CAMP 2014 Faculty Research Projects

The following faculty research projects are organized by colleges, and then alphabetically by department. Students are encouraged to look at related fields, as well as within their major departments for research projects, which might be interesting to them. For example, the research project in the Biochemistry department might also be interesting to biology or biomedical science majors.

Bourns College of Engineering

Bioengineering

Faculty Mentor: **Dr. Huinan Liu**
Research Setting: Lab
Research Project: Dr. Liu’s Biomaterials and Nanomedicine Lab research involves design, fabrication and evaluation of novel biomaterials for tissue regeneration, controlled drug delivery, and medical implant/device applications. Medical applications of nanomaterials and nanotechnology are actively explored through both fundamental studies and applied research. Materials studied in the lab include polymer, ceramic nanoparticles, polymer/ceramic nanocomposites and bioresorbable metals for guided tissue regeneration. Students will be involved in developing a novel material that stimulates stem cells toward nerve or bone regeneration. Students will acquire lab skills in material synthesis, characterization, electron microscopy, fluorescence microscopy, and mammalian cell culture studies.

Chemical and Environmental Engineering

Faculty Mentor: **Dr. Sharon Walker**
Research Setting: Lab
Research Project: Dr. Walker’s Lab research is focused on optimizing effective water treatment and distribution, wastewater reclamation, and to understand mechanisms controlling microbial and particle transport in aquatic environments. Dr. Walker and her students are investigating the factors controlling bacterial and nanoparticle fate and transport as it pertains to water quality. Specifically, the fundamental mechanisms involved in aggregation, deposition, and adhesion occurring at the molecular scale between environmental particles and surfaces are being explored.

Computer Science and Engineering

Faculty Mentor: **Dr. Vagelis Hristidis**
Research Setting: Lab
Research Project: Dr. Hristidis’ Lab research involves information discovery in various domains including intellectual property, bibliographic, clinical and biological databases. Students in this lab will assist in the investigation social networks and analyze health data. Other research might involve building web applications and database management.
Mechanical Engineering
Faculty Mentor: Dr. Hideaki Tsutsui
Research Setting: Lab
Research Project: Dr. Tsutsui’s Lab research focuses on developing and characterizing new engineering tools and technology to provide innovative solutions for health-related problems, especially in the areas of stem cell-mediated regenerative medicine, low-cost medical diagnosis and food security. Students will work on the development of quantitative DNA detection method in a paper microfluidic device or origami-inspired nonplanar 3D paper diagnostic devices.

College of Natural and Agricultural Sciences

Biochemistry
Faculty Mentor: Dr. Ernest Martinez
Research Setting: Lab
Research Project: Dr. Martinez’ Lab investigates the characterization of the basic molecular mechanisms of mammalian gene regulation at the transcriptional level with a focus on the chromatin/epigenetic signaling and transcription regulatory processes that control cell growth and differentiation that contribute to cancer formation. Students will conduct research in biochemistry and molecular biology to investigate molecular mechanisms involved in gene regulation in mammalian cells.

Biology
Faculty Mentor: Dr. Theodore Garland, Jr.
Research Setting: Lab
Research Project: Dr. Garland’s Lab studies behavior, physiology, and neurobiology of lines of mice that have been selectively bred for high voluntary wheel running. Students will gather behavioral data and analyze how this data relates to the physiology of the mouse and to the mammal as a species.

Biomedical Sciences
Faculty Mentor: Dr. Ilhem Messaoudi
Research Setting: Lab
Research Project: Dr. Messaoudi’s Lab focus on three general areas: 1) the impact of age on immune response to viral infections; 2) modulation of immune function by nutritional intake and sex steroids levels; and 3) uncovering mechanisms of pathogenesis during infection with emerging and re-emerging infectious agents. Students will assist in current ongoing projects.
Botany and Plant Sciences

Faculty Mentor: **Dr. Edith Allen**
Research Setting: Lab
Research Project: Dr. Allen’s Lab researches plant ecology, with an emphasis on restoration ecology, soil ecology, and invasive species ecology. Dr. Allen has a project on impacts of anthropogenic nitrogen deposition on plants and soils in the Santa Monica Mountains. Most of the samples will be collected during the spring growing season, but there will be 1-2 field trips with the graduate student to collect soil samples during the summer. The CAMP student would assist in sample preparation for analysis of plant tissue and soil nitrogen. One of the project objectives is to assess the impacts of elevated N on allocation to different plant tissues. This will require separating leaves from stems, measuring stems, and weighing all tissues. The project will require computer data entry and analysis. The CAMP student would be able to present a talk or poster on plant response to nitrogen.

Cell Biology & Neuroscience

Faculty Mentor: **Dr. Weifeng Gu**
Research Setting: Lab
Research Project: Dr. Gu’s research primarily focuses on Piwi-interacting RNAs (piRNAs), which bind Piwi Argonaute proteins and play critical roles in silencing transposons, virus, and non-self transcripts. Students will partake in the investigation of small RNA using high-throughput sequencing and bioinformatics analysis.

Faculty Mentor: **Dr. Prue Talbot**
Research Setting: Lab
Research Project: Dr. Talbot's Lab studies reproduction and development using mammalian systems and stem cells. The lab also studies the effects of environmental toxicants on cell development. Students who participate in this lab will examine the health effects of new tobacco products.

Chemistry

Faculty Mentor: **Dr. Yadong Yin**
Research Setting: Lab (Chemistry Laboratory for Materials Science)
Research Project: Dr. Yin’s Lab works on the development of magnetically responsive photonic nanostructures that can change color in response to the application of external magnetic fields. Research also focuses on the synthesis of noble metal nanostructures with controllable optical properties.
Faculty Mentor: **Dr. Jingsong Zhang**  
Research Setting: Lab  
Research Project: Dr. Zhang’s Lab concentrates on elementary processes of transient reactive intermediates with an emphasis on atmospheric and combustion chemistry. The lab works on air pollution measurements, its chemistry, and analytical instrument development. They also work with optical spectroscopy, mass spectrometry and chemical reaction mechanisms.

**Earth Sciences**

Faculty Mentor: **Dr. Abhijit Ghosh**  
Research Setting: Lab  
Research Project: Dr. Ghosh’s Lab investigates earthquakes and faults using seismology as a tool. They also develop novel techniques for high resolution imaging of earthquakes. Students will focus on understanding the underlying physics and mechanics of earthquakes and faults.

**Physics and Astronomy**

Faculty Mentor: **Dr. Bill Gary**  
Research Setting: Lab  
Research Project: Dr. Gary’s Lab works in collaboration with the CERN Laboratory in Geneva, Switzerland and the BABAR Collaboration at the SLAC National Accelerator Laboratory. A student in his lab will assist in the search for supersymmetry with the CMS detector at CERN; commissioning of the CMS hadron calorimeter for the 2015 run of the Large Hadron Collider.

Faculty Mentor: **Dr. Harry Tom**  
Research Setting: Lab  
Research Project: Dr. Tom’s Lab focuses on nonlinear optics and femtosecond time-resolved laser techniques. Research interests also include surface dynamics, laser-induced surface chemical reactions, laser-induced phase transitions in bulk materials, nonlinear optics of the water/solid interface and terahertz spectroscopy. Students will assist in optical studies of novel electronic materials and optical studies of positronium.