students training to become educators with basic counseling skills is now more important than ever. This is an idea I have wanted to turn into a reality for a number of years. I started to collect books on the topic even before Newtown. I would like to further develop this idea into a series of workshops for educators. Aim The goal is to create a series of workshops and an accompanying brochure. Duties The student researcher will work on a literature review, read and review articles, research videos, and YouTube clips that may be appropriate and useful as instructional tools. We will meet throughout the process to discuss progress and implementation of found articles and clips. Required Skills The student researcher should be self-motivated, have an interest in education, and a desire to become part of a project to develop workshops for teachers. The student should possess good writing skills, be creative, and have a sense of humor. Student Gain This workshop has great potential. Depending on the student's initiative and future availability, this is just the

[Return to top of document](#)

beginning. There are several opportunities that I foresee, a pilot program, an article, and presentations.

EDUCATIONAL LINGUISTICS

Nelson Flores

Project 1: A History of Bilingual/ESL Education in Philadelphia

This project seeks to document the history of bilingual/ESL education in Philadelphia from the 1960s until today. The primary sources of information will be interviews conducted as part of an oral history, archival materials, and relevant secondary sources. The goal is both to create a coherent timeline of major policies, events, and social movements that shaped bilingual/ESL education in Philadelphia as well as develop a more in-depth understanding of how this history has impacted the current state of bilingual/ESL education in the city. Specifically, this project hopes to understand the socio-historical factors that have led to the elimination of most bilingual education programs in district schools occurring alongside the opening of several dual language charter schools. The student will help in all aspects of documenting the history of bilingual/ESL education in Philadelphia. This may include conducting and transcribing interviews with informants, locating archival materials, and working on an on-going literature review of secondary sources on the topic. There are no prerequisites for working on this project though the ideal candidate will have an interest in the education of English Language Learners, the ability to navigate library databases, and/or experience working in historical archives.

TEACHING, LEARNING, AND LEADERSHIP DIVISION

Rand Quinn

Project 1: Community Mobilization, Race, and the Politics of School Desegregation in the Urban North

Our goal is to understand the development and racial politics of student assignment policy during the period of time when school desegregation moved out of the South and into the urban North (1960s-1980s). Primary duties include: (1) compiling and coding newspaper articles, letters to the editor, and opinion pieces published during the focal period that pertain to Philadelphia's student assignment plan, the use of race and other factors in assigning students to schools, and school desegregation; (2) compiling and coding relevant archived organizational documents of the NAACP, Pennsylvania Human Relations Commission, the School District of Philadelphia, and others; (3) cataloging past and present student assignment policies from school districts

[Return to top of document](#)

[Return to top of document](#)

throughout the urban North; and, (4) conducting a literature search on community mobilization, race, and the politics of school desegregation. Prerequisite: an interest in the political history of urban education.

Sharon Ravitch

Project 1: Semillas Digitales (Digital Seeds): PennGSE-CISA Educational Action Research Initiative ***Rising Juniors only***

I. Overview of Semillas Digitales Program Semillas Digitales (Digital Seeds), a collaboration between the CISA Group in Nicaragua and the University of Pennsylvania Graduate School of Education (PennGSE) in the United States, is a community and school-based action research initiative that seeks to develop – with community members and local educators – a sustainable, capacity-building model of educational innovation focused on digital literacy and technology integration, intensive professional development for teachers and school/community leaders, pedagogical improvement, curricular development and alignment, and community development and involvement. As action research, the approach develops and evaluates the emerging model simultaneously. The study of the initiative seeks to document and examine the effects of the incorporation of a technology-based curriculum and intensive teacher professional development for students and teachers in selected community schools for the children of coffee farm workers in rural Nicaragua. A research team, comprised of faculty (Dr. Sharon M. Ravitch) and graduate students (Matthew J. Tarditi) from the University of Pennsylvania Graduate School of Education and CISA corporate social responsibility educational specialists, is facilitating and studying this initiative for implementation and replication purposes, which includes evaluating the levels and types of impact – on students, teachers, supervisory staff, and community members – and the match between community contexts and the initiative. The research documents how the implementation of a technology-based curriculum with an emphasis on broad professional development and teacher and student engagement influences: (1) school environment; (2) student learning, skills development, and educational affiliation; (3) teacher knowledge and approaches to teaching and classroom evaluation; and (4) school, family, and community dynamics, communication, and engagement. II. Description of Internship Opportunity Our research team is looking for highly motivated, dedicated students interested in international education, corporate social impact and evaluation, educational research, Nicaragua, and development to participate in a variety of research activities related to the Semillas Digitales program. Students will have the unique opportunity to work alongside PennGSE faculty and doctoral students on an applied educational research program nestled within the Corporate Social Responsibility Division of a Nicaraguan multinational corporation. As part of the research team, the internship provides students with the potential to contribute in any and/or all of the following elements of our program: • Engagement in development and implementation Evaluation and Monitoring System for both processes of implementation and impact on student and teacher performance (including

[Return to top of document](#)

[*Return to top of document*](#)

Instruments and Indicators) • On-site data collection in Nicaragua (probable) • Research into additional educational technologies (software, hardware, etc.) and development of plan for their implementation in Semillas • Creative input in the operation, design, development and future expansion/growth of the Program • Participation in research team meetings including possible data analysis *It is important to note that qualitative and quantitative research experience is a plus, but they are not mandatory for participation.

[*Return to top of document*](#)

Engineering and Applied Sciences

BIOENGINEERING

Brian Chow

Project 1: Molecular Tools for Optical Control of Biological Circuits

Optogenetic reagents enable the on-demand control of cells using light-activated proteins. The toolbox is biochemically rich, including ion channels and pump for controlling neurons and excitable cells, transcription factors, and GPCRs. With these cellular “control knobs,” one can dynamically manipulate biological circuits in order to elucidate them, or even engineer them for therapeutic purposes. In this project, students will engineer new photoreceptors. This project is suited for students interested in synthetic biology, protein engineering, cellular engineering, neuroscience, or biomedical optics. No experience is required, but skills in molecular biology and mammalian cell culture are pluses. Students who continue research during the Fall/Spring will be expected to spend >10 hours/week during the semester.

Project 2: Optical Platforms for Controlling Biological Circuits

Optogenetic reagents enable the on-demand control of cells using light-activated proteins. The toolbox is biochemically rich, including ion channels and pump for controlling neurons and excitable cells, transcription factors, and GPCRs. With these cellular “control knobs,” one can dynamically manipulate biological circuits in order to elucidate them, or even engineer them for therapeutic purposes. In this project, students will create new optical platforms for high-throughput protein engineering. This project is suited for students interested in synthetic biology, protein engineering, cellular engineering, neuroscience, or biomedical optics. No experience is required, but skills in automation, optics, and microfabrication are considered pluses. Students who continue research during the Fall/Spring will be expected to spend >10 hours/week during the semester.

Paul Ducheyne

Project 1: Mesoporous silica nanoparticles for the simultaneous controlled release of antibiotic and adjuvant

Finding solutions to deliver drugs in a controlled fashion is not a contemporary issue; however, it remains a critical biomaterials and pharmacological goal. Dr. Ducheyne’s laboratory focuses on the controlled release of biological and pharmaceutical molecules from nanostructured silica based biomaterials. Recent breakthroughs in the synthesis of mesoporous silica materials with

[Return to top of document](#)

high surface areas (>800 m²/g) and tunable pore diameter (2-10 nm) have led to the development of new delivery systems that can absorb guest molecules with sizes that can vary extensively into the mesopores. This lab has recently demonstrated the controlled release with near constant release rate over 4 weeks of large proteins. These molecules served as model molecules for large growth factors and were released from 120 nm size nanoparticles. In the current project, we propose to use mesoporous silica nanoparticles (MSN) with absorbed antibiotic inside the pores and an absorbed adjuvant (rifampicin) on its surface. We will synthesize the nanoparticles with methods developed in our lab and we will measure pore size and released molecules in solution in order to determine release kinetics over one month. The student will actively participate in all stages of the research, including methods formulation, experimentation, and data interpretation and reporting. He/she will learn the synthesis and functionalization of silica based biomaterials. The student will also gain hands on experience regarding the synthesis and characterization of nanostructured biomaterials. He/she will have the opportunity to address a critical biomaterials and pharmacological goal through fundamental research.

Christopher Fang-Yen

Project 1: Developing devices for imaging worm behavior and lifespan

Our laboratory is developing new technologies for monitoring behavior and lifespan in the roundworm *C. elegans*. The student will use computer-aided design, 3D printing, and PDMS molding to create custom-designed microplates optimized for worm culture and imaging of several hundred worms at a time. We will use a computer-controlled optical imaging system to quantify each worm's behavior over its lifespan of several weeks. Tasks will include microscopy, strain maintenance, data acquisition, and data analysis. Basic computer programming skills are required.

Project 2: Using optics to read the mind of a worm

Our lab is interested in understanding how neural circuits generate behavior, using the roundworm *C. elegans* as a model. The student will use genetically-expressed fluorescent voltage and calcium indicators to study how a worm decides to switch between direction of movement. Tasks will include microscopy, strain maintenance, data acquisition, and data analysis. Previous lab experience and some familiarity with computer programming are helpful but not required.

David Issadore

Project 1: A miniaturized digital microfluidic-based genetic analyzer

In droplet-based microfluidics (also known as ‘digital microfluidics’) fluid is compartmentalized into millions of highly uniform, discrete picoliter sized containers which can be processed and

[Return to top of document](#)

[Return to top of document](#)

analyzed for massively multiplexed measurements. In recent years, droplet-based microfluidic chips have proven to be a promising platform for quantitative, high-throughput analysis for applications such as DNA sequencing, drug screening, and molecular binding assays. Despite the great promise that has been demonstrated in the laboratory, prohibitive instrumentation size and cost have kept this technology from being widely adapted for clinic application. This project aims to develop a fully integrated, miniaturized droplet-based microfluidics platform that will free digital microfluidics-based genetic analysis for point-of-care clinical applications. The student who works on this project will work with a post-doctoral researcher, and will have experiences / responsibilities within all aspects of the project, including device design, assay development, device fabrication, and testing.

CHEMICAL AND BIOMOLECULAR ENGINEERING

Daeyeon Lee

Project 1: Targeting Cancers with Smart Bubbles

Antivascular ultrasound is a novel approach that uses low-amplitude ultrasound and microbubbles to treat cancers. In the presence of ultrasound irradiation, microbubbles act as microscopic sources that convert acoustic energy into heat through viscous damping of oscillating bubbles. The localized intravascular heating damages endothelial cells and disrupt tumor vasculature. Thus microbubbles function as both energy source and ultrasound wave beacons to deliver acoustic energy locally to the vascular endothelium. The goal of this project is to develop “smart bubbles” that will be used in the antivascular ultrasound therapy using microfluidics technology. By carefully controlling the flow of gas and liquid in sub-millimeter channels, we will generate highly uniform and tunable microbubbles. The researcher will be trained to prepare microfluidic devices and optimize microbubble generation. The undergraduate researcher will be highly encouraged to work on the project beyond the summer and also to present the results at a future scientific conference, as has been achieved by previous undergraduate researchers in the group.

Project 2: Engineering Biofilms for Power Production: Microbial Fuel Cells

A fuel cell is a device that converts the chemical energy from a fuel into electricity through a chemical reaction with oxygen or another oxidizing agent. Unlike the chemical combustion systems, these devices are able to generate power without generating CO₂, the major source of greenhouse gas. Microbial fuel cell drives a current by taking advantage of the reactions catalyzed by bacteria. The most critical component of the microbial fuel cells is the anode which comprises biofilms. We will develop and engineer biofilms using a bottom-up method to impart properties that will allow us to use them as anodes in microbial fuel cells. This goal will be

[Return to top of document](#)

[*Return to top of document*](#)

achieved by directly spraying bacterial cells, cytochromes and nanomaterials onto conducting surfaces with programmed structures to enable oxidation of organic fuels. The researcher will be trained to engineer biofilms and test their efficacy in the oxygenation of organic matters. The undergraduate researcher will be highly encouraged to work on the project beyond the summer and also to present the results at a future scientific conference, as has been achieved by previous undergraduate researchers in the group.

Project 3: Smart Biofilms for Oil Spill Clean-up

Oil spills are man-made disasters that have catastrophic impact in the environment. Despite the recurrence of oil spills, there are few economically viable ways to remove/degrade oil in the water effectively. The objective of this project is to develop “smart” biofilms that can degrade hydrocarbon pollutants in water. Biofilms are aggregates of microorganisms embedded in extracellular polymeric substances (EPS), also known as “slime”. Biofilms are typically associated with a wide range of microbial infections in the body. Just like oil spills, biofilms are occurrences that should be avoided in many cases. We will take a completely different look at biofilms and ask the following question: can biofilms benefit us? We believe they can. We will develop and engineer biofilms using a bottom-up method to impart properties that will allow us to use them in environmental remediation such as oil-spill clean-up. This goal will be achieved by directly depositing bacterial cells and EPS such as polysaccharides onto surfaces with programmed structures to enable degradation of hydrocarbon pollutants in water. Our strategy combines the versatility of biofilms in degrading a wide range of contaminants with the nanostructural control of layer-by-layer assembly. The researcher will be trained to engineer biofilms and test their efficacy in decontaminating polluted water. The undergraduate researcher will be highly encouraged to work on the project beyond the summer and also to present the results at a future scientific conference, as has been achieved by previous undergraduate researchers in the group.

Wen Shieh

Project 1: Biomatrix with Filamentous Backbones

Background. Biologically-mediated reactions are highly effective in converting numerous anthropogenic organic compounds found in liquid waste streams into innocuous end-products. Two morphologically different bacterial groups are commonly grown in the same bioreactor to carry out the desired bio-reactions: floc-forming bacteria and filamentous bacteria. Floc-forming bacteria are clustered and embedded in dense aggregates (i.e., bio-flocs) and thereby, they can easily be separated from the liquid waste stream by gravity upon the completion of biodegradation. On the other hand, filamentous bacteria are bulky and their loosely-structured architectures produce poor settling properties. Kinetically speaking, floc-forming bacteria perform best when O₂ and nutrients (mainly N and P) are abundant, because their near-spherical

[*Return to top of document*](#)

shapes produce relatively small surface-to-volume ratios. As a result, in situ bubble oxygenation/mixing and nutrient addition are required to attain the desired aggregate mass in the bioreactor. Conversely, filamentous bacteria are highly competitive in the oxygen and nutrient deficient environments, because the filamentous morphology yields a large surface-to-volume ratio that facilitates the mass transfer at the liquid-cell interface. Most bioreactor systems currently employed for liquid waste treatment are designed to grow large quantities of floc-forming bacteria, however, the proliferation of filamentous bacteria is inevitable because of their competitive advantages. Therefore, in addition to high operating expenditures, these systems are highly susceptible to poor biomass-liquid separations that often lead to excessive biomass losses and deteriorated treatment performance. This project will attempt to grow a biomass structure that is morphologically different from the aggregates that are populated with floc-forming bacteria. In essence, a loosely-structured biomatrix that is dominated by the filamentous bacteria will be grown in the bioreactor as the primary agent to carry out the desired bio-reactions. It is hypothesized that the biomatrix is capable of capturing and retaining the cells with diversified physiological characteristics and degradation capabilities in close proximity. As a result, the biomatrix is able to offer the integrated functions of biodegradation, biomass retention, and biomass-liquid separation directly in the bioreactor. The bioreactor will be operated under the upflow and gas effervescence-free conditions to maintain the structural integrity of the biomatrix. External oxygenation, which can closely be controlled, will replace the in situ bubble oxygenation to satisfy the biochemical oxygen demands. A bioreactor system with these novel features could represent a much-needed breakthrough in the environmental biotechnology. Additional applications can also be identified which will benefit from this unconventional biotechnology. Study Approach. This project will primarily focus on the validation of the hypothesis regarding the biomatrix formed with filamentous backbones: “A stable but loosely-structured biomass matrix, in which the backbone structure provided by filamentous bacteria is utilized to capture and retain the cells with diversified physiological characteristics and degradation capabilities, is able to offer the integrated functions of biodegradation, biomass retention, and biomass-liquid separation in a variety of hydrodynamic and reaction environments”. A laboratory investigation will be performed to produce the experimental evidence that ascertains the validity of the hypothesis. Ethylene glycol (CH₂OHCH₂OH) and ammonium chloride (NH₄Cl) will be used as the carbon and nitrogen sources, respectively, to grow the biomatrix. Ethylene glycol is chosen because it is commonly used as the deicing and antifreeze agents. It is toxic to wildlife and aquatic organisms. A C/N ratio > 50 will be used to prepare the feed stream to encourage the growth of filamentous bacteria. A glass bioreactor will be modified to accommodate for the flow scheme required to grow and maintain the biomatrix. The degree of oxygenation will be chosen as the sole experimental variable. The hydrodynamic conditions in the bioreactor which will affect the stability of the biomatrix are quantified through the definition of RMS (root-mean-square) shear gradient G. The biodegradation effectiveness of the biomatrix will be measured in terms of C and N removals. The stability of the biomatrix will be assessed in terms of biomatrix specific volume and biomass washout rate. A junior or rising

sophomore will be appointed to carry out the experimental work and prepare the research report. The experiments will be performed in the Bio-Environmental Engineering Laboratory, Department of Chemical and Biomolecular Engineering. It is anticipated that a paper that is suitable for publication in a refer journal will be produced.

Project 2: Production of Pharmaceutical-Grade Micro-Algae Using Waste/Nutrient Inputs

Introduction. It has recently been reported that a pharmaceutical- grade omega-3 fatty acid, eicosapentaenoic acid (EPA, C₂₀H₃₀O₂), can be extracted from micro-algae. Moreover, the single cell protein (SCP) recovered from micro-algae is appealing because it is an excellent source to supplement animal/fish feed protein requirements. In spite of these promising applications, however, many technical challenges need to be addressed to ensure the success of the proposed enterprise. In particular, the production of pharmaceutical-grade micro-algae will be economically viable if (1) waste/nutrient inputs are used and (2) micro-algal biomass is mass-produced. Since the growth of micro-algae is biologically mediated, the rate at which solar energy is captured and recovered is intrinsically low. Therefore, the technical barriers mentioned above can be overcome if best available bioreactor technologies and cultivation practices are employed. It appears that a photo-bioreactor system will be a rational choice to meet the above-mentioned requirements. A photo-bioreactor can closely be controlled to circumvent the adverse ambient conditions. The light source is used when the nature light is either absent or weak. The wavelengths of the light source can be controlled within the desired ranges to increase the photosynthetic activities of micro-algae. Moreover, CO₂-rich gas streams can be mixed with the air stream to yield the elevated CO₂ mass influx to the photo-bioreactor. Finally, the installation of photo-bioreactors is by and large location-independent and the resulting land requirements are small as compared to the open systems. To avoid the addition of nutrients (primarily N and P) the secondary effluent stream discharged from the municipal wastewater treatment facility will be utilized as a candidate waste/nutrient input. In general, the secondary effluent stream will contain about 20-25 mg N/L, which is sufficient to grow significant quantities of micro-algae (i.e., about 0.1 g N is needed to produce 1 g micro-algal biomass). A cascade photo-bioreactor system is proposed for this endeavor. The key features of the system are described as follows. 1. Cascade Photo-Bioreactors. Micro-algae will be grown in a cascade of CFSTRs (continuous-flow, stirred-tank reactors). The cascade design enables a liquid flow through the system that resembles the plug-flow patterns observed in the race-way systems. When reaction rates are mass-dependent, improvements in the overall productivity will be noticeable when the plug-flow pattern is maintained. The feed stream will be sterilized (e.g., UV irradiation) prior to being fed to the 1st photo-bioreactor to remove pathogens and other harmful organisms. 2. Gravity Flow. The liquid will flow by gravity after it exits from 1st photo-bioreactor to reduce the energy expenditures. 3. Unique CFSTR Design. A micro-strainer will be installed at the outlet of each CFSTR to retain and concentrate its micro-algal biomass without disrupting the liquid flow through the system. This design feature permits micro-algae to be grown in and harvested from each CSFTR at the rates deemed necessary to increase the operational flexibility, protect the

[Return to top of document](#)

system stability, and optimize the overall biomass productivity. The absence of biomass circulation through the CFSTRs will curtail the frequent strain shifts that are a common occurrence in mixed microbial cultures cultivated in a single vessel. 4. Climate Control. A greenhouse or a translucent enclosure will be used in regions with low winter temperatures that will hinder the growth of micro-algae. In addition, evaporative water losses can also be reduced during the hot and dry season. Study Approach. A bench-scale photo-bioreactor system which consists of 4 cascade CFSTRs will be fabricated. A glass beaker with a discharge port fused at the 1-L mark will be used as the CFSTR. The discharge port will be covered with a porous filter pad to keep the micro-algae in the beaker. A porous air stone connected to an aquarium air pump will be placed inside the beaker to dissolve CO₂, ventilate O₂, and mix the micro-algae. A CO₂ canister can be connected to the air line, if necessary, to increase the mass % of CO₂ in the gas stream. A single peristaltic pump will be used to deliver the feed stream. The beakers will be housed inside an enclosure to keep the ambient light to the minimum. White LED strips (wavelength spectrum: 380 – 760 nm) attached to the inside walls of the enclosure will be used as the sole light source that can be adjusted at a prescribed photosynthetic active radiation (PAR) energy density (e.g., mW/cm²). Micro-algae harvested from the outlet weir of the Southwest Philadelphia Pollution Control Plant will be screened, washed, and equally distributed among 4 beakers and used as the seeding materials for the startup of the photo-bioreactors. It has been reported that the accumulation of micro-algal fatty acids contents is often coupled with the decrease in their biomass inventories. As result, the maintenance of a delicate balance between these two competing processes, which take place in the same system, will be the primary focus of this study. The criteria to be used to assess the process performance include: (1) biomass production (kg/d), (2) biomass concentration (kg/m³), (3) dilution rate (d⁻¹), (4) fatty acids yield (kg/d), (5) cellular protein yield (kg/d), and (6) CO₂ consumption (kg/d). A junior or rising sophomore will be appointed to carry out the experimental work and prepare the research report. The experiments (including routine analyses on process parameters) will be performed in the Algaculture Laboratory. Special analyses on fatty acids and cellular proteins will be performed using the instruments available in the Biotechnology Laboratory. It is anticipated that a paper that is suitable for publication in a refer journal will be produced.

ELECTRICAL AND SYSTEMS ENGINEERING

Jan Van der Spiegel

Project 1: A Mathematic Magic – Compressive Sensing in Imaging Acquisition and Processing

Compressed sensing is a signal processing technique for efficiently acquiring and reconstructing a signal, by finding solutions to underdetermined linear systems. This project takes the advantage

[Return to top of document](#)

of the capability of compressive sensing in reconstructing sparse signal with low sampling rate. Necessary Students' duties and responsibilities: 1) algorithm implementation on a FPGA based platform integrated a customized compressive sensing image acquisition sensor; 2) Research on the trade-off issue between sampling rate and quality of the reconstructed image. Prerequisites: Basic understanding of circuit design and hardware coding. Experience in Matlab coding is helpful. Student with strong mathematic background is encouraged to take this project.

Project 2: Explore the Brian – Wireless Neural Signal Recording and Processing

Background description: In neuroscience, researchers study the nervous system. One of the most important and fundamental studies is the study of the behavior of a neuron. A neuron is an electrically excitable cell that processes and transmits information by electrical and chemical signaling. In the last decade, scientists begin using a microelectrode system to measure and record the electro-physiological responses of a single neuron. This project cooperates with researchers from neuroscience to record, and to perform data mining on the signal captured from a wireless neural recording system. Necessary Students' duties and responsibilities: 1) neural signal recording using a customized wireless neural recording platform; 2) on-line data processing on the wirelessly recorded neural signals; 3) off-line data mining on the signal captured from a wireless neural recording system. Prerequisites: Experience in Matlab coding is helpful. Student with biology background is encouraged to take this project.

Project 3: Next Generation of Architecture Design – Sensor Network design for Intelligent Building

Background description: This project seeks to explore novel implementation of intelligent building automation system to minimize the net energy consumption and carbon emission in the next generation of building architecture designs. Distributed intelligent control systems will be embedded into modern architecture design, referring to as Building Automation System (BAS). This project employs nano/micro scale new material, sensor networking and smart phone controlling . Necessary Students' duties and responsibilities: 1) study of the characteristic of new material; 2) implementation of sensor networking with control logic for the integration of the new material at each sensor node; 3) smart phone communication interface design for the tracking of the status as well as for the controlling of the system Prerequisites: Experience in smart phone app development is helpful.

MECHANICAL ENGINEERING AND APPLIED MECHANICS

Igor Bargatin

Project 1: Designing away unwanted tilting in microelectromechanical systems (MEMS)

Rising Juniors only

Microelectromechanical systems (MEMS) are increasingly found in cars, smart phones, and other industrial and consumer devices, where they typically serve as cheap and reliable sensors of acceleration, rotation, pressure, temperature, and other physical variables (see http://en.wikipedia.org/wiki/Microelectromechanical_systems). All these quantities are ultimately measured by detecting microscopic deflections of specially designed microfabricated mechanical structures. A common problem in MEMS design is how to create suspended structures (e.g. a plate) that can perform only translational motion, i.e., without tilting/rotation or bending. In conventional (macroscopic) mechanical design, this is often accomplished by using guide rails or other mechanical constraints. In micro- and nano-world, however, the equivalent structures cannot be fabricated, and we need to invent new approaches to prevent tilting/rotation and bending

In this project, our goal is to use the technique of topology optimization to discover new shapes that can effectively prevent bending and tilting/rotation and, at the same time, can be micro- or nano-fabricated. The student will primarily work with the software packages that perform topology optimization and model the mechanical motion of the resulting structures. Promising mechanical structures can be fabricated on the macro scale in the machine shop. Successful designs will eventually be integrated into new generations of MEMS devices fabricated in the Penn Nanofabrication Facility.

Law

LAW

David Abrams

Project 1: Pharmaceutical Industry Payments to Physicians and Prescribing Behavior

The relationship between the pharmaceutical industry and the medical profession has been a topic of concern for many years. However, empirical evidence on the impact of pharmaceutical promotional activities on physician prescribing is virtually non-existent. Using newly-linked data on payments to physicians and prescriptions, we will provide the first physician-level analysis on the relationship between payments and physician prescribing behavior. Our findings could have broad implications on the policy level. In addition to informing discussions on cost-effectiveness and cost-containment, our research could pave the way for more substantive and enforceable policies regarding physician-industry interactions. The influence of pharmaceutical payments on generic versus brand name drugs could be of interest to private and public insurers, and would also have financial implications for individual patients. Students will work with faculty from the law school, med school and Wharton. Familiarity with economics and statistics or a math/science/engineering background are helpful but not essential.

Project 2: Beyond Citations: Determinants of Patent Value

The use of patents in economic and legal research is complicated by the fact that patents vary enormously in value. But patent values are notoriously difficult to estimate because patents are idiosyncratic, don't trade on a centralized exchange, and licensing information is almost always kept private. Current research on innovation and intellectual property almost exclusively uses patent counts and citation-weighted counts to proxy for value. The lack of a more realistic method of valuing patents is perhaps the greatest impediment to progress in the field. The goals of this research are ambitious: to 1) construct the first viable patent valuation model, 2) test the validity of citation counts as a proxy for value and 3) establish a new standard patent value proxy that performs better than citations. In order to do so, I will make use of unique data previously unavailable to researchers that provides patent-year level revenue data. Students with interests in economics, intellectual property (patents) and innovation are especially encouraged. A background in math/science/engineering/economics will be very valuable.

Project 3: Outside Directors as a Brake on Corporate Control Transactions

Background: Much of the scholarship on M & A is premised on the assumption that CEOs will seek to hold on to power (the "omnipresent specter of entrenchment"), and that outside directors will go along. Yet there is substantial heterogeneity in the board room. It starts with inside versus

[Return to top of document](#)

outside directors. But that difference has evolved over time as compensation contracts have evolved. This paper is the first empirical attempt to estimate the impact of compensation to outside corporate directors on the likelihood of a change of control transaction. Students with interest and background in finance are especially encouraged to apply.

LAW, SOCIOLOGY, AND AFRICANA STUDIES

Dorothy Roberts

Project 1: Interracial Marriage in Chicago and the Civil Rights Revolution

I am conducting an interdisciplinary book project on interracial marriages in Chicago during the civil rights movement. I inherited from my father, an anthropologist at Roosevelt University, numerous boxes containing original interviews he conducted in Chicago between 1937 and 1986 with hundreds of interracial couples, as well as notes, articles, and other related materials. I plan to use this archive to write a book interrogating the relationship between interracial marriage and the civil rights movement, asking questions such as: what role did laws and taboos banning interracial marriage play in the segregationist racial regime in the North as well as the South?; what were the experiences of interracial couples in Chicago during the 1940s, 1950s, and 1960s?; did they see their marriages as contesting Jim Crow and furthering racial justice?; how did litigation challenging anti miscegenation laws figure in the civil rights agenda?; how should we think about the role of intimate relationships in the struggle against racism? Students will help me to organize and analyze my archive on interracial marriages; conduct additional research related to this topic; and accompany me on a trip to Chicago to explore archives at University of Chicago, Roosevelt University, and other venues. Students will learn how to conduct and analyze original research, including ethnographic, legal, and archival data. This position would be especially helpful to students interested in careers in law, sociology, anthropology, Africana Studies, political science, and history. It requires excellent organizational skills, creative thinking, and care with original documents.

[Return to top of document](#)

Medicine

ANESTHESIOLOGY

Rita Valentino

Project 1: Cognitive impact of corticotropin-releasing factor modulation of serotonin

The stress-related neuropeptide, corticotropin-releasing factor, modulates activity of brain serotonin neurons. In this project the student will determine the effects of CRF injected into the raphe nucleus on a cognitive task. The student will learn stereotaxic surgery in rats, implantation of cannula and assessing rat behavior in an operant cognitive task.

Project 2: Role of beta arrestin 2 in stress-related behaviors

The stress-related neuropeptide, corticotropin-releasing factor, modulates activity of brain norepinephrine neurons. In this project the student will determine the effects of CRF injected into the norepinephrine nucleus locus coeruleus on a cognitive task. The student will learn stereotaxic surgery in rats, implantation of cannula and assessing rat behavior in an operant cognitive task.

ANESTHESIOLOGY AND CRITICAL CARE

Roderic Eckenhoff

Project 1: Surgery, Anesthesia and Alzheimer's Disease

We are investigating post-operative changes in inflammatory biomarkers, cognition and neuropathology in aged wild-type and transgenic Alzheimer mice. Students will be part of ongoing studies involving biomarkers, immunohistochemistry, quantitative brain imaging, and learning and memory behavioral tests. Opportunities for continued work in our lab during the school year, as well as, independent research projects, are available for highly motivated students.

Project 2: Anesthesia and Brain Development

We are investigating the effects of anesthesia during the neonatal period on neuronal migration in the dentate gyrus in rats. Students will be part of ongoing studies involving immunohistochemistry, quantitative brain imaging, and learning and memory behavioral tests in

[Return to top of document](#)

neonatal to young adult mice. Opportunities for continued work in our lab during the school year, as well as, independent research projects, are available for highly motivated students.

Project 3: Anesthetic Target Discovery

Despite giving anesthetics every day, functional binding targets in the brain have not been identified. This project is part of an ongoing study on the mechanisms of anesthetic action. Students will be involved in the study of in vivo binding of novel anesthetic photolabels and identification of binding targets using proteomic analyses, such as gel electrophoresis, mass spectrometry and immunoblotting. Opportunities for continued work in our lab during the school year, as well as, independent research projects, are available for highly motivated students.

Raymond Roginski

Project 1: Role of GCOM1 Hub Gene and its Interacting Genes in Neurodegenerative Diseases

We hypothesize that the CNS expression of GCOM1 and its interacting genes become dysregulated in neurodegenerative diseases such as Parkinsonism and Alzheimer's and may thereby play a role in disease pathogenesis and/or serve as a diagnostic tool or therapeutic target. Therefore we shall perform quantitative immunohistochemical analyses of post-mortem human brain tissue from NDD patients using antibodies against GCOM1 proteins and several of its interacting genes in collaboration with investigators in the Dept. of Psychiatry. Specifically, we predict that immunoreactivity will be decreased in specific brain regions involved in the respective diseases in patients compared with controls, consistent with our preliminary data.

Project 2: Bioinformatic Analysis and Verification of GCOM1 Interacting Genes

To test our hypothesis that the 27 GCOM1 interacting proteins we have discovered via yeast two-hybrid (Y2H) screening participate in new pathways relevant to neurologic disease, we shall analyze them using advanced bioinformatic software (e.g., Ingenuity Systems) to determine which are likely to be the most relevant to disease. Then we will attempt to verify the three most relevant Gcom1 Y2H protein-protein interactions (PPI) in a mammalian system by immunologic methods. Our preliminary analysis suggests that PRKRA, INA and OLFM1 may be important in Parkinsonism (especially PRKRA) and other NDDs. Verification is essential because the literature shows that not all PPI detected by Y2H screening are reproducible in mammalian systems.

[Return to top of document](#)

BIOCHEMISTRY AND BIOPHYSICS

Kushol Gupta

Project 1: The Structural Basis of Site-Specific Recombination and Retroviral Integration

The Van Duyne group is interested in lateral DNA transfer: the study of the structure and mechanisms of enzymes that manipulate nucleic acids. In addition to the mechanisms and regulation of genome replication and transcription, this includes processes such as DNA repair, site-specific and homologous recombination, transposition, condensation of chromosomes, chromosome pairing and segregation, and RNA trafficking and splicing. The group's approach is to establish three-dimensional models of macromolecular assemblies relating to a particular biological question using X-ray diffraction and biophysical methods and to then develop mechanistic and functional models that can be tested experimentally. Students will have the opportunity to join projects focused on retroviral integration (including the integrase proteins from HIV and other related retroviruses), or site-specific recombination (including the tyrosine recombinases Cre and the large serine recombinases). Techniques to be learned will draw from basic molecular biology, protein purification, and macromolecular crystallization and x-ray structure determination. This opportunity is ideal for biology, biochemistry, chemistry, and biophysics majors who intend on continuing on in a science career, including medical school and graduate study. Reliability, attention to detail, and time-management skills are prerequisite.

CANCER BIOLOGY

Lewis Chodosh

Project 1: Post-translational modifications of the protein kinase HUNK ***Rising Sophomores only***

The successful applicant will investigate the mechanisms that regulate HUNK, a protein involved in breast cancer formation and progression. All necessary laboratory techniques such as quantitative PCR, western blotting, mammalian cell culture, and standard molecular biology procedures, will be taught upon beginning the project. Therefore, while some familiarity with scientific principles is advantageous, previous lab experience is not required. However, the student must demonstrate willingness to accept direction and instruction, attention to detail and be a self-motivated learner. By committing to this research, the student will be performing experiments that will provide mechanistic insight into the roles that HUNK plays in mammary tumor progression with direct relevance to improving anti-neoplastic therapy. Bench skills learned during this process will be essential to students wishing to pursue scientific graduate

[Return to top of document](#)

degrees and the critical thinking skills developed while performing research are vital for everyone, regardless of their future trajectory.

Project 2: Subcellular localization of the protein kinase HUNK

HUNK is a protein kinase with established roles in breast cancer formation and metastasis. This project is designed to examine the ways in which HUNK is regulated, with particular emphasis on the dynamic control of its subcellular localization and the impact such localization has on protein function. Research on this subject will provide mechanistic insight into how HUNK promotes tumor formation and progression, thus providing crucial data in the pursuit of developing more effective cancer therapies. While familiarity with basic scientific principles would be advantageous, all necessary laboratory techniques will be taught upon project commencement. These practical skills will include quantitative PCR, western blotting, mammalian cell culture, and standard molecular biology procedures, all of which are critical for students wishing to pursue higher degrees in scientific fields. In addition, the analytical and other intangible skills gained by the successful applicant are key components of any education and will prove highly transferable, regardless of their chosen profession.

CARDIOVASCULAR MEDICINE

James Kirkpatrick

Project 1: Echocardiographic imaging of ventricular assist devices

Ventricular assist devices are implantable pumps which bypass one or both sides of a failing heart. These devices are increasingly used to treat patients with severe heart dysfunction, keeping them alive and improving quality of life. However, they are prone to a number of problems which are best diagnosed by heart ultrasound imaging (echocardiography). This project will explore the usefulness of specialized echocardiography imaging techniques for imaging ventricular assist devices. The student will be involved with abstracting images from our digital system, cataloging the images and transcribing key findings. In the process the student will learn about echocardiography and ventricular assist devices and will gain experience with basic interpretation. It is expected that the student will help to write and will present an abstract based on the work at a national meeting (if able to attend) and will be involved as an author on the paper that will arise from the work. Work on the project can be done after hours.

Project 2: Resuscitation Science and Ethics

There is a collaborative research group which has focused on projects at the intersection of resuscitation science, cardiology and medical ethics. The group continues to meet and formulate projects. Interested students can attend group meetings and work on clinical data-gathering

[Return to top of document](#)

[Return to top of document](#)

projects and review/position paper projects with faculty from the Departments of Emergency Medicine, Cardiology and Medical Ethics and Health Policy.

Project 3: Advance directives in cardiac patients

Advance directives (living wills and durable powers of attorney for healthcare) are documents that patients formulate to say what they would want done with their medical care if they lose the capacity to make medical decisions. Advance directives for cardiac patients have been advocated by professional societies, but there are few studies exploring how to promote advance directives in this population. In addition, it is not always easy to find these documents when decisions need to be made, and no proven way to incorporate them into electronic medical records has been created. This study will explore ways to help cardiac patients complete advance directives and find ways to document patient wishes in the medical record. Students will be involved with survey data collection and medical chart review. It is expected that the student will help to write and will present an abstract based on the work at a national meeting (if able to attend) and will be involved as an author on the paper that will arise from the work. Work on the project can be done after hours.

CELL AND DEVELOPMENTAL BIOLOGY

Shannon Fisher

Project 1: Genetic screen for zebrafish mutants affecting skull formation

The student would join an ongoing screen for mutants affecting skull and suture formation in zebrafish. We aim to better understand the biology underlying normal skull development and skull malformations, developing the zebrafish as a powerful model system for these common human birth defects. The student would assist in several aspects of the screen, including staining skeletal preparations, screening them for abnormalities, breeding fish to recover carriers of identified mutations, and isolating DNA samples for mutation identification.

Project 2: Enhancer mutation of the bone transcription factor Runx2

We have isolated several enhancer regions that regulate transcription of the Runx2 gene, which is required for bone formation during development. In order to determine the contribution of individual enhancers to the overall regulation of the gene, we aim to mutate one or more of the enhancers in their native genomic context in the zebrafish. The student would use recently developed efficient reagents (TALENs) for targeted genome manipulations to introduce such mutations directly in vivo. The student would inject RNAs encoding the targeting proteins into zebrafish embryos, screen by PCR for induction of the appropriate mutations, and then breed correctly targeted fish to recover the desired mutations in the next generation.

[Return to top of document](#)

DERMATOLOGY

Elizabeth Grice

Project 1: Bioinformatic analysis of skin microbial community sequence data *Rising Juniors only*

The student will use bioinformatic tools to analyze changes in skin microbial communities upon perturbation. They will be analyzing 16S ribosomal RNA sequence data, which is used to identify bacteria. They will use several software packages, including QIIME and mothur. Prerequisites include ability to use command line and a basic knowledge of DNA sequence analysis. Prefer ability to script in Python, R, and/or Perl.

Todd Ridky

Project 1: Engineering Human Cancer in Three-Dimensions *Rising Sophomores only*

Generating new genetically-defined human tissue models of invasive cancer is a major research focus. These models incorporate normal human stromal cells and architecturally intact stroma, in a faithful 3-dimensional context recapitulating the tumor-stroma microenvironment. Cancer cells are engineered to harbor genetic changes in central oncogenic drivers associated with spontaneous human malignancy. These new human tissue models are designed to complement conventional transgenic murine and cell line-based studies by overcoming limitations of cost, speed, and physiologic relevance through a standard experimental platform that is relatively inexpensive, rapid, and based on primary human cells in composite 3-D human tissue.

Requirements Biology or other life science major. Undergraduates are eligible starting the summer after their freshman year. Responsibilities Students will be given the opportunity to participate in all phases of the project including isolating and growing human cells from fresh tissues, and using viral-based gene delivery methods to introduce specific oncogenes. Students will then use the genetically altered cells to generate 3D human tissues grown either in culture incubators or in mice. Tissues and tumors will be followed by various imaging techniques including in vivo bioluminescence and fluorescence. Tumors will be harvested and analyzed using PCR, immunofluorescence, deep sequencing, and microarrays. Bioinformatics approaches will be used to identify potentially important drug targets, and to develop hypotheses. The hypotheses will be tested by attempting to block cancer development using drugs, antibodies and RNAi. Students will be expected to read relevant literature and develop proficiency in all of the experimental procedures used. Mentor Areas Students will be actively engaged in developing physiologically relevant 3-D models of human cancer. Engineered tissues will be generated through incorporation of tumor associated genetic changes and cancer stem cells. The models will then be used to identify central elements necessary for key steps in cancer progression

including invasion and metastasis. Various strategies will be used to attempt to block cancer growth and spread including using drugs, therapeutic antibodies, and RNAi technologies.

John Seykora

Project 1: Regulation of skin cancer by Src kinases and Srcasm

Our laboratory has developed novel genetic models to study the mechanisms of UV-induced skin carcinogenesis. We have transgenic mice that overexpress the Src tyrosine kinase Fyn in the epidermis. Increased epidermal Fyn kinase activity leads to spontaneous formation of precancerous lesions and squamous cell carcinomas (SCCs); SCCs are the second most common form of skin cancer. We also discovered a negative regulator of Fyn which we named Srcasm (Src-activating and signaling molecule). Downregulation of Srcasm is seen in human skin cancers, and to better understand the biological impact of Srcasm downregulation on cells in vivo, we have developed a Srcasm knockout mouse and Srcasm siRNA knockdown lentiviruses. We have ongoing projects using Fyn transgenic and Srcasm knockout mice to study the effect of UVB on skin cancer. Students working on these projects will be supervised by a senior technician and will be expected to assist in genotyping and analyzing the skin of these mice using molecular techniques. Students will be expected to learn how to make protein lysates from skin, perform western blots, perform immunohistochemistry, and isolate RNA and DNA. Once mastery of these techniques is demonstrated additional experimental responsibilities will be given. No prior experience is required; however, a commitment to become proficient at this work is necessary.

Project 2: Use of topical small molecule kinase inhibitors to treat skin cancer

Our laboratory has developed novel in vivo models of skin carcinogenesis as a tool to develop better therapeutics. We have initiated studies characterizing the efficacy of using topical small molecule kinase inhibitors to treat skin cancer. We utilize kinase inhibitors that target the canonical signaling pathways that promote keratinocyte growth in tumors. This project will involve assisting in the topical application of kinase inhibitors in gels or solutions and monitoring tumor size over the treatment period. Students working on these projects will be supervised by a senior technician and will be expected to assist in genotyping and analyzing the regressing tumors using molecular techniques. Students will be expected to learn how to make protein lysates from skin, perform western blots, perform immunohistochemistry, and isolate RNA and DNA. Once mastery of these techniques is demonstrated additional experimental responsibilities will be given. No prior experience is required; however, a commitment to become proficient at this work is necessary.

EPIDEMIOLOGY AND BIOSTATISTICS

Michael Levy

Project 1: Bed Bug / Chagas Bug Research assistant

My lab works on two parallel urban plagues: Chagas disease (a parasitic disease carried by the bloodsucking triatomine bug) in Arequipa, Peru and Bed bugs (a distant cousin of the triatomine bug) in Philadelphia, Pa. We conduct ecological and epidemiological studies and do a lot of fancy statistics to try to figure out how these bugs move through urban environments and how to control them. Over the summer we will be going door to door to look for bed bugs in Philadelphia, as well as analyzing data collected in the same fashion in Peru. Computer/Math and/or Spanish skills are required, but more importantly a commitment to work with the team long term.

Project 2: Mathematical modeling of vector-borne disease

Students will work on mathematical models to try to understand how bugs move through cities, and how to control diseases that they carry. Experience with R, Python, C or similar.

FAMILY MEDICINE AND COMMUNITY HEALTH

Ian Bennett

Project 1: Participatory Design of mHealth Interventions for Maternal Health in Vulnerable Populations

Women from vulnerable populations face a range of obstacles to accessing health services during pregnancy and while parenting young children. Low income and race/ethnic minority communities must face these obstacles without many resources available to other groups within the US. Mobile phones represent a cost effective strategy for addressing some of these obstacles and have been nearly universally adopted by younger women – including the majority of those with young families. Health interventions to make use of mobile phones – often referred to as mHealth interventions – are increasingly being explored as a means of enhancing the reach of health care services. As is generally seen with health care innovations the needs of vulnerable populations are not the focus of most work in this area. This is a particular issue because technology systems which are not perceived by the end users as useful and tailored to their needs will not be utilized. We are currently carrying out community partnered research projects with two groups in Philadelphia to develop mHealth interventions for low income and race/ethnic minority women in pregnancy and with young children.

[*Return to top of document*](#)

The focus of these systems is: 1) perinatal depression (depression in pregnancy and postpartum), and 2) contraception continuation. This research involves the development of prototypes of automated interactive sms text and interactive voice response systems in collaboration with a community design board comprised of patients and clinical staff from primary care and obstetric clinical sites caring for these populations. An undergraduate student would participate as part of a multidisciplinary research team carrying out focus group design meetings followed by development and modification of the communication system prototype in a design-review-revise cycle following lean manufacturing principles. A participating student would be expected to function as part of the research team in helping organize and carry out the design meetings, assess the outcomes of the meetings, work with programmers in implementing the system changes called for and troubleshooting the system. Students will also be expected to help with interviews with patients in assessing the perceived value of the system. As this is an ongoing research project the student would be invited to continue with the project after the end of the summer – based on their interest – and to participate in professional presentations and publications of results of this work. The research activities will occur at the Hospital of the University of Pennsylvania and at health clinics in West Philadelphia.

Jun Mao

Project 1: Integrative Medicine to Improve Cancer Survivors' Wellbeing

Dr. Jun Mao's overall research program seeks to inform evidence-based integration of complementary and alternative medicine (CAM) to improve symptom management and quality of life of cancer patients and survivors. His research program is funded by the National Cancer Institute and the National Center for Complementary and Alternative Medicine. Current active research includes: 1) Acupuncture for symptom management in cancer patients and survivors; 2) Understanding CAM use by cancer patients; 3) Herbal trials for depression and anxiety; and 4) Genetic determinants of pain in breast cancer survivors. The undergraduate students will engage in multidisciplinary clinical research by participating in a variety of activities (depending on specific project) including patient recruitment, chart abstraction, instrument and protocol development, and data management/analysis. We will work with student(s) to select one specific project to focus on while learning diverse skills as related to clinical research. For motivated summer students, we hope them will continue to work with us part-time during the school year to substantively contribute to our research program. Students will participate in group and individual mentoring throughout the research elective.

[*Return to top of document*](#)

[Return to top of document](#)

Giang Nguyen

Project 1: Depressive symptoms and social connectedness in Southeast Asian elders

Depression is an important condition for older adults; for older immigrant adults, it is even more problematic, due to cultural and linguistic barriers. Meanwhile, data from a study by the Penn Asian Health Initiatives have indicated that mental health disorders are more common in Philadelphia's limited English proficient Southeast Asians when compared with the Asian American population at large. There is potential in programs that might help reduce the likelihood of depression in this population, through social programming to promote interpersonal connections. In this project, the student will help the principal investigator (PI) to analyze data from a study assessing depression and social connectedness in Laotian, Vietnamese, and Cambodian elders. The student will learn to write statistical programming code and will work with the PI to interpret output from the analyses. In order to help the student understand the experiences of older immigrants, he/she will also spend some time during the summer working with an elder-serving non-profit partner organization, as this experience will help with the interpretation of data from this study. Finally, the student will also work with the PI to write a scientific paper based on the data, for submission to a peer-reviewed public health journal. Prior statistical programming skills are not required, but a general understanding of computer programming languages would help. Strong organizational skills and excellent communication and writing skills are necessary, and prior experience with scientific writing is helpful. Minority students who have a strong interest in studying Asian health issues are encouraged to apply.

GENETICS

Xinjun Ji

Project 1: RNA-protein interaction in post-transcription gene regulation

The student will be performing these works with guidance 1) Cell culture 2) preparation of tagged constructs 3) Cell transfection 4) qPCR analysis 5) Western blot 6) RNA-seq

Kyoung Jae Won

Project 1: Constructing TF-gene networks in adipocyte

An undergraduate student will play one of the important roles in designing an interface in the project. He(She) will develop a method to show identified TF-gene relationships and implement computational operations in the TF-gene network, which will be an important step in studying gene regulation in our current project. A. Role of an undergraduate student : Visualizing

[Return to top of document](#)

[Return to top of document](#)

transcription factor(TF)-gene networks An undergraduate student will use a publicly available tool to show TF-gene relational network. Consist of genes and their regulating TFs, the network need to be visualized for better description of the transcriptional relationships. An undergraduate student will use tool to show 1) TF-gene relationships and 2) the variations of gene expression induced by TZD treatment. The visualization tool will provide an interface for the research staffs in my lab to study the rules for gene regulation in adipocyte. B. Mentoring. I will mentor an undergraduate student by providing the knowledge about TF-gene network and ample guideline that will help design the regulatory relationships. I will introduce the undergraduate student the gene regulatory network and introduce several tools for visualizing TF-gene relationships. To perform the proposed tasks I will incorporate undergraduate students majoring in computer science or related subjects. The students will learn how to use and maintain massive biological data. This will be a good opportunity for an engineering student to experience other areas of research. The undergraduate student will communicate extensively with the group members and design the user interface for the proposed project. C. Working hour. The undergraduate students will work part-time (10 hours per week during the academic year and 20 hours during the summer break), and will be supported accordingly. D. Future plan The visualization tool will be a great asset for the on-going project. A successful mentorship can be continued even after finishing the project if agreed by the undergraduate student. prerequisites: programming skill in Unix operating system.

Kyoung-Jae

Project 1: exploiting epigenomic landscapes *Rising Sophomores only*

Developing computational software to exploit the characteristic pattern in the genome. A student will be involved in a computational tool to predict the start and end of gene transcription.

MEDICINE

Lawrence Brass

Project 1: Regulation of platelet activation by spinophillin

Platelets are blood cells that help to limit bleeding after trauma by sticking to sites of vascular injury and forming a plug. On the other and, ill-timed platelet activation leads to heart attacks and strokes. The studies in this project focus on the role of a scaffold molecule called spinophillin, which we have shown to be able to regulate key steps in the initiation of platelet activation. The project will be part of an NIH-funded study of platelet activation. The work will examine the binding of proteins such as SHP-1, PP-1 and RGS18 to spinophillin with the goal of

[Return to top of document](#)

[Return to top of document](#)

understanding how this affects the platelet signaling network. The experiments involve learning to work with human blood and standard research protocols such as western blotting.

Project 2: Computational approaches to understanding platelet function in vivo

Platelets are blood cells that help to limit bleeding after trauma by sticking to sites of vascular injury and forming a plug. On the other hand, ill-timed platelet activation leads to heart attacks and strokes. The studies in this project will focus on developing computational approaches to simulate in silico platelet activation in vivo, building upon our large observational data set from studies in mouse models.

William Schweickert

Project 1: Assessing Training and Practice Patterns for Common Bedside Medical Procedures

Medical procedures such as thoracentesis, paracentesis, and central venous catheter placement are performed by a wide range of medical professionals, spanning internists, subspecialists, emergency medicine physicians, and radiologists. The increased utilization of bedside ultrasound, removal of procedure training mandates within internal medicine residency programs, and clinical time constraints have substantially changed the landscape of procedure delivery. We seek to understand how residency training programs have incorporated procedure training and will measure the frequency and complexity of procedures performed by trainees through surveys. Additionally, we will survey practicing physicians on procedure practice patterns. This information will be utilized to help develop optimal training environments for clinicians most likely to employ procedures in their practice. Furthermore, we hope to develop tools to assess competency for these procedures. The student will be responsible for learning database development in RedCAP and designing surveys for trainees and practicing physicians. Surveys will be distributed and data will be analyzed as time allows. If the student is interested, time will be allotted to observation of the medical procedures.

Project 2: Measuring the Effectiveness of a Procedure Service Training Elective on Procedure Competency

Formal medical services dedicated to the delivery of common bedside procedures (“Procedure Service”) have been developed at selected academic institutions. However, the benefits of the service on patient outcome and the education of trainees have been minimally investigated. At The Hospital of the University of Pennsylvania, a formal Procedure Service specializing in the delivery of thoracentesis, paracentesis, lumbar puncture and central venous catheterization has been present for the last six years. Trainees can participate in a one week elective with the service to aid in development of procedure skills. We propose an evaluation of the effectiveness

[Return to top of document](#)

[Return to top of document](#)

of a procedure service rotation on resident competency (knowledge and skills) with bedside procedures. This will be done through a pre- and post-rotation survey as well as observations of simulated procedures. The student will be responsible for the development and administration of surveys and monitoring simulated procedures. Data will be entered and analyzed as time allows. If the student is interested, time will be allotted to observation of the medical procedures.

Sigrid Veasey

Project 1: PRIMING THE BRAIN FOR PARKINSON'S DISEASE: CHRONIC SLEEP DISRUPTION

HYPOTHESIS: CHRONIC SLEEP FRAGMENTATION INDUCES MITOCHONDRIAL INJURY IN DOPAMINERGIC SUBSTANTIA NIGRA NEURONS. THE STUDENT WILL LEARN IMMUNOHISTOCHEMISTRY AND WILL THEN EXAMINE INJURY TO THE SUBSTANTIA NIGRA NEURONS IN MICE FOLLOWING EXPERIMENTAL CHRONIC SLEEP DISRUPTION. THE STUDENT WILL ALSO PERFORM BEHAVIORAL TESTS EXAMINING THE MICE FOR SYMPTOMS OF PARKINSONISM. A THERAPY WILL BE TESTED TO EXAMINE THE ROLE OF MITOCHONDRIAL SUPEROXIDE PRODUCTION IN SUBSTANTIA NIGRA INJURY. THE PROJECT WILL PROVIDE THE STUDENT WITH AUTHORSHIP IN A MANUSCRIPT TO BE COMPLETED IN THE SUMMER

Project 2: THE ROLE OF HYPOTHALAMIC SIRTUIN IN WEIGHT GAIN AND INSULIN RESISTANCE FORM CHRONIC SLEEP DISRUPTION.

HYPOTHESIS: CHRONIC SLEEP DISRUPTION RESULTS IN A LOSS OF SIRT1 IN SF1 NEURONS IN THE HYPOTHALAMUS THAT IN TURN PROMOTES WEIGHT GAIN, INACTIVITY AND INSULIN RESISTANCE. THE STUDENT WILL EXAMINE METABOLICS IN MICE WITH UNDER, OVER AND NORMAL SIRT1 EXPRESSION IN THE HYPOTHALAMUS. THE WORK IS EXPECTED TO LEAD TO A SUMMER PUBLICATION AND MEETING PRESENTATION.

[Return to top of document](#)

MEDICINE - CARDIOLOGY

Emile Mohler

Project 1: Evaluation of Microvascular Blood Flow and Circulating Stem Cells in Response to Exercise in Patients with Peripheral Artery Disease

This NIH supported study is evaluating the mechanism of improved walking ability in patients with Peripheral Artery Disease with exercise. The student would help with patient recruitment, study visits, case report forms, data entry, and IRB interactions.

Project 2: Peripheral Artery Disease Patient Registry

This is a prospective registry of patients with Peripheral Artery Disease. The student would help with patient recruitment, study visits, case report forms, data entry, and IRB interactions.

Project 3: Evaluation of the Vascular Health Profile Blood Test in Response to Statin Therapy

This study will evaluate the effects of Crestor on circulating stem cells and microparticles, called the Vascular Health Profile. The student would help with patient recruitment, study visits, case report forms, data entry, and IRB interactions.

MEDICINE - GASTROENTEROLOGY

John Lynch

Project 1: Autophagy in Barrett's Esophagus

Esophageal adenocarcinoma (EAC) has been the fastest rising malignancy in the U.S.. Several conditions increase the risk for the development of EAC, including obesity, smoking, diet, acid reflux, and, most significantly, Barrett's esophagus (BE). BE occurs at the gastroesophageal (GE) junction and is the replacement of normal squamous esophageal mucosa with an intestinalized columnar epithelium. It typically arises in response to chronic acid exposure and is associated with acid reflux. Importantly, the histologic precursor lesions and molecular mechanisms underpinning BE pathogenesis remain poorly understood. One reason is the paucity of experimental models for BE. Our research has focused on this problem, and the development of innovative, genetically based and physiologically relevant human cell based 3D organotypic cultures and transgenic mouse models for BE is an important objective of my lab. We are broadly pursuing several strategies including exploring the role of intestine-specific transcription

[Return to top of document](#)

factors like Cdx1, Cdx2, and Hath1, as well contributions by proinflammatory cytokines (IL-1beta), eicosanoids (Cox-2), and autophagy in BE pathogenesis and progression to neoplasia.

Project 2: Modeling Oxidative Stress and DNA Damage Using Human 3D and Organtypic Culture Systems

Acute and chronic inflammatory environments of the gastrointestinal tract like gastroesophageal reflux disease (GERD), intestinal graft vs. host disease (GVHD), acute rejection after small intestine transplantation, and Ulcerative colitis (UC), are fairly common conditions. Disease models based on human cell and tissue culture systems that recapitulate in vivo growth and differentiation would enhance our understanding of disease progression and improve prevention and detection strategies. The development of innovative, genetically based and physiologically relevant tissue culture models for UC, GERD, GVHD, and Barrett's Esophagus (BE) are important objectives for my lab.

MEDICINE - PULMONARY, ALLERGY & CRITICAL CARE

Nuala Meyer

Project 1: Molecular Epidemiology of Severe Sepsis in the Intensive Care Unit (MESSI)

This is a molecular epidemiologic cohort study of patients with severe sepsis -- acute infection associated with organ dysfunction or failure -- in the medical ICU (MICU). We are interested in defining genetic or blood biomarkers associated with specific organ failures and/or mortality, in order to better characterize subgroups within severe sepsis and suggest personalized therapeutics for these subjects. Students' duties would include the following: collection of patient information from the electronic medical record (EMR) and entry into a web-served database; processing of blood samples for laboratory investigation; and participation in weekly lab meetings to review data integrity, descriptives, and investigations. Prerequisites: introductory biology. Students will need to complete training for human subject research, handling of biological samples, and viewing personal health information if participating in this research.

Project 2: Genomic research in critical illness *Rising Juniors only*

In tandem with our observational cohort of subjects with severe sepsis in the ICU, this is a project to investigate the association between common genetic variation and risk for acute respiratory distress syndrome (ARDS)-- acute respiratory failure with severely low blood oxygen levels -- and death from severe sepsis. Student's duties will include extracting genomic DNA from blood samples; genotyping DNA for specific genetic polymorphisms; and potentially testing subjects' blood samples for specific plasma proteins by ELISA (Enzyme linked

[Return to top of document](#)

[Return to top of document](#)

immunosorbent assay). Student will also participate in weekly lab meetings to inspect data and analyze results.

NEUROLOGY

Daniel Licht

Project 1: Augmented physiologic monitoring to predict brain injury in infants with CHD

Assist at bedside monitoring, manage imaging and pt data, interact with physics, anesthesia and clinical team.

Brian Litt

Project 1: Translational Bioengineering Internship

The Litt Lab seeks a conscientious, detail-oriented individual to collaborate with PhD students, Post Docs and MDs to assist with research projects involving analysis and conversion of large data sets from a variety of in-vitro and in-vivo sources. The successful candidate will have experience with MatLab, Java and LabView. Knowledge of Unix terminal is helpful, but could be acquired while working on a specific project. The ability to multi-task, and work in a team environment is necessary. The position offers the following learning opportunities: - Literature review of current epilepsy research - Use of a coregistration software to create 3D reconstructions of the brain using MRI and CT images -Attendance at weekly Litt Lab meeting where translational bioengineering research projects are presented by lab members and guests of the Litt Lab -Attendance at the UPenn weekly Epilepsy Surgical conference for review of clinical epilepsy cases being presented for surgical intervention. -Observation and possible participation in the development of novel electrode design and fabrication

David Raizen

Project 1: Finding new sleep signals using the round worm

Sleep disorders are prevalent in our society yet few good medicines exist to treat these disorders. To find new drug targets, we employ a discovery genetic approach using the round worm *C. elegans*. We have identified new neuropeptides (small signaling molecules) that can induce sleep in this organism. The summer PURM project goal will be to identify the receptor and signaling pathway for this neuropeptide. The methods used will include genetic analysis, behavioral observations, microscopy, and PCR. The student will work directly under Dr. Raizen's

[Return to top of document](#)

[Return to top of document](#)

supervision. Prerequisites include Biol 121 or equivalent. Prior research laboratory experience is not required.

Project 2: Metabolic rhythms: from sleep/wake cycles to the molting cycle

The function of sleep is one of the greatest mysteries in biology. We use a comparative physiology approach to addressing this mystery. Our hypothesis is that sleep/wake cycles are the consequence of metabolic/energetic cycles. To test the hypothesis, we will see if there are metabolic/energetic cycles corresponding to sleep-wake cycles in the nematode *C. elegans*, the simplest animal to date shown to sleep. The student will measure glycogen using colometric assays and measure in vivo ATP levels by expressing a fire fly light producing enzyme luciferase in specific tissues. The light emitted by luciferase is proportional to the cellular ATP level. The student will also use Western Blotting technology to measure the activity of another metabolically-sensitive enzyme called TOR. Prerequisites include Biol 121 or equivalent. No prior lab experience is required.

Project 3: Discovering small peptides that affect fat stores

To combat the obesity epidemic, we would like to better understand how fat stores are regulated. We will approach this problem by testing the effect of different small peptides (neuropeptides) on fat stores. We use the powerful laboratory animal model *C. elegans* in this project. The student will use genetic, behavioral, histological, and molecular tools in her/his project. Prerequisites include Biol 121 or equivalent. No prior lab experience is required.

NEUROSCIENCE

Long Ding

Project 1: Neural basis of complex decisions

Our everyday decisions are often based on a variety of factors, including sensory inputs gathered from the environment and internal preferences derived from experience, current goals, and personal bias. For example, a choice between broccoli and banana depends on considerations including how fresh each option looks, whether it's snack or dinner time, and whether the decider likes the taste of broccoli/banana. The goal of this project is to identify neural computations underlying decisions that require appropriate incorporation of external sensory evidence and internal preferences for reward. We will develop a behavioral task to characterize how animal subjects dynamically incorporate different types of information to reach a decision. We will develop an appropriate theoretical framework to capture behavior performance when the strength of sensory evidence and/or reward preference is manipulated. We will record from single neurons in the brain while the animal performs this task. We will then, using the

[Return to top of document](#)

theoretical framework, relate neural data to behavioral performance and infer the neural computations. The student's duties will include help with analyzing behavioral and neural data. In addition to gaining first-hand experience in examining data quantitatively, the student will be exposed to the experimental procedures ongoing in the lab, including animal training and data collection. A strong background in mathematics and computer programming is desirable but not required.

Joshua Gold

Project 1: So what does the cingulate cortex do, exactly?

The cingulate cortex is a midline structure that is thought to play important roles in a variety of high-order brain functions including decision making, error monitoring, and learning. Abnormal cingulate function has also been implicated in a number of clinical conditions including depression and schizophrenia. However, to date there have been relatively few studies of the specific computations carried out by cingulate neurons that are responsible for these high-order functions. Ongoing work in my laboratory is gathering such a data set: measurements of the activity of individual neurons in the two primary sub-divisions of cingulate cortex – anterior and posterior – in monkeys performing a sophisticated learning/decision-making task. This extensive data set will require new analysis techniques for assessing relationships between neural activity in the two brain areas and behavior. The goal of this project is to help design and implement these analyses, thereby providing a quantitative basis for novel views of the function of cingulate cortex. A strong background in mathematics and computer programming is desirable.

Project 2: Making good decisions while the world is constantly changing

We learn from experience to make more advantageous decisions, often by adjusting our expectations to match past outcomes. In a dynamic world, this adjustment process must itself be adaptive, because changes can occur that render past outcomes irrelevant to future expectations. For example, historical yields from a fruit tree that has since died should no longer affect future expectations. A history of stable stock prices can become irrelevant after a major change in corporate leadership. The goal of this project is to develop new behavioral tasks to test how well human subjects adaptively adjust their decisions in the face of environmental changes that can affect the relationship between past outcomes and future events. We will measure task performance for several different subject groups, including those that differ in age (e.g., young, middle-age, and older adults). We will compare their performance to that of an "ideal-observer" model to better understand the capacities and limitations of subjects under these conditions. These experiments will help inform other experiments in our laboratory that examine the brain mechanisms responsible for these abilities. The student's duties will include help with designing, implementing, testing, and using these new behavioral tasks. A strong background in mathematics and computer programming is desirable.

Project 3: Probing an important brainstem neuromodulatory center by looking into someone's eyes

The locus coeruleus (LC) contributes to many aspects of normal brain function and clinical disorders that affect millions of people, including ADHD, anxiety, depression, and schizophrenia. A major challenge to our ability to understand the LC's contributions to these functions is its size and location, which make it difficult to study. Our laboratory is examining one possible way to overcome this challenge by testing in detail a proposed link between LC activity and pupil diameter. We measure both directly in awake monkeys. This work, if successful, would provide a powerful, non-invasive tool to help understand, diagnose, and treat pathologies of the LC system. The goal of this project is to develop and use new analysis tools to quantify relationships between LC activity and pupil diameter in our data set. A strong background in mathematics and computer programming is desirable.

Jon Lindstrom

Project 1: Efficiently Expressing Alpha 6 Nicotinic Receptors

Alpha 6 nicotinic acetylcholine receptors (AChRs) are critical for addiction to nicotine in tobacco. We are pioneers in expressing these AChRs from cloned human AChR subunits. In order to study these AChRs, and be able to develop drugs directed at them, it is necessary to be able to express cloned human AChRs efficiently. Alpha 6 AChRs have several unusual features which impair expression of functional AChRs. We have been mapping these features on the sequence of alpha 6 subunits and discovering ways to overcome them. By making chimeras of alpha 6 and alpha 3 subunits, we have determined that an alpha 6 chimera with the large cytoplasmic domain of alpha 3 subunits gains efficient transport to the surface of *Xenopus* oocytes. We want to determine the minimum alpha 3 sequence necessary to confer transport.

Project 2: Improve Specific Immunosuppressive Therapy of Myasthenia Gravis

We have devised a method for specifically suppressing experimental autoimmune myasthenia gravis (EAMG) in rats. This involves treatment with the cytoplasmic domains of human muscle nicotinic acetylcholine receptors (AChRs) expressed in bacteria. We want to determine whether rat AChR sequences would be more potent. Human sequences set us up for doing therapy in humans, but before trying that we want to test our therapy in cats or dogs with MG. If rat sequences work in rats much better than do human sequences, then we would have to make cat or dog sequences. However, we could then expect that human therapy with human sequences would be even more effective than what we have already achieved in rats with human sequences. This summer would be spent making and expressing the rat therapeutic construct.

OBSTETRICS AND GYNECOLOGY

Anuja Dokras

Project 1: Cardiovascular risk in women with PCOS

Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder affecting an estimated 7-10 million reproductive-aged American women. Women with PCOS have irregular menses, high androgens and several risk factors for atherosclerotic disease such as metabolic syndrome and diabetes. Since cardiovascular disease (CVD) is one of the leading causes of female morbidity and mortality in the US, PCOS may represent a significant portion of the CVD seen in women. Thus, it is imperative that the precise CVD risk in PCOS be quantified. Prior studies have shown the prevalence of subclinical markers of CVD in PCOS patients and the perturbations in the lipid profile, including elevated triglycerides, high LDL and low HDL. A further clarification of the lipoprotein phenotype, including lipoprotein particle size, particle concentration and particle function, in PCOS patients will help further clarify this CVD risk. This project will include recruiting PCOS subjects at the PENN PCOS center, maintaining a database of recruited subjects and analysis of serum samples for novel markers of cardiovascular disease.

Monica Mainigi

Project 1: The effect of hyperstimulation on VEGF, PlGF and sFLT1 during early placentation

In vitro fertilization has been associated with a number of adverse perinatal outcomes including low birth weight and preeclampsia. Many of these outcomes are associated with poor placentation. We hypothesize that VEGF and other angiogenic factors produced by the multiple corpus lutea following superovulation may affect trophoblast invasion and early implantation. Over the past several years, serum from IVF patients at the time of their first hCG level has been banked for further studies. We propose to utilize these specimens to examine VEGF, VEGFR-1 (sFLT1) and PlGF levels during early placentation to determine their correlation estradiol levels. We also determine whether these levels are predictive of pregnancy complications and birth weight. The student's duties would include locating and aliquotting serum samples, running Elisa assays, and simple statistical analysis to determine whether levels correlate with pregnancy outcome. No prior lab experience or pre-requisites are required.

ORTHOPAEDIC SURGERY AND BIOENGINEERING

Louis Soslowsky

Project 1: Tendon and Ligament Injury, Repair, Healing, and Regeneration

We have several projects related to tendon injury and repair using orthopaedic biomechanics and other multidisciplinary approaches. We are a diverse lab with members from different backgrounds with an emphasis on bioengineering and clinical interfaces. Many of the projects utilize small animal (rat, mouse) surgical models.

ORTHOPAEDIC SURGERY-PEDIATRIC

Motomi Enomoto-Iwamoto

Project 1: Study on stem/progenitor cells in synovial joints

Synovial joints have essential roles for providing smooth movement to the skeleton. Current knowledge regarding progenitors involving structuring and maintaining the synovial joints is limited. Understanding the possible source and fate of these progenitors and the regulatory mechanisms of their function are necessary for developing therapeutic methods to stimulate self-renewal and repair of the synovial joint components. We have been examining the presence and distribution of progenitor cells in the synovial joints by monitoring the slow cell-cycle cells that can be visualized using a pulse-chase method with a nucleoside derivative. Students will participate in analysis of the slow cell- cycle cells in the synovial joints during their development or repair process. They will gain experience with histological procedures and computer-associated microscopic image analysis.

PATHOLOGY AND LABORATORY MEDICINE

Khalil Bdeir

Project 1: The role of Platelet Basic Protein (CXCL7) and Platelet Factor 4 (CXCL4) in Acute Lung Injury.

Acute lung injury (ALI) is a common cause of significant morbidity and mortality rate in critically ill patients, and is characterized by abnormally enhanced coagulation, microvascular barrier dysfunction and tissue necrosis. Platelets are known as primary effector cells of

hemostasis and thrombosis, but a growing body of evidence also supports an important role for platelets in inflammatory response, including leukocyte recruitment. Platelets activated during an inflammation or injury, release chemokines and other proteins stored in their alpha-granules. The two most abundant proteins accounting for 5% of all released proteins are platelet factor 4 (PF4/CXCL4) and platelet basic protein (PBP/CXCL7). The role of CXCL4 in pathogenesis of heparin-induced thrombocytopenia, thrombosis, atherosclerosis and megakaryopoiesis has been well established in part due to studies using mouse (m) CXCL4 knockout (mCXCL4-KO), and mice overexpressing human (h) CXCL4 specifically in platelets (hCXCL4+). CXCL7 belongs to the same family of chemokines as CXCL4, but has the glutamic acid-leucine-arginine (ELR) motif within its N-terminal sequence that is important for interaction with chemokine receptors CXCR1 and CXCR2, which mediate migration of leukocytes. The biological role of platelet CXCL7 is not well established, thus we also created a parallel knockout mouse (mCXCL7-KO) that lacks the three exons of *Cxcl7*. We also constructed a hCXCL7+ mice. Human CXCL7 is initially expressed as 94 amino acid (aa) platelet-basic protein (PBP) and then cleaved into 70 aa active fragment with an exposed ELR N-terminus, called neutrophil activating peptide-2 (NAP-2). NAP-2 is a known leukocyte chemoattractant, binding the chemokine receptor CXCR2. When we examined full-length recombinant mPBP and native mPBP released from mouse platelets, we found that it too can be N-terminally processed by cathepsin G released from neutrophils (PMNs) to yield a biologically active mNAP-2 version.

We are proposing to in vivo study the role that CXCL7 and PF4/CXCL4 might play in the development of lung injury and vascular integrity in acid-induced mouse model of ALI, that involves as a crucial element migration of PMNs into the lungs. In this study, knock-out and transgenic mice already have been generated, and the acid induced lung injury model is well established. Thus, we will train the student to genotype and maintain mice colonies, and to assist in the lung injury model by measuring PMN content in bronchoalveolar lavage fluid (BALF), lung permeability studies by FITC-Dextran extravasation into BALF, and total protein contents. In addition mechanism of action will be assisted in vitro using pulmonary endothelial cells and PMNs. As CXCL4 is not a ligand for CXCR2, the mechanism of CXCL4 effect may be different, possibly involving lipoprotein receptor-related protein (LRP), which has been implicated to help maintain the integrity of the capillary-alveolar barrier. Further studies into the role(s) of platelet-released chemokines in ALI may therefore have provide important new insights into the pathogenesis of ALI and may lead to novel therapeutic strategies to modify the severity of this challenging disorder.

Project 2: Anti-atherogenic effects of alpha-defensin

Atherosclerosis is a chronic inflammatory disease and is a leading cause of death in cardiovascular diseases. Recent studies demonstrate that monocytes and macrophage heterogeneity contribute to atherogenic and atheroprotective axes. In contrast to the abundance of monocytes/macrophages and the foam cells, polymorphonuclear neutrophils (PMNs) are

uncommon in mature lesions and their contribution to atherosclerotic plaque development has been largely overlooked. This proposal focuses on the role that alpha-defensin (α -def), a major protein released from activated human PMNs, plays in the immune response and genesis of atherosclerosis, a role that has been ignored in existing murine models of atherosclerosis because mice do not express α -def, and in humans due to the short lifespan of PMNs in the plaque. We and others have reported that α -def is abundant in human atherosclerotic plaques indicating PMN activation. We have also shown that α -def binds and inhibits the degradation of lipoproteins by endothelial cells, and increases the accumulation and retention of LDL and Lp(a) to subendothelial matrices

Based on these in vitro data, we anticipated that α -def is pro-atherogenic. To study the contribution of α -def to the chronic inflammatory response and development of atherogenesis in vivo, we generated novel mice that express human α -def in their PMNs bred onto ApoE^{-/-} (D^{+/+}ApoE^{-/-}). To our surprise, in our preliminary studies D^{+/+}ApoE^{-/-} mice showed less atherosclerosis and reduced systemic inflammation compared with D^{-/-}ApoE^{-/-} control mice on a high fat diet. This is in line with recent studies that contrast with the widely accepted pro-inflammatory role of α -def, documented anti-inflammatory effects on macrophages and monocytes. Moreover, α -def inhibits activation of NF- κ B in macrophages, inhibits adhesion of human and mouse macrophages to matrix proteins and increases the number of the anti-inflammatory regulatory resident subset of monocytes in air pouch model of inflammation. Together, these data support an anti-inflammatory, anti-atherogenic role for α -def in vivo. Based on our preliminary data, we hypothesized that α -def released from activated PMNs in nascent atherosclerotic lesions modulates the monocytes/macrophage subset distribution from a pro-inflammatory to an anti-inflammatory phenotype by inhibiting NF- κ B activation and the subsequent expression of multi proinflammatory cytokines. To test this hypothesis, we will study the effect of α -def on atherosclerosis and inflammation in vivo and elucidate its mechanism of action in vitro on monocytes and macrophages using isolated α -def and neutrophils packed α -def in def^{+/+} mice that we developed in the following specific aims: Specific Aim 1: Determine the role of endogenous α -def in the development of inflammation and atherosclerosis in def^{+/+} mice crossbred onto the atherogenic ApoE^{-/-} mice. We will study aortic lesion size and localization of α -def. Systemic and local lesional inflammatory response will be determined in D^{+/+}ApoE^{-/-} mice and D^{-/-}ApoE^{-/-} control mice by characterizing the profile of cytokines and chemokines in the plasma and locally in the lesions, infiltration and activation of PMNs, classical inflammatory and resident monocytes, M1 and M2 macrophages and foam cells in both early and late aortic lesions. Specific Aim 2: Examine the mechanism underlying anti-inflammatory/anti-atherogenic effects of α -def on monocyte/macrophages. We will study the effects of isolated α -def on the activation and phenotypic differentiation of isolated monocytes/macrophages by measuring the cytokines/chemokines profile, cellular markers of the different subsets of cells (inflammatory and resident monocytes, M1 and M2 macrophages) and the effects of α -def on intracellular signaling pathways that mediate NF- κ B activation. The effects of α -def on the recruitment and

[Return to top of document](#)

activation of the different subsets of leukocytes will be studied using the in vivo air pouch model of inflammation.

Juan Jiménez

Project 1: Coronary Stent Strut Geometries - A Possible Cause for Clinical Failure *Rising Juniors only*

Our laboratory is searching for an enthusiastic student to participate in a research project related to in-stent restenosis. Vessel reclosure after stent implantation in coronary arteries is a frequent cause of clinical complication. We are currently using a bench top flow system that simulates coronary flow to understand how the presence of the stent device changes blood flow characteristics in coronary arteries, and how the resulting flow perturbations due to the coronary stent can be a contributor to in-stent vessel reclosure. Student responsibilities include growing cells in culture, conducting assays to quantify gene expression, conducting in-vitro experiments with cells, and basic laboratory duties. Student should have taken physics, chemistry, and biology courses.

Karuppiah Muthumani

Project 1: Enhancement of immune responses by novel DNA vaccine strategy.

Effective vaccines are still needed to combat a number of deadly diseases including Human immunodeficiency virus (HIV), Malaria, and emerging mosquito-borne pathogens such as Dengue Virus (DV), West Nile Virus (WNV) and Chikungunya Virus (CHIKV). Over the past 25 years, multiple vaccine platforms have been explored to induce protective viral-specific immunity. DNA is one such platform and has already been studied in numerous clinical protocols. The platform's safety has been well-documented in the clinic with more than 20,000 persons having received DNA vaccines with no adverse effects. In addition to its enviable safety record, the technology is made attractive by the simplicity of its engineering and production as compared to live attenuated and killed viral vaccines. DNA vaccines are also very stable and, therefore, ideal candidates for third world distribution where an effective vaccines are most needed. Improvements to second-generation DNA vaccines such as DNA optimization, RNA optimization, and electroporation (EP) have given the platform-increased immunogenicity and research efforts are currently underway to enhance DNA vaccines for HIV, DV, WNV and CHIKV using consensus sequences. (a) DNA Vaccination to generate Virus-specific Immunity: We are engineering several vaccines into enhanced-DNA constructs using these techniques and comparing their ability to drive immune responses with previously developed immunogens for HIV, Dengue, West Nile Virus and Chikungunya virus. (b) Immediate and Persistent Protection Against viral Diseases: The ability to elicit improved antibody responses against infectious

[Return to top of document](#)

[Return to top of document](#)

disease is another crucial goal of a prophylactic vaccine. We are working on the production of synthetic antisera for passive immunity against viral pathogen. Development of monoclonal antibodies by cloning human B cells has been difficult in the past as only a few clones could be produced using time-intensive processes. We will instead utilize a phage display technique. We will use this system to directly isolate gene sequences encoding human monoclonal antibodies from PBMCs of CHIKV, WNV, and Dengue seropositive individuals. We will then clone these sequences into our enhanced DNA vectors to generate full human IgG expression vectors. These plasmids will provide a safe, non-live, and non-viral approach to deliver antibody-mediated immunity against pathogens within 1-2 days of delivery.

Project 2: Targeting tumor growth by blocking Myeloid-derived suppressor cells

Approximately a quarter of all deaths in the U.S. are due to cancer, with this disease recently surpassing cardiovascular disease as the number one killer in the U.S. Effective therapies against cancer should ideally induce cytotoxicity against tumor cells without affecting normal cells [3]. Fortunately, studies over the past 2 decades have provided insight into some of the complex molecular mechanisms that initiate oncogenic transformation. Cancers can adapt several mechanisms for evasion from immunological control including apoptosis resistance, self-sufficiency in growth signals, insensitivity to anti-growth signals, sustained angiogenesis, and a limitless replication potential as well as tissue invasion and metastasis. Consequently, it is essential to develop innovative cancer strategies that address these obstacles and target the mechanisms involved in this process. Myeloid-derived suppressor cells (MDSCs) are a mixture of immune cells composed of immature macrophages, granulocytes, dendritic cells, and myeloid cells that expands and facilitates tumor growth, inflammation and viral infection, and that have a remarkable ability to suppress immune response. These cells are of great interest because they have the capacity to suppress immune response to vaccine and MDSCs may serve as a target for preventing tumor progression. We are investigating the mechanisms of MDSC expansion and characterizing the role of MDSC in T cell immune suppression in a melanoma model system. We will study this effect in an antigen specific B16 melanoma tumor model in mice utilizing a novel Tyrosinase DNA vaccine. The ultimate goal of this project is to learn how to generate effective antitumor immunity even in the presence of an immune suppressive tumor environment.

Project 3: Molecular functions of the Host-Pathogen Interactions

Given the ongoing global burden of infectious disease, the study of host-pathogen interactions continues to be a pressing area of investigation. We are interested in all aspects of the complex relationship between pathogens and their hosts. In particular, our laboratory focuses on the molecular functions of the HIV-1 accessory proteins Vpr and Nef, which are arguably the most important pathogenic factors during HIV infection. Using modern tools of virology and immunology, we explore the molecular basis of proteomic function, the interaction between these factors and host cell signaling proteins, general T cell and APC functions, the function of the T cell exhaustion marker, and the interaction between Programmed death 1 (PD-1) and

[Return to top of document](#)

[Return to top of document](#)

Programmed death 1 ligand (PD-L1). By studying viral proteins and their interacting cellular partners, our research is aimed at not only understanding the mechanisms involved in these pathways, but also the development of new compounds that block these interactions. This investigation will identify a novel antiviral mechanism for exploiting the immune suppressive PD-1/PD-L1 pathway and suggest a role for virus-infected cells in contributing to the local corruption of immune responses that are required for viral control. The methods used in these studies are equally applicable to other serious infectious diseases such as DV, WNV, and CHIKV-a virus that kills more than two million young children and adults every year.

Warren Pear

Project 1: Notch regulated targets in T-cell leukemia *Rising Juniors only*

Successful treatment of T-cell leukemia (T-ALL) is a challenge in pediatric leukemia as the patients are treated with very toxic therapies and relapsed disease is extremely difficult to cure. Mutations in Notch, a protein that mediates cell fate decisions in both invertebrates and vertebrates, occur in the majority of T-ALLs and inhibiting Notch may provide an effective therapy for T-ALL. Notch is a receptor that functions as a transcription factor after ligand binding. The oncogenic Notch mutations in T-ALL cause Notch to function as a transcription factor in the absence of ligand. We have conducted a screen to identify the transcriptional targets of Notch in T-ALL. Among the targets identified are non-coding RNAs. The goal of this project is to investigate the role of these non-coding RNAs in the pathogenesis of T-ALL. The goals of this summer project will be to: A) demonstrate that one of the long non-coding RNAs identified is a direct Notch target B) Using both gain and loss of function approaches, show that this non-coding RNA is important for the growth, differentiation and/or survival of T-ALL cell lines. Prerequisite skills are: 1. Proficiency in basic molecular biology techniques: PCR, growing plasmids, subcloning 2. Previous tissue culture experience

Daniel Powell

Project 1: Generating Universal Immune Receptors for Personalized T cell Therapy for Cancer

Our lab is currently exploring the application of T cell based immunotherapy for cancer. One specific research focus relies on the development of chimeric immune receptors with the capacity for flexible antigen specification. Building off of promising proof of concept studies, we seek a talented student to aid in the optimization of this universal immune receptor approach. Duties will include performing molecular and biochemical experiments and perform day-to-day activities related to routine laboratory procedures in support of several research studies of cancer immunotherapy. The selected individual will have knowledge of T cell engineering, perform

[Return to top of document](#)

[Return to top of document](#)

molecular and biochemical experiments and will aid in general laboratory maintenance as a team member.

PEDIATRICS

Lamia P. Barakat

Project 1: Psychosocial Needs and Resources for Adolescents and Young Adults with Cancer

Participation in recruitment, data collection and data analyses for our quality improvement project designed to assess the unique needs of adolescents and young adults with cancer as well as develop programs for this patient population. Support of our Adolescent and Young Adult Patient Steering Committee in their efforts to interpret results of the survey and plan and implement programs. Prerequisites: experience volunteering with children and families (in any setting), exposure to research methods through coursework.

Project 2: Psychosocial Screening at Diagnosis for Children with Cancer and their Parents

Facilitate our infrastructure project assessing the feasibility and acceptability of universal psychosocial screening for newly diagnosed patients with childhood cancer and their parents and screening when patients move off treatment. Involves recruitment and data collection data via iPad with families in clinic and in the inpatient setting, downloading data from RedCap, data management and analyses. Participation in team meetings as well as supporting the project with related research tasks are involved. Prerequisites: experience volunteering with children and families (in any setting), exposure to research methods through coursework.

Project 3: Proton Registry: Neurocognitive Late Effects of Proton Treatment

Medical file review with possibility for observing neuropsychological testing. Prerequisites: experience volunteering with children and families (in any setting), exposure to research methods through coursework.

Tyra Bryant-Stephens

Project 1: Not one More life

Follow up telephone questionnaires, database entry of responses, identification of new sites for community outreach

Project 2: CAPP classes

[Return to top of document](#)

[Return to top of document](#)

Assist in scheduling new community class sites Serve as teacher for children's classes Identify new sites for classes Collect data for classes

Elizabeth Lowenthal

Project 1: Adolescent Adherence to HIV Treatments

The student will be working with data from an Africa-based study of adolescent adherence to HIV treatments. The student's responsibilities will include assisting with cleaning data from microelectronic monitors utilizing patient adherence diaries. Responsibilities may also include coding of qualitative data from focus groups.

John Maris

Project 1: Genetics of childhood cancers

Perform molecular biological analyses of recently identified cancer predisposition genes.

Project 2: Drug development for childhood cancers

Perform screening and/or cytotoxicity studies of novel anti-cancer drugs.

Project 3: Systems biology of pediatric cancer

Perform genetic manipulation studies of newly identified "master regulators" of neuroblastoma oncogenicity.

Rebecka Peebles

Project 1: Quality Improvement Drivers of Health Outcomes in Adolescents with Eating Disorders

This a QI collection, and students will be considering the first encounter to our Eating Disorders Program. Students will collect data from medical records, participate in lab meetings and educational conferences, cross check data, enter data, and begin some basic analyses. They need to be interested in eating disorders, team players, detail-oriented, and responsible. There are no prerequisites.

Project 2: Rate of Weight Gain as a Predictor of Remission in Adolescents with Eating Disorders

[Return to top of document](#)

[Return to top of document](#)

These students will be involved in both the collection of ongoing data and also preliminary work toward a large grant submission. Students will collect data from medical records, participate in lab meetings and educational conferences, cross check data, enter data, and being some basic analyses. They need to be interested in eating disorders, team players, detail-oriented, and responsible. There are no prerequisites.

Jennifer Walter

Project 1: How to Support Shared Decision Making in the Pediatric Intensive Care Unit: A Randomized Controlled Trial ***Rising Juniors only***

This project is a prospective randomized controlled trial that aims to explore how factors of communication between physicians and patients of children admitted to the intensive care unit impact parent satisfaction and patient outcomes at the Children's Hospital of Philadelphia. Students will conduct literature reviews, collect data from the medical record, administer surveys, and participate in lab meetings. Students should be responsible, flexible, and curious, have strong writing skills, great interpersonal skills, and be capable of both group and individual work. We also expect students to have some skill in conducting literature reviews. Students should be able to work at least 20 hours per week over the summer and will need to complete a background check to be able to work within CHOP. There are no prerequisites.

PEDIATRICS / CARDIOLOGY

Joseph Rossano

Project 1: Mortality and Wait-List Times by Region for Solid Organ Transplant in the United States

Many children will succumb to their illness while waiting for solid organ transplant. This study will evaluate the regional differences and other factors that may account for varying wait-list times and mortality in children listed for solid organ transplant. The results of this study may be useful in re-defining organ allocation systems. This will be a clinical research project utilizing data from the United Network of Organ Sharing. This is a robust dataset on all solid organ transplants in the United States. The student will organize and analyze the data to assess the variability of wait-list times and mortality by region of the United States in children who are listed for solid organ transplant. Under the guidance of the physician mentor, the student will assist in the generation of univariable and multivariable models as a part of this analysis. Prior experience with data management and basic statistics is encouraged, but not a prerequisite. With

[Return to top of document](#)

[Return to top of document](#)

this project, the student will gain experience and a fundamental understanding of hypothesis driven clinical research, database management, and statistical analysis.

Project 2: Donation after Circulatory Death in Pediatric Solid Organ Transplants: Trends and Outcomes

Solid organ transplant in children is limited by the number of available organs. Most organs are donated after the deceleration of brain death in the donor; however, the use of organs from donors that die from circulatory death has the potential to greatly increase the number of available organs for transplantation. The purpose of this study will be to evaluate the trends and outcomes of donation after circulatory death (DCD) in pediatric solid-organ transplant over the last decade. This will be a clinical research project utilizing data from the United Network of Organ Sharing. This is a robust dataset on all solid organ transplants in the United States. Under the guidance of the physician mentor, the student will analyze the data and assess the impact of DCD on organ utilization in pediatric heart, kidney, liver, and lung transplantation. The project will also compare the outcomes of solid organ transplants from DCD donors to brain dead donors using univariable and multivariable models. Prior experience with data management and basic statistics is encouraged, but not a prerequisite. With this project, the student will gain experience and a fundamental understanding of hypothesis driven clinical research, database management, and statistical analysis.

PHARMACOLOGY

Paul Axelsen

Project 1: Protein folding in reverse micelles

We have experimental data showing that the amyloid beta protein that accumulates in Alzheimer's disease forms extended beta structure (a structure that occurs only in disease) in reverse micelles (an environment that mimics the extracellular environment in human brain). The project involves computer simulation of protein folding in a reverse micelle to account for the factors that induce this structure to form. A suitable student would have to be computer-savvy, and would learn how to run a multiprocessor Linux computer system as well as a lot about protein structure and folding processes

Project 2: Biosynthesis of isotopically-labeled fatty acids

In our work on Alzheimer's disease, we have need for polyunsaturated fatty acids labeled with stable (i.e. non-radioactive) isotopes (i.e. ^{13}C). The project involves cultivating yeast in media containing isotope-labeled fatty acid precursors and purifying the fatty acids that they produce from these precursors. The student would learn a lot about intermediary metabolism, microbiological

[Return to top of document](#)

[Return to top of document](#)

techniques, and lipid chemistry techniques - particularly as they pertain to the "omega-3" fatty acids that are currently getting so much popular attention.

Project 3: Paradoxical antioxidant activity

It is not widely appreciated that so-called dietary antioxidants can actually promote oxidative stress under many circumstances. For example, we have observed that vitamin C accelerates oxidative lipid damage in the presence of the amyloid beta proteins that accumulate in Alzheimer's disease. The project involves determining the role of trace metals such as copper in this process. The student would learn a lot about antioxidant chemistry, the interaction of bioactive metals with proteins, and the technique of mass spectrometry.

Teresa Reyes

Project 1: Assessment of attentional deficits in mice

This research project involves using an operant behavioral task in mice to assess motivation and attention. The student will have an opportunity to work directly with mice, participating in the training and testing aspects of the project.

Project 2: Protein expression in the brain

This project is designed to understand differences in protein expression that arise in mouse offspring, based on the dams diet during pregnancy. In this project, the student will learn essential lab techniques used in the assessment of basic neuroscience research.

PSYCHIATRY

Deborah Kim

Project 1: Transcranial Magnetic Stimulation for Pregnant Women with Depression

This project examines the efficacy of a neuromodulation device called transcranial magnetic stimulation as an alternative to antidepressants in pregnant women with major depressive disorder. The project is a randomized controlled trial and novel in its hypotheses and design. The student would help with recruitment, trained to help with psychiatric ratings and treatments as well as data collection under the guidance of myself and an experienced research coordinator. The ideal student would be one interested in clinical research/medicine and either psychiatry or neuroscience. Good relational skills are important as contact with subjects will be necessary. I have mentored many college and medical students as well as residents and fellows.

[Return to top of document](#)

Project 2: Early Life Adversity and HPA Axis Functioning during Pregnancy

This project evaluates the impact of prepubertal adversity on the functioning of the maternal and infant stress systems. The student would help with recruitment, trained to help with psychiatric ratings and procedures as well as data collection under the guidance of myself and an experienced research coordinator. Procedures include learning about different ways to measure HPA functioning in the mother and her infant. The ideal student would be one interested in clinical research/medicine and either psychiatry or neuroscience. Good relational skills are important as contact with subjects will be necessary. I have mentored many college and medical students as well as residents and fellows.

Selamawit Negash

Project 1: Implicit Learning Paradigms as Potential Markers of Preclinical AD

As research on Alzheimer's disease (AD) moves toward early detection and prevention, the need for tools that are sensitive to subtle changes, very early in the disease course, has become increasingly important. Nonetheless, one of the challenges in the detection of preclinical AD has been the lack of instruments that are specific to subtle cognitive changes in very early AD versus normal aging. While standard psychometric tools have received significant attention over the years, a parallel approach using well-developed, experimental paradigms has been less aggressively pursued with little change in testing batteries. Implicit learning, with its multiple forms, is a less studied, yet potentially important system that can offer insights into the dissociation of preclinical AD from normal aging. Specifically, if some forms of implicit learning are impaired in preclinical AD compared to normal aging while others are not, this pattern could help in early and accurate detection of AD. Equally important, an intact implicit system might be used to help design programs that can increase the period during which patients can be relatively independent. To this end, the current project investigates the utility of two novel, well-developed, implicit paradigms (contextual cueing and sequence learning), which, based on cognitive neuroscience literature and our own work, appear to differentially dissociate between age-related and AD-related changes. The proposal also leverages on high-dimensional imaging pattern classification method, SPARE-AD index (Spatial Pattern of Abnormality for Recognition of Early Alzheimer's disease) in classification of preclinical AD and normal aging groups. It is hypothesized that the implicit learning paradigms will detect subtle cognitive deficits in preclinical AD versus normal aging, and that this will occur to a greater extent than in standard neuropsychological instruments. As such, it is expected that this project will provide an important foundation for development of inexpensive screening measures in preclinical disease and potential outcome measures in trials directed at this population. Student duties: Recruit and enroll participants into the study; administer computerized cognitive testing; data entry and analysis

Project 2: Enhancing Cognitive Fitness in African American Older Adults

With the aging of the “baby-boomer” generation, there is an emerging interest in health promotion behaviors of older adults. The Alzheimer’s Association has recently partnered with the Centers for Disease Control and Prevention to develop the Healthy Brain Initiative, which recommends lifestyle interventions as part of its Road Map for maintaining or improving the cognitive performance of all adults. Despite the growing interest, however, research on cognitive health of minority older adults has critically lagged. This is unfortunate because minority populations are already at a disadvantage with regards to engaging in health promotion behaviors. There is now accumulating evidence that engaging in regular physical activity can help older adults maintain and improve their cognitive functions, such as learning and memory. Researchers have also suggested that regular physical activity may decrease the risk of dementia. Nonetheless, lifestyle intervention studies that are targeted towards ethnically diverse populations are critically lacking. This presents a significant health disparity concern, and studies that are cognizant of ethnoracial differences are needed. The current project seeks to address this critical knowledge gap. The purpose of the study is to examine whether physical activity enhances cognitive function in healthy African American older adults. As such, the study has significant potential to improve health behaviors as well as quality of life in African American older adults. Student duties: Recruit and enroll participants into the study; monitor their participation; data entry and analysis

PSYCHIATRY AND OBSTETRICS/GYNECOLOGY

C. Neill Epperson

Project 1: Functional Brain Imaging and Cognition in Women Undergoing Oophorectomy

Cognitive and mood complaints are common among women during the menopause transition and are even more pronounced in premenopausal women who become acutely postmenopausal due to undergoing oophorectomy (surgical removal of the ovaries). Although many women at risk for ovarian and breast cancer due to genetic factors will undergo oophorectomy for cancer prevention, we do not yet have a method to predict which women will experience significant cognitive or mood disturbances after surgery. The overarching goal of this study is to utilize functional magnetic resonance imaging (fMRI) and proton magnetic resonance spectroscopy (1H-MRS) as tools to determine the central nervous system impact of hypogonadism and effects of both hormonal and pharmacologic interventions targeting cognition and mood in acutely hypogonadal women. The student's responsibilities include subject recruitment and screening and escorting subject to their brain scans. Ambitious students may learn how to administer structured diagnostic ratings and subject questionnaires, draw and process blood, and assist in conducting brain imaging experiments. Students who plan to use the summer as a spring board

[Return to top of document](#)

for independent study may begin to design a research study and/or write a manuscript for peer review. Priority will be given to a rising sophomore or student with previous experience/interest in brain imaging. This project is ideal for a student who wishes to become involved in on-going research and is willing to consider independent study during the academic year.

Project 2: Progesterone Effects on Brain Function and Craving In Nicotine Addiction

The hormone progesterone has been found to reduce craving and/or drug liking in cocaine and nicotine addiction. Progesterone's effects are likely mediated by the metabolite allopregnanolone (ALLO) which is a potent gamma aminobutyric acid (GABA) receptor agonist. This project focuses on the impact of progesterone treatment on neurochemistry and neural activity as well as craving and smoking behavior in men and women with nicotine addiction. The student's responsibilities include subject recruitment and screening and escorting subject to their brain scans. Ambitious students may learn how to administer structured diagnostic ratings and subject questionnaires, draw and process blood, and assist in conducting brain imaging experiments. Students who plan to use the summer as a spring board for independent study may begin to design a research study and/or write a manuscript for peer review. Priority will be given to a rising sophomore or student with previous experience/interest in brain imaging. This project is ideal for a student who wishes to become involved in on-going research and is willing to consider independent study during the academic year.

RADIOLOGY

David Cormode

Project 1: The development of gold nanoparticles as computed tomography contrast agents

The student will learn to synthesize gold nanoparticles and to apply a variety of coatings. The students will learn to characterize the nanoparticles with a variety of methods including transmission electron microscopy and computed tomography (CT). The nanoparticles will then be evaluated for their uptake and biocompatibility with CT and assays such as ELISA or MTT. The student will be supported by an experienced lab member.

Harish Poptani

Project 1: Magnetic resonance spectroscopy in diagnosis and treatment monitoring of brain tumors

Magnetic resonance spectroscopy (MRS) allows studying the cellular metabolic processes in vivo in a totally noninvasive manner. It has shown promise in the diagnosis of several

[Return to top of document](#)

pathologies including brain tumors. Despite its potential, the technique is primarily used as a research tool at leading academic centers due to the complications involved in data acquisition, processing and interpretation, which typically require an in-house expertise in MRS. In this project, we aim to develop a semi-automated MRS protocol that is easy to implement, requires very little human intervention and provides automated diagnosis. Availability of such a protocol has the potential to be widely used in the clinic. Specifically for the summer project, we are looking for a motivated student with interest and skills in optimizing a brain tumor spectroscopy database and experience in Microsoft Excel or Access will be preferred. Once the database is populated, it will allow faster and efficient clinical decision making, as well as data mining for publications and developing new hypotheses. The student will be trained in the analysis of human brain tumor spectra, quantitative automated processing and cataloguing the information in a searchable data base. The existing database needs to be optimized to include desirable features, such as developing links to other clinical information and keyword search options. Participation in the project will give the student an opportunity to have hands-on experience in clinical research and the students will be able to learn about the basics of clinical MRS and its applications in studying the brain.

Project 2: Quantitative Magnetic Resonance Spectroscopy of the brain

Magnetic resonance spectroscopy (MRS) allows studying the cellular metabolic processes in vivo in a totally noninvasive manner. Almost all pathologies result in a change in tissue metabolic processes that can potentially be detected by MRS. However, the data needs to be analyzed quantitatively so that subtle changes in metabolite levels can be detected with high sensitivity and used in the clinic as a decision support tool. While some commercial software programs are available to quantitatively analyze the MRS data, they rely on certain assumptions about the characteristics of the metabolites (also known as “basis sets”), which are magnetic field dependent. In this project, we will develop the “basis sets” for several metabolites found in the brain, to develop a comprehensive database of metabolic information. The experiments will be performed on a human 7Tesla MRI as well as a small animal 9.4T magnet so that the information can be used for human as well as rodent brain studies. We are seeking a motivated student with interest in learning MRS and MRI physics, data acquisition and analysis. The student will aid in preparation of various metabolite solutions at different concentrations, acquisition of MRS data from these samples at 7T and 9.4T MRI magnets and data analysis to form the “basis sets”. Ample training will be provided to give the student a basic knowledge and understanding of translational research projects. They will also be able to participate in the ongoing clinical research projects and will get a hands-on experience in translational research.

SURGERY

Niels Martin

Project 1: Fault Analysis and Injury Patterns in Trauma

Complete the design of a fault analysis survey, then assist in its implementation and data acquisition. Clinical participation in trauma service activities may be needed. Preliminary assimilation of data will also be performed by the student.

Project 2: Transfusions in Critical Illness: What is the Optimal Hemoglobin Concentration

Participate in a retrospective review of critical ill surgical patients looking at morbidity and mortality among different groups based on average hemoglobin level. Duties include database manipulation, basic statistical analysis and manuscript writing.

Project 3: Nutritional Support in Critical Illness: Enteral, Parenteral, or Both

participate in the creation of a prospective study looking at hospital outcomes based on the nutritional support received during critical illness. Student would finalize study design working with a multi-disciplinary group and assist in enrollment and data acquisition.

TRANSPLANT SURGERY

Paige Porrett

Project 1: Immunologic Memory and Immunosuppression Withdrawal

Organ transplantation improves quantity and quality of life for hundreds of thousands of people, but outcomes are negatively impacted by the side effects of non-specific pharmacologic immunosuppression. Consequently, a primary goal of transplant physicians is to minimize that immunosuppression, but little is currently understood about the immune system's response to withdrawal or minimization of these agents. In our laboratory, we are particularly interested in how immunologic memory develops during immunosuppression withdrawal and how it impacts graft survival. We study the T cell and B cell responses to skin grafts in a mouse transplant model using common immunologic techniques such as flow cytometry and protein/DNA/RNA analysis. An interested student should have a strong interest in immunology and prior coursework in biology, chemistry, and physics is preferred. Students will participate in experimental design, data analysis, and publication of results. Additional responsibilities will be commensurate with experience.

[*Return to top of document*](#)

Project 2: Maternal Immunologic Tolerance of the Fetus and Allograft Rejection

Organ transplantation improves quantity and quality of life for hundreds of thousands of people, but outcomes are negatively impacted by the side effects of non-specific pharmacologic immunosuppression. Although pharmacologic immunosuppression is currently required for recipients of organ transplants to prevent immunologic rejection, efforts are on-going to understand how to promote tolerance of the organ so that these drugs are no longer necessary. An important clue in the mystery of immunologic tolerance is the fact that the maternal immune system does not "reject" the developing fetus, a source of foreign tissue that is indeed recognized by maternal T and B cells. The mechanisms underlying this immunologic fetomaternal tolerance remain unknown. We are interested in understanding this phenomenon and applying this knowledge to promote tolerance of solid organs. In the lab, we are developing a mouse model that will allow study of the maternal immune system during pregnancy. An interested student should have a strong interest in immunology and prior coursework in biology, chemistry, and physics is preferred. Students will participate in experimental design, data analysis, and publication of results. Additional responsibilities will be commensurate with experience.

[*Return to top of document*](#)

Nursing

BIOBEHAVIORAL HEALTH SCIENCES

Bart De Jonghe

Project 1: Neural Controls of Energy Balance: the POMC neuron as a master regulator

The prevalence of obesity has catalyzed the need for greater understanding of how physiological signals of food intake and energy expenditure converge within the brain to regulate body weight. An emergent theme from decades of research using many human and animal models is that the melanocortin system is an essential component in the overall regulation of energy balance. Among the most influential players in the melanocortin “system” neural circuit are neurons expressing pro-opiomelanocortin (POMC)-derived melanocortin receptor (MCR) ligands. Importantly, POMC neurons are distributed within only two brain locations: the arcuate nucleus of the hypothalamus, and the nucleus of the solitary tract within the hindbrain. While the hypothalamic population of POMC neurons is relatively well-studied, this project provides a framework to elucidate the vastly understudied role of hindbrain POMC neurons in the regulation of energy balance. Student involvement will be focused on all of the following: assisting in small animal survival surgeries, daily food intake and body weight measurements, gaining proficiency in the handling and training of experimental mice, assisting in post-mortem tissue analysis and evaluation of hormonal and neurochemical factors implicated in the control of energy balance and development of obesity. Students do not need previous laboratory experience, but a strong interest in the mechanisms of obesity and control of food intake/body weight regulation is encouraged. Any previous experience in bench work and small animal behavior in a laboratory setting related to energy balance would be particularly useful.

Project 2: The Neurophysiology of Nausea: translating animal findings to human treatments

Nearly one million cancer patients in the U.S. annually undergo chemotherapy. Cisplatin drug treatment, common for many cancers, is accompanied by severe side effects, such as prominent nausea and vomiting. The use of anti-vomiting drugs over the last 20 years has greatly reduced the severity of vomiting; however nausea remains relatively poorly controlled. The lack of effective anti-nausea medication is directly related to a poor understanding of the neural system of nausea generation and signaling. The student within this project will gain insight into how nausea and sickness behavior are generated, and what neurotransmitters and hormones control the severity of sickness. Responsibilities include: training in the handling of laboratory rats, measurements of food intake and body weight daily, scholarship related to the rationale and significance of the study in a broader context of energy balance, being part of an interdisciplinary

[Return to top of document](#)

team focused on identifying the mechanisms of nausea and sickness, as well as identifying novel targets for anti-nausea medication using rat models. Students do not need previous laboratory experience, but a strong interest in the mechanisms of nausea and vomiting and control of food intake/body weight regulation is encouraged. Any previous experience in bench work and small animal behavior in a laboratory setting related to energy balance would be particularly useful.

Mary Ersek

Project 1: Development of a Pain Intensity Measure for Persons with Advanced Dementia

The prevalence of dementia is growing, as are the costs associated with care. Under-identified and undertreated pain is associated with unnecessary suffering and increased caregiver burden and healthcare costs in persons with dementia. A key factor that contributes to undertreated pain in this vulnerable group is impairment in the ability to report pain. Several pain measures exist for this population; yet, four challenges have prevented the development of an effective measure of pain intensity: 1) there is uncertainty regarding the specificity of some behaviors typically “counted” as indicative of pain; 2) there is little evidence that existing tools accurately measure pain intensity; 3) no “gold standard” exists for pain when self-report is unavailable; and 4) multiple inputs (i.e., behavioral observation and caregivers’ proxy pain reports) may be needed to achieve adequate pain assessment in this population. The goal of this VA-funded study is to develop and validate a pain intensity measurement strategy for persons with dementia who have limited ability to self-report their pain. This 3 ½ year study involves intensive data collection at the Philadelphia VAMC Community Living Center (CLC), located very close to School of Nursing building. Students can choose among several activities, including: 1) observing consented CLC residents for signs of pain; 2) interviewing CLC staff about residents’ agitation, sleep, and depression-related behaviors; 3) conducting chart reviews; 4) entering and managing study data; and 5) general research-related clerical duties. Qualifications: Excellent oral communication skills, interest in pain and gerontology, keen eye for detail.

Karen Hirschman

Project 1: Health Related Quality of Life: Older adults in Long-term Care

Currently long term services and supports (LTSS) is characterized by the rapid growth of a fragmented and costly “system” with substantial and persistent concerns about quality. LTSS is provided in including nursing homes, assisted living facilities, and through home and community-based services. Health related quality of life (HRQoL) has been identified by leading clinical scholars as a focal outcome for quality assessment among the growing population of older adults receiving LTSS in the U.S. Unfortunately there is a paucity of data regarding the trajectory of changes in the multiple domains reflecting HRQoL in this population. As a result,

[Return to top of document](#)

[Return to top of document](#)

older adults and their families have inadequate information upon which to assess the quality of various LTSS options, and clinicians and policy makers do not have the knowledge base to assure high quality, cost-effective services. The HRQoL study (PI: Dr. Mary Naylor) consists of data from 470 older adults new to LTSS and interviewed nine times over 24 months using a comprehensive set of valid and reliable instruments. The study is in the data cleaning and analyses phase. The findings from this study will enable policy makers and providers, as well as recipients of LTSS, to evaluate and make informed choices related to long-term care. The novice student who participates in the project will participate in team meetings, learn about using standardized instruments for interviewing, perform data entry, and literature searches with opportunity to develop a self-directed component for subsequent mentored analysis and publication.

Joseph Libonati

Project 1: Exercise and Cardiotoxicity

This project is designed to investigate how exercise impacts the heart's response to cardiotoxic cancer agents. Students will perform histological processing and measurement, cell culture, and gene and protein expression experiments. Students are expected to attend weekly laboratory meetings. In house laboratory training will be provided for all experimental techniques. Students are required to be trained in laboratory safety and to comply with all university standards in the use and care of laboratory animals.

Project 2: Can exercise and stem cell therapy improve myocardial phenotype following myocardial infarction?

This project is designed to test how combined stem cell therapy and exercise impacts the hearts structure and function. Students will be involved in exercise training mice, histological processing, and gene and protein analysis. Students will also participate in data analysis for cardiac echocardiography. Students are expected to attend weekly laboratory meetings. In house laboratory training will be provided for all experimental techniques. Students are required to be trained in laboratory safety and to comply with all university standards in the use and care of laboratory animals.

Lea Ann Matura

Project 1: Impact of Fatigue in Pulmonary Arterial Hypertension

Pulmonary arterial hypertension (PAH) is a chronic, debilitating, life-limiting disease affecting primarily young to middle age women. It is characterized by increased pulmonary artery pressure (typically without a known cause) and results in right-sided heart failure. Fatigue is reported by >

[Return to top of document](#)

[*Return to top of document*](#)

90% of patients. Fatigue interferes with patients' lives and negatively affects health-related quality of life (HRQOL). While fatigue is commonly measured by self-report we do have an objective measure to capture the impact of fatigue in PAH. A novel way to gauge the impact of fatigue is by determining the relationship between fatigue and physical activity using accelerometry. The accelerometer is worn on the waist of the dominant side to provide objective data regarding physical activity levels throughout the day. The purpose of this study is to evaluate the reliability of accelerometry to measure physical activity in patients with PAH and to examine its relationship with self-reported fatigue and HRQOL. Our overall hypothesis is patients with more self-reported fatigue will have lower physical activity (accelerometry) and HRQOL and the accelerometry will demonstrate good reliability overtime in PAH. Data from this study will have important implications in terms of future studies of strategies to reduce fatigue. Students will assist with subject recruitment, analyzing and interpreting data and acquire basic scientific writing skills. Students will need to know basic library research skills and knowledge of working with Microsoft office.

[*Return to top of document*](#)

Social Policy and Practice

Femida Handy

Project 1: Philanthropy in India

Student will have the opportunity to participate in a book being written about the practice of philanthropy in India that is under contract with Sage publishers. This will include doing primary and secondary research. The primary research will focus on diaspora philanthropy among Indian immigrants to the US. Secondary research will focus on document and Internet research. Student will be involved in all steps in the research. Need a responsible, self-directed student who will be comfortable taking initiative in doing the research. Good writing and organizing skills

Project 2: Employee engagement and organizational commitment

In this research we examine if employee engagement that is promoted by the employer in pro-social causes (through employee volunteering and donating to good causes) will also strengthen employee commitment to the employer. Student will be engaged in doing primary and secondary research. The primary research will focus on designing and pre testing survey instruments that will be conducted among firms in India and Netherlands. Secondary research will focus on journal articles. Student will be involved in all steps in the research. Need a responsible, self-directed student who will be comfortable taking initiative in doing the research. Good writing and organizing skills

Project 3: The influence of corporate social responsibility on job search :Germany, China and India

A perennial question then facing employers is how to recruit the most superior talent. Monetary incentives notwithstanding, superior talent is attracted by other job and organizational characteristics including the perceptions of a firm's social responsibility (CSR) programs. In this research we examine the differences among business and engineering students in the importance they attach to CSR programs in seeking employment. Students will be involved in doing primary and secondary research. The primary research will focus on data cleaning, coding and analysis. Secondary research will focus on journal articles and Internet. Student will be involved in all steps in the research. Need a responsible, self-directed student who will be comfortable taking initiative in doing the research. Good writing and organizing skills. Data analysis skills would be useful but not required

Yin Ling Irene Wong

Project 1: Stigma and Community Inclusion of People with Psychiatric Disabilities and Their Family Members in Urban China

The project goal is to examine the relationship between stigma and community inclusion of persons with psychiatric disabilities and their family members in urban China. Community inclusion refers to the engagement in community activities, social interaction and networking, and perceived community membership. Existing research has found that stigma, defined as the mark that distinguishes a person as discredited, to have negative impacts on self-esteem, quality of life, persistent depression, impairment in social relationships and early treatment discontinuation among persons with psychiatric disabilities. In this study, survey data on self-stigma, family stigma and community inclusion will be collected using standardized scales. Quantitative data will be complemented by in-depth interview data that explore the nuances of inclusion and participants' perception of how experiences of stigma influence community engagement. The data collection of this project will take place in Shanghai, China. The PURM student will engage in fieldwork in Shanghai for four to six weeks. During this study phase, the student will work with students from Fudan University to conduct face-to-face interviews with study participants using a standardized survey. The student will also participate in in-depth interviews with a sub-sample of persons with psychiatric disabilities and their family members. After the fieldwork phase is concluded, the PURM student will return to Penn and participate in analyzing and writing-up the study data. The PURM student will learn the following knowledge and skills employed in a social and behavioral science research project: 1) review of theoretical and empirical literature on stigma and community inclusion; 2) data collection in the field; 3) community engagement and community outreach; 4) analysis of survey data using statistical software; 5) qualitative analysis of transcripts from in-depth interviews; and 6) write-up of manuscripts for publication. Fluency in written and spoken Chinese (Mandarin/Putonghua) is preferred, but not required for this project.

Veterinary Medicine

ANIMAL BIOLOGY

Brett Kaufman

Project 1: Protection of mtDNA during heart attack

Mitochondria are small cellular compartments that produce the chemical form of energy called ATP, which is essential for normal cell function. ATP production requires numerous enzymes, which are encoded by either the nuclear (2 copies per cell) or mitochondrial genomes (mtDNA; thousands of copies per cell). The maintenance and expression of mtDNA is therefore essential to mitochondrial respiratory function. The mechanisms governing mtDNA metabolism, however, are potentially disrupted in disease states associated with low mtDNA copy number (depletion), deletions, mutations, or aberrant transmission. We have found that the expression of the mtDNA associated protein TFAM protects hearts against necrotic cell death. This is apparently through extensive compaction of the mitochondrial genome. Furthermore, we have found preventing phosphorylation of this protein at a specific site can also cause a similar compaction to overexpression. We seek a research collaborator to contribute to these studies, with the end goal of identifying the physiological kinase that regulates this process and evaluating whether its inhibition could be therapeutic during heart attack. Students would be required to perform cell culture, molecular, and biochemical experiments to extend upon our current findings.

Wharton

BUSINESS, ECONOMICS, AND PUBLIC POLICY (BEPP)

Shing-Yi Wang

Project 1: Earnings of Migrant Workers

The project makes use of new data on wage payments to migrant workers in the United Arab Emirates. There are several questions that we are pursuing. One is to examine the relationship between wages earned by migrant workers and the amount of money that they remit back to their home countries. This line of research seeks to contribute to an understanding of the fundamental explanations for why migrant workers send money home, and what determines the amount that they send versus what they keep. The second question examines labor institutions in UAE. In particular, it explores how restrictive immigration policies affect wage patterns and opportunities for workers. The research assistant will assist with finding and processing data and background research. Experience with Stata (or another statistical package) or a willingness to learn to use Stata would be a plus.

Project 2: Agricultural Productivity and Migration in Rural China

There are two projects that the student would assist with. One is on internal migration of workers out of rural areas and what happens to the household members left behind in rural areas. The second project examines the interactions between farmers and firms in land transactions in China. Both projects involve the use of large data sets to examine these questions. The research assistant will assist with finding and processing data and background research. Experience with Stata (or another statistical package) or a willingness to learn to use Stata would be a plus. Chinese language ability would also be a plus but is not necessary.

HEALTH CARE MANAGEMENT

Guy David & John Whitman

Project 1: Estimating the Real Economic Impact of Preventing Avoidable Nursing Home to Hospital Admissions

This project will focus on estimating the true economic impact of preventing a nursing home to hospital admission on:

- 1) The nursing facility

[Return to top of document](#)

- 2)The hospital
- 3)The 3rd party payer
- 4)The physician
- 5) Our health care system as a whole.

This is a very timely project. CMS recently introduced the 30 Day Readmission Penalty changing the long standing financial incentives which historically have encouraged nursing home to hospital admissions. Other flaws in our health care system have also encouraged these transfers despite the fact that retrospective studies have consistently found 65% or more of these transfers to be unnecessary. The negative quality of care implications for seniors of being admitted to the hospital when not required are staggering. The economic implications on our health care system as a whole are even more staggering. To properly evaluate the true economic implications of this reimbursement shift, this initiative will need to look at the actual economic impact for all key parties including the nursing facility, the hospital, 3rd party payers, physicians and our overall health care system. Student(s) will be required to research the direct economic impact from all of these perspectives by literally tracking several possible patient transfer scenarios and the full spectrum of costs associated with each move along the care continuum. The student (s) will work directly with John Whitman, an adjunct instructor in the Wharton Health Care Management Program for the past 23 years along with oversight provided by Guy David, Associate Professor in the Wharton MBA Health Care Management Program. This initiative will require traditional research as well as interviews and documentation review.

The successful conclusion to this project will be a quantified estimate of the true economic impact of reduced nursing home to hospital admissions from the perspective of each key player as well as an overall industry wide estimate. This project has real life, present day impact because quantifying this detail at the facility level can be most helpful in supporting "shared savings" agreements currently being discussed between individual providers and 3rd party payers.

Project 2: The Availability of Dental Care Services to Pennsylvania's 80,000+ Nursing Facility Residents ***Rising Juniors only***

This is a very timely project and addresses an important population health issue. Dental care in our nation's 16,000 nursing facilities has historically been poor at best. With the growing body of literature supporting the link between poor oral/dental care and general health, dental care services for this vulnerable population is beginning to receive attention. The goal of his project is to evaluate the current state of and availability of dental care services across Pennsylvania's 720+ nursing facilities. This review will require the student interaction with the two state nursing

[Return to top of document](#)

[Return to top of document](#)

home associations, conducting an on line survey of the 720+ facilities across the state, conducting informal focus groups with nursing facility staff, residents and family, inventorying the current dental care providers within the state, understanding the Pennsylvania Medicaid Dental Benefits Program and finally, developing recommendations for improving dental care services for Pennsylvania's vulnerable nursing home population. This project will be led by John Whitman, an adjunct instructor in the Wharton MBA Health Care Management Program for the past 23 years with direct experience in this specific area. John Whitman was responsible for a similar study in 2006 evaluating dental care in Florida's nursing facilities. That study has become recognized as a leading initiative for improving dental care services for nursing facility residents across America.

This project will also be overseen by Guy David, an Associate Professor in the Wharton MBA Health Care Management Program. The student (s) will be required to interact with the two state nursing home associations, the state Medicaid program, conduct a state wide on line survey of over 720 facilities, conduct focus groups and interviews, identify current providers and their strengths and weaknesses and finally, organize the collected data and findings into recommendations for improving dental care services across the state for this very vulnerable population.

LEGAL STUDIES AND BUSINESS ETHICS

Philip Nichols

Project 1: Underage Drinking and the Rule of Law

This project examines the interaction of underage drinking in the United States and the concept of the rule of law. The student will be required to conduct research in legislative materials, political science texts, social science journals, and law journals. The student will be tasked with developing a history and explanation of drinking age laws in the United States, a description – emphasizing historical development – of the concept of the rule of law, and empirical research on the effects of drinking age laws in the United States. The objective of this project is a journal article. The concept of the rule of law has application in emerging economies and the student may help in considering how to present that concept to emerging economies.

Project 2: Relationships, Networks, Trust, and Emerging Economies

[Return to top of document](#)

[Return to top of document](#)

There has been an explosion of literature in the social sciences on different types of networks and social relationships and how they affect trust. This project tries to integrate that research with research on emerging economies. The student will be required to conduct research in social science journals and regional journals. The student will be tasked with creating a comprehensive description of the existing research and then working with the professor to apply that research to a generalized understanding of emerging economies. The object of this project is a manuscript. Discrete portions of this research may have immediate application in emerging economies, and the student may be asked to help develop those applications.

Project 3: Implementation of Corruption Control Policies in Emerging Economies

There is a profound lack of connection between scholarship on corruption and the implementation of corruption control policies in emerging economies. This project attempts to translate corruption scholarship into understandable lessons and workable policy in an emerging economy. The student will be required to conduct research in regional journals, social science journals, and local sources possibly including interviews (in English or through a translator). The student will be required to develop material suitable for PowerPoint, video, and/or internet presentation. The object of this project is to determine possible scholarly insights from the translation of scholarship into policy, but the creation of usable material might be another outcome.

MANAGEMENT

Adam Cobb

Project 1: Corporate political activity in the wake of politician turnover

Firms have headquarters, branch offices, plants, and stores, all with employees—and voters—that reside in specific congressional districts. In this study we ask, How does a firm's own representation in Congress shape the firm's political (lobbying) strategies? Specifically, we are interested in whether local politicians are substitutes for the type of information and influence for which firm's utilize lobbying organizations. We plan to answer this question by examining how firms respond when their local Congressman leaves office. Students may be asked to help collect and code firm and executive political contribution data as well as company lobbying data. Research on lobbying firms may be necessary as well. Proficiency with Excel is required. Programming skills are a plus.

[Return to top of document](#)

Emilie Feldman

Project 1: The Long-Term Implications of Legacy Divestitures ***Rising Juniors only***

In this project, we will investigate the long-run survival prospects of and outcomes experienced by companies that undertake divestitures, as well as the divested business units. Primary responsibilities will involve conducting historical research on and collecting and coding qualitative and quantitative data about the entities involved in a large sample of divestitures. There will also be opportunities to run preliminary statistical tests and to assist in writing about the empirical results generated from this research. Strong research skills, intellectual curiosity, and a meticulous attention to detail are required. Economics majors or Wharton undergraduates with a basic background in statistics are preferred.

Project 2: Culture Clash in Post-Merger Integration ***Rising Juniors only***

In this project, we will investigate the process through which firms can ease the process of post-merger integration in acquisitions where there is a strong “culture clash” between the acquiring and acquired companies, as well as the performance implications of the strategic choices firms make along this dimension. Duties involve conducting industry research on potential contexts in which to investigate this question; collecting and coding qualitative and quantitative data on the entities involved in the acquisitions; generating summary statistics from these data; and summarizing the relevant academic literature on mergers and acquisitions. Economics majors or Wharton undergraduates with a basic background in statistics preferred.

Xu Han

Project 1: The Antecedents and Consequences of Corporate Entrepreneurship: A Multi-Level Analysis

In this project, we will investigate how corporate entrepreneurship emerges or be created in an established firm as well as its consequences. Specifically, we would like to examine a number of antecedents and consequences of corporate entrepreneurship at the individual level (e.g. leadership, network position, and turnover), group level (e.g. group composition, group dynamics and performance) and organization level (e.g. incentive system, structure, routine, culture). The study will be situated in the context of an established Chinese MNC which started to embrace the concept of corporate entrepreneurship seven years ago. The methodologies used in the study will be multi-cases and survey. Duties for research assistant involve summarizing the relevant academic literatures on corporate entrepreneurship, transcribing interviews (probably conducting interviews if possible), and helping with survey data collection and cleaning. Wharton students with interest in emerging market corporations and entrepreneurship are encouraged to apply.

David Hsu

Project 1: Catching the Wave: How Venture Capitalists Identify Valuable Technologies

As new technologies are introduced, how do venture capitalists adapt to source, identify, invest, and support firms pioneering these new technologies? What characteristics of a venture capitalist—network position, initial conditions, experience, etc.—make her more able at identifying valuable new technologies and promoting their commercial success? Consider the renowned venture capital firm Kleiner Perkins Caufield & Byers. It goes without saying that since the company's initial founding in 1972, KPCB has seen technology change drastically and rapidly, with huge innovations like recombinant DNA (Genentech) and the web (AOL, Amazon.com, etc.). Despite these changes, KPCB has managed to keep their position as one of the top venture capitalists in the world. Most investors and firms fail to adjust properly and fall as new technology makes their experience and skills obsolete. Previous research has found that venture capital returns persist strongly across subsequent funds of a partnership. How this persistence is related to a VC's ability to source new technology investments? Research assistants will also assist with other projects in the fields of finance, management, entrepreneurship, and technological innovation. All undergraduates are encouraged to apply, with preference to students in Wharton, Engineering and those studying social sciences (economics, political science, etc.). No prior experience or knowledge is necessary, but a genuine curiosity in the subject is required. Research assistants will receive training in contemporary research techniques and tools. This opportunity will be beneficial for a future career in finance, management consulting, or academic research. Freshmen are especially encouraged to apply.

Project 2: Do Incumbent Firms Have a Midas Touch for Startups? A Two-Sided Matching Model of Incumbent-Entrepreneur Alliances in the Biotechnology Industry

We explore the relationship between incumbent pharmaceutical firms and biotechnology startups. Given the basic structure of this industry, to what extent are incumbents adding value to their startup partners and increasing their likelihood of a successful exit event? Or are they merely skilled in selecting successful startups with commercially viable technology? What are the observable determinants of the level of sorting and of value adding? We consider complementary assets, experience, and access to capital, and examine if there is persistence in the heterogeneity of incumbent impact. To do this, we set up and estimate a two-sided matching model using biotechnology alliance data from 1973 to 2009. All undergraduates are encouraged to apply, with preference to students in Wharton, Engineering and those studying social sciences (economics, political science, etc.). No prior experience or knowledge is necessary, but a genuine curiosity in the subject is required. Research assistants will receive training in contemporary research techniques and tools. This opportunity will be beneficial for a future career in finance, management consulting, or academic research. Freshmen are especially encouraged to apply.

Laura Huang

Project 1: Selection and funding of entrepreneurial ventures

This project explores the role of gender and ethnicity in entrepreneurship. For example, gender self-stereotypes or ethnic congruence may have an impact on the selection and funding of entrepreneurial ventures. Students engaged in this project would help with tasks such as conducting a search for scholarly literature relevant to the research project, clerical and record-keeping for the overall project, collecting data by planning and implementing experiments, conducting interviews, administering surveys, or coding data and entering data into a database or spreadsheet.

Natalya Vinokurova

Project 1: Heart Surgery in NY State

This project looks at the evolution of cardiac surgery outcome data collection in New York State between 1950s and 1990s. The goal is to understand what institutional arrangements enabled New York to achieve a 40 percent drop in open heart surgery mortality. The student will be asked to read, look for patterns in, and summarize large volumes of archival data. The project may involve digitizing and organizing archival materials. I am looking for a critical thinker with good writing skills. The major is unimportant although some experience with mathematics or statistics and/or facility with MS Excel or Atlas.ti is a plus.

Project 2: Robo-signing and 2008 Mortgage Crisis: An outcome of good intentions?

This project seeks to develop a history of Mortgage Electronic Registration System (MERS), an entity that played an important role in enabling securitization of mortgages that precipitated the 2008 mortgage crisis. The goal is to understand the extent to which the ideas of transaction-cost economics influenced the creation of this organization and the organization's role in robo-signing in the aftermath of the crisis. The student will be asked to consult primary and secondary sources and to write detailed memos. I am looking for a critical thinker with good writing skills. The major is unimportant, but being detail-oriented, experience with documenting sources, and/or facility with MS Excel or Atlas.ti would be great.

Project 3: British Petroleum: Safety record from growth to decline

This project looks at the safety record of BP plants before they were owned by BP, during BP ownership period, and after BP sold them. The goal is to understand the effect of BP culture on its safety record. The student will work with government records, corporate ownership records, industry press and legal filings to construct a database of BP facilities. Research skills,

[*Return to top of document*](#)

experience with documenting sources, and facility with MS Excel are critical. Some knowledge of statistics or econometrics would be a plus.

OPERATIONS AND INFORMATION MANAGEMENT (OPIM)

Maurice Schweitzer

Project 1: Deception and Emotions

People frequently express emotions that they do not feel. In many cases, emotional misrepresentation facilitates group dynamics. We may like and even trust people who consistently misrepresent their emotions. In this project, we will explore the frequency and the consequences of emotional misrepresentation. Students participating in this project will help run experiments, analyze data, and read background literature.

[*Return to top of document*](#)