Biomarker Research

Project #	Project Title:	Advisor
1	*Do Novo* peptide sequencing from MS/MS data	Jim Osborne

Project Description:

Sequencing peptides by MS/MS is difficult when the expected peptides in a sample are not in a common database. Several groups have developed algorithms to obtain sequence information from the raw peptide MS/MS data files. This project is to evaluate academic and commercial approaches to de novo sequencing from MS/MS data files, install the best options on an appropriate computer and test performance with MS/MS data from a known peptide.

What kind of student background is required?

Setting up and installing software operating systems and algorithms on computers, and some experience with data mining large databases

What will student learn?

A basic understanding of peptide fragmentation patterns in MS/MS. Critical thinking skills in evaluation of data mining algorithms. Generation and analysis of MS/MS data for de novo sequencing of complex peptides.

Drug Discovery

Project #	Project Title:	Advisor
2	Drug discovery against Anthrax, Diphtheria, and Pseudomonas toxins	Mikhail Martchenko

Project Description:

Many bacterial pathogens produce toxins, which are their main pathogenesis factors. Current FDA approved therapies are often directed against bacterial cells and anti-toxin countermeasures are lacking. Therefore, we discover new anti-toxin drugs by screening libraries of chemicals and select those that inhibit Anthrax, Diphtheria, and Pseudomonas toxins for further studies in animals.

What kind of student background is required?

Any sub-fields of Biology, Biochemistry, and Chemistry

What will student learn?

Mammalian cell culture, microbiology, and drug-discovery

Project #	Project Title:	Advisor
3	Safety profile for potential Ebola treatment	M. Martchenko/Joel West

Project Description:

The Martchenko Lab has been working to identify opportunities to repurpose existing FDA-approved compounds to treat infectious diseases, including the 70+ Class A, B and C pathogens that are the highest priority for NIAID and NIH. It has identified one such small molecule compound that provides in vitro protection against Ebola and a number of other pathogens, and is actively seeking other related compounds.

What kind of student background is required?

We are looking for a student researcher to analyze more than 40 years of published research on this prior compound to prepare a detailed analysis of safety and other clinical data -- including possible interactions or contra-indications -- to help obtain FDA approval for treating Ebola or other Class A pathogens.

Project #	Project Title:	Advisor
4	Adaptive antibiotic resistance of human pathogens to clinical antibiotics	Anastasia Levitin

Project Description:

Antimicrobial resistance is a growing global concern. As naturally occurring antibiotics used for the treatment of infections become unavailable, more expensive and longer treatments must be used, which greatly increase health-care costs. There are various types of antibiotic resistance, most broadly categorized as inherited and non-inherited. This project specifically focuses on a particular type of non-inherited antibiotic resistance, *i.e.* adaptive antibiotic resistance. Microbial adaptation to lethal doses of clinical antibiotics is a transient phenomenon. There are gaps in current knowledge about antibiotic resistance mechanisms mediated by non-mutated chromosomal genes and about the effects of such mechanisms on pathogen persistence during antimicrobial treatment. The student will identify combinations of clinically relevant antibiotics enabling microbial persistence under normally hostile conditions.

What kind of student background is required?

Microbiology, biochemistry and molecular biology

What will student learn?

Aseptic techniques, designing high throughput screening assays

Project #	Project Title:	Advisor
5	Repurposing of Drugs for Treatment of Pulmonary Hypertension	Vivek Gupta

Project Description:

This project deals with testing a library of currently FDA approved drugs for their efficacy in treating pulmonary arterial hypertension (PAH), a rare and debilitating disorder of pulmonary circulation. This library will contain >1,000 drugs approved for other therapeutic interventions. Drug repurposing provides numerous advantages over traditional drug development including (i) well-established safety and pharmacokinetic profiles, and (ii) ease of scale-up due to well optimized bulk manufacturing and formulation development. One of the well-known examples of drug repurposing for PAH includes sildenafil, which has established itself as a drug for PAH and male erectile disorder after being unsuccessful as a drug for common hypertension. We will screen the drug library against primary cell lines for their efficacy in ameliorating cellular proliferation, a main characteristic of PAH progression.

What kind of student background is required?

Undergraduate student with basic laboratory skills. Cell culture experience desirable.

What will student learn?

Student will learn to design and execute one's own experiments under supervision of faculty advisor and a postdoctoral fellow. Student will also be trained in analyzing data, and presenting results.

Project #	Project Title:	Advisor
6	siRNA peptide conjugates for cancer therapeutics	Samit Shah

Project Description:

In this project, students will work on the development of a targeted siRNA delivery system. This project shall require the student to try to develop siRNA peptide conjugates that can specifically target cancer cells. Students will learn the principles of bioconjugate chemistry, gel electrophoresis and in *in vitro* transfection experiments.

What kind of student background is required?

Undergraduate student with basic laboratory skills. Cell culture experience desirable.

What will student learn?

Student will learn to design and execute one's own experiments under supervision of faculty advisor and a postdoctoral fellow. Student will also be trained in analyzing data, and presenting results.

Project #	Project Title:	Advisor
7	Drug Discovery and Development through computer aided drug design	Srikanth Kolluru/ John Krstenansky

Project Description:

Overall aim of our projects is to design and develop lead molecules for various biological targets using *in-silico* molecular modeling as well as find out how these drugs interact at their target sites. We are currently working on the viral targets such as HIV integrase (treatment of AIDS, HPV (Human Papilloma virus) [treatment of cervical cancer).

A model research strategy is as follows:

1. Drug databases (e-Drug-3D) will be screened using molecular docking to predict their binding strength with the target.
2. The identified lead molecules will be tested *in vitro*
3. The "hits" obtained from *in intro* biological experiments will be used for generating pharmacophore models and/or substructure search and screening them against commercially available large drug like molecule databases (e.g., Chembridge database, CoCoCo database)
4. Further optimization and screening will be done by docking and biological screening.

Student will have an opportunity to work with various molecular modeling software including docking software e.g., GOLD (Genetic Optimization for Ligand Design), Visualization software e.g., Pymol and Discovery Studio as well as Chem Draw for structure drawing and minimization. Apart from this, student will also experience how to obtain and prepare proteins and small molecules for molecular modeling.

What kind of student background is required?

Students will be asked to perform *in silico* Drug design. Chemistry background is preferred with knowledge on computer aided drug design.

What will student learn?

Students will have an overall idea about computer aided drug design; learn to use various molecular modeling software mentioned above.

Project #	Project Title:	Advisor
8	Development of *Pichia pastoris* strain for production of an animal feed enzyme	Ilya Tolstorukov

Project Description:

Several US and European companies use KGI expertise for the development of *Pichia pastoris* strains used for manufacturing animal feed enzymes. A number of such *P. pastoris* strains have been created in our lab.

Target genes encoding enzymes of interest will be inserted into plasmids under control of strong promoters and then transformed into competent cells of *P. pastoris*. Selected transformants will be analyzed for expression of the target gene and activity for the encoded enzyme using activity and protein detection assays. The best strains will be further evaluated and manipulated to further increase the productivity of the strains by introducing additional copies of the target gene-promoter cassette or by introduction of a chaperone. The expressed proteins will be analyzed by activity assays and SDS PAGE. Samples of the recombinant enzymes will be generated using lab scale production and purification methods.

What kind of student background is required?

Experience in DNA and protein manipulations including restriction enzyme digestion, cloning, and PCR of DNAs, protein analytical methods, and standard microbiology techniques.

What will student learn?

What *P. pastoris* specific tools (strains, plasmids) and manipulations are currently available and how a *P. pastoris*-made protein production strain is developed from scratch, analyzed and improved.

Project #	Project Title:	Advisor
9	Development of a novel vector for the *Pichia pastoris* expression platform	Ilya Tolstorukov

Project Description:

Pichia pastoris expression is a powerful platform for the synthesis of pharmaceutics, enzymes for biofuels, animal feed and other commercially useful proteins. Currently, there are several vectors and host strains available. However, there is significant room for improvement of both. A novel vector with improved capability for manipulation and introduction into *P. pastoris* host genome will be designed and constructed. This vector with a test gene of interest will be transformed into *P. pastoris* cells and the fate of the inserted DNA molecule will be analyzed.

What kind of student background is required?

Experience in DNA manipulations, including restriction enzyme digestion, cloning, and PCR analysis. Experience with standard microbiology techniques.

What will student learn?

What *P. pastoris* specific tools (strains, plasmids) and manipulations are currently available and how they can be applied for creation of a *P. pastoris* protein production strain is and what gene-engineering approaches can be used to improve both the strain development technique and the properties of the strains.

Drug development

Project #	Project Title:	Advisor
10	Combinatorial Nanotherapeutic strategies for Pulmonary Fibrosis	Vivek Gupta

Project Description:

The specific goal of this project is to develop and characterize a combinatorial nanotherapeutic regimen for Idiopathic Pulmonary Fibrosis (IPF) management. We propose to develop biodegradable polymeric nanocarriers co-encapsulating pirfenidone, a known antifibrotic agent; and iloprost, a FDA-approved therapeutic agent for Pulmonary Arterial Hypertension (PAH) which has also shown immense promise in IPF treatment. This combinatorial approach will not only enable us to target diverse pathways responsible for IPF pathogenesis, but will also facilitate PAH treatment, which has emerged as one of the most fatal outcomes of IPF pathogenesis. We will test both pirfenidone and iloprost for their efficacy in treating PAH and IPF in cell culture studies, which will lead us to developing polymeric nanoparticles encapsulating both the drugs for *in-vivo* studies.

What kind of student background is required?

Undergraduate student with basic laboratory skills. Cell culture experience desirable.

What will student learn?

Student will learn to design and execute one's own experiments under supervision of faculty advisor and a postdoctoral fellow. Student will also be trained in analyzing data and presenting results.

Computational and Systems Biology

Project #	Project Title:	Advisor
11	Huntington's Disease Cell Biology	Animesh Ray

Project Description:

Using a yeast model of Huntington's disease, the student will examine the network of interacting genes that module the toxic effects of Huntington's disease protein.

What kind of student background is required?

Genetics, molecular biology, cell biology, biochemistry; alternatively, strong science and mathematics background and a willingness to learn

What will student learn?

Systems biology methods and thinking

Molecular Basis of Human Disease

Project #	Project Title:	Advisor
12	Systemic Inflammation Induced Cerebral Microbleeds	Rachita Sumbria

Project Description:

Cerebral microhemorrhages are the pathological substrate of cerebral microbleeds (CMB), a common MRI finding associated with cerebrovascular diseases, hypertension, sepsis and normal aging There is strong evidence from the literature supporting a crucial role for inflammation in the pathogenesis of cerebral microbleeds, and we have recently developed a mouse model of microbleeds that is induced by standard inflammatory stimulus lipopolysaccharide (LPS). Using this model, we are interested in studying the mechanism by which red blood cells leave the brain vasculature and enter the brain perivascular space. In my lab, we are currently investigating the interactions between red blood cells and brain endothelial cells that may result in CMB development.

What kind of student background is required?

Basic knowledge of dilutions, buffer preparation, working with microscopes

What will student learn?

The students will have the opportunity to learn basic cell culture, histology (stain quantification), microscope use, use of Image J software for quantification of staining. Students may have a chance to shadow research personnel during mouse dosing, mouse brain harvestation and brain sectioning.

Project #	Project Title:	Advisor
13	A brain penetrating TNF-alpha inhibitor for Alzheimer's Disease	Rachita Sumbria

Project Description:

TNF-alpha plays a central role in the development of Alzheimer's disease (AD). The existing TNF-alpha inhibitors include biologic drugs that do not cross the blood-brain barrier. In this current project, we will be studying the effect of a brain-penetrating TNF-alpha inhibitor in AD mice. The mouse studies will be done at UC, Irvine. All the brain tissue processing will be done at KGI.

What kind of student background is required?

Tissue sectioning, immunohistochemistry, microscopy, and general laboratory experience in buffer preparation.

What will student learn?

The student will have the opportunity to learn brain tissue histology, brain tissue sectioning, brain amyloid plaque immunostaining, stain quantification using Image J.

Project #	Project Title:	Advisor
14	Mitochondrial Bioenergetics in cancer	Derick Han

Project Description:

In the 1920's, Otto Warburg made the observation that human cancer cells seem to produce more lactate than normal cells (Bensinger et al., 2012). In particular, Warburg and his colleagues observed this phenomenon in multiple human carcinomas even in the presence of oxygen (Bensinger et al., 2012). This occurrence, which has become known as the "Warburg effect", suggests that cancer cells eschew metabolism oxidative phosphorylation in favor of glycolysis and lactic acid fermentation. Although oxidative phosphorylation is more efficient in producing ATP from glucose, the ATP yield of glycolysis may exceed that of oxidative phosphorylation if glycolytic flux is high (DeBerardinis et al., 2008). Some have suggested that this shift in metabolic reprogramming is due to anaerobic conditions found in tumor hypoxic states (Vander Heiden et al., 2009). However, multiple studies have found that cancer cells utilize this form of glycolytic metabolism prior to hypoxic conditions (Vander Heiden et al., 2009). Nonetheless, there appears to be mitochondrial metabolic reprogramming that occurs when cells become tumorigenic. Indeed, cells from multicellular organisms have been found to exhibit proliferative metabolic phenotypes in the presence of abundant nutrients and growth signals (Vander Heiden et al., 2009).

What will student learn?

My lab is interested in investigating the Warburg effect in breast cancer cells. Utilizing techniques such as Western blotting, mitochondrial respiration, and cell microscopy, we are investigating the mitochondrial bioenergetic changes that occur in breast cancer cells.

Project #	**Project Title:**	
15	Characterizing CREB target genes in T cells.	Jeniffer Hernandez

Project Description:

The CREB/CRTC2 pathway has emerged as an important regulator of immune function. We have shown that the CREB/CRTC2 pathway modulates autoimmune disease by promoting differentiation of the pro-inflammatory T cell, Th17. Although Th17 cells protect us against specific pathogens, Th17 cells have been found to cause destruction of tissue in patients with autoimmune diseases. Using a novel technique called RNAseq, we have identified several genes that may be regulated by CREB in Th17 cells. The student will characterize the role of these genes in T cells to help us better understand Th17 cell development and function. The long term goal is to be able to manipulate these Th17 cells with drugs to treat patients with autoimmune disease and other inflammatory diseases.

What kind of student background is required?

Basic laboratory skills. Cell culture experience is preferred but not required. Motivated and a willingness to learn. Knowledge in immunology is a plus.

What will student learn?

T cell biology, mammalian cell culture, molecular biology and biochemistry. Some of the techniques student may learn include retroviral induction, flow cytometry, quantitative PCR, and Western blot.

Project #	**Project Title:**	
16	The effect of hyperglycemia on T cell development and function	Jeniffer Hernandez

Project Description:

Obesity is associated with several metabolic dysfunctions such as insulin resistance, hyperglycemia, and high blood pressure, all of which are risk factors for cardiovascular disease and type 2 diabetes. Recent evidence implicates the pathological involvement of the immune system in type 2 diabetes. Excessive levels of nutrients such as glucose and free fatty acids will result in stress in pancreatic islet, adipose tissue, liver, and muscle. The stress results in the local production and secretion of pro-inflammatory cytokines and chemokines. Interestingly, clinical trials using anti-inflammatory drugs have shown to lower blood glucose levels in patients with type 2 diabetes. Although T cells have been found in insulin sensitive tissues, it is unclear what their function is in these tissues. In this study, we would like to determine the effect of high glucose levels on T cell development and function. The student will culture T cells in high glucose concentrations and study T cell survival, cell cycle, and secretion of cytokines.

What kind of student background is required?

Basic laboratory skills. Cell culture experience is preferred but not required. Motivated and a willingness to learn. Knowledge in immunology is a plus

What will student learn?

T cell biology, mammalian cell culture, molecular biology and biochemistry. Some of the techniques student may learn include retroviral induction, flow cytometry, quantitative PCR, and Western blot.

Project #	Project Title:	
17	Targeted genetic modifier screen mapping the role of the retromer in regulating autophagosome formation in Drosophila	Katerina Venderova

Project Description:

Thanks to the high degree of genetic conservation and an unparalleled arsenal of genetic tools, Drosophila is commonly employed in delineating complex cellular pathways. Macroautophagy plays a fundamental role in maintaining cellular homeostasis and cell survival by forming autophagosomes to sequester and subsequently clear unnecessary or damaged proteins and organelles, and invading microorganisms. Despite a considerable scientific interest, the precise mechanism of autophagosome formation and its regulation remain unclear. The retromer complex and retromer-dependent protein trafficking has been implicated in the process. The goal of this project is to employ a range of transgenic flies in a targeted genetic modifier screen to determine how exactly retromer regulates autophagosome formation.

What will student learn?

In addition to general lab techniques, the students working on this project will learn the basics of Drosophila genetics and maintenance; will become familiar with stereomicroscopy and basics of confocal microscopy; will learn how to utilize online databases and other resources for fly genetics; will participate in designing and setting up the genetic crosses; will become proficient in genotyping and sorting the flies; and will be able to compare, analyze and photo document the Drosophila eye phenotypes and other phenotypes.

Project #	Project Title:	
18	Protein-protein interactions between the leucine-rich repeat kinase 2 (LRRK2) and key players in macroautophagy	Katerina Venderova

Project Description:

Leucine-rich repeat kinase 2 (LRRK2) is a large multi-domain protein that is plays a key role in macroautophagy through a mechanism that has yet to be elucidated. In Drosophila, we have identified several genetic interactors of LRRK2 within the macroautophagy pathway. The goal of this project is to first validate our data in mammalian cells, and to determine if LRRK2 is part of the same molecular complex with the proteins encoded by these genetic interactors.

What will student learn?

Students will become familiar with basic molecular biology techniques and tools, such as the proper aseptic technique, cell culturing, cell survival assay, fluorescence microscopy, bacterial transformation, plasmid DNA purification, analysis of plasmid DNA concentration and purity, gene transfection, cell harvesting and cell lysis, protein quantification, co- immunoprecipitation, SDS-PAGE, western blot and image analysis by infrared fluorescence detection.

Medical Diagnostics and Devices

Project #	Project Title:	Advisor
19	Optimizing Devices for Point of Care TB diagnosis	Hsiang-Wei Lu, Angelika Niemz

Project Description:

Tuberculosis (TB) is still a global health threat, with over 8 million new cases and over 1 million deaths each year. Our overall goal of is to enable diagnosis of pulmonary tuberculosis at the point of care in low resource high burden countries by developing a portable, easy to use, integrated nucleic acid testing device that executes sample preparation, isothermal DNA amplification and lateral flow based detection without user intervention. We have designed and are currently testing a functional prototype of this system, consisting of an integrated cartridge and a compact instrument. This project focuses on further characterizing and optimizing the hardware components and process execution.

What kind of student background is required?

We are looking for students with an engineering background, or with strong aptitude for science, who are creative, able to think outside the box, and who have good manual skills.

What will student learn?

Working with our team of engineers, students will learn how to use computer-assisted design (CAD) software such as SolidWorks, and how to fabricate device components e.g. via machining, molding, or rapid prototyping. Students will learn how to execute system assembly and testing, with a focus on thermal and fluidic control.

Project #	**Project Title:**	**Advisor**
20	Optimizing Isothermal Nucleic Acid Amplification Assays for Point of Care TB diagnosis	Angelika Niemz

Project Description:

As described in the previous project, we have developed a device to enable diagnosis of pulmonary tuberculosis at the point of care in low resource high burden countries, which uses isothermal DNA amplification through Loop Mediated Amplification (LAMP) or Cross Priming Amplification (CPA), each coupled to lateral flow based detection. This project focuses on (1) further optimizing the sensitivity (i.e. limit of detection) of these assays as implemented in our device, (2) characterizing the specificity, i.e. lack of cross-reactivity with other pathogens, and (3) optimizing dry reagent formulations to enable storage of sensitive master-mix reagents at elevated temperatures, which is a critical requirement in the intended use settings.

What kind of student background is required?

We are looking for students with a background in biology (ideally molecular biology), who have meticulous laboratory skills, and ideally prior experience with running PCR.

What will student learn?

Students will learn how to execute various isothermal amplification methods for pathogen detection, and what is involved in assay optimization and validation for clinical diagnostic applications.

Project #	**Project Title:**	**Advisor**
21	Optimizing Devices for Point of Care Diagnosis of Dengue Virus Infections via Nucleic Acid Testing	Hsiang-Wei Lu, Angelika Niemz

Project Description:

The incidence of Dengue virus is increasing globally, particularly in India, Southeast Asia and South America. Secondary infections with a different serotype of the virus that result in Dengue hemorrhagic fever or Dengue shock syndrome are often fatal. Our overall goal of is to enable rapid, serotype-specific detection of acute Dengue virus infections at the point of care in low resource high burden countries through nucleic acid testing. We have already developed a device that executes sample preparation, isothermal DNA amplification and lateral flow based detection without user intervention, for diagnosis of pulmonary TB from sputum. This project focuses on adapting our existing system to enable Dengue virus detection from a drop of whole blood obtained via a finger prick.

What kind of student background is required?

We are looking for students with an engineering background, or with strong aptitude for science, who are creative, able to think outside the box, and who have good manual skills.

What will student learn?

Working with our team of engineers, students will learn how to use computer-assisted design (CAD) software such as SolidWorks, and how to fabricate device components e.g. via machining, molding, or rapid prototyping. Students will learn how to build and test subsystems, and how to integrate these into a larger device.

Project #	Project Title:	Advisor
22	Optimizing Isothermal Nucleic Acid Amplification for Point of Care Diagnosis of Dengue Virus Infections	Angelika Niemz

Project Description:

As described in the previous project, we are modifying an existing device to enable diagnosis of acute Dengue virus infections at the point of care in low resource high burden countries. For this test, we will use isothermal amplification of the viral RNA through Reverse Transcription, followed by Loop Mediated Amplification (RT-LAMP). This project focuses on (1) optimizing the sensitivity (i.e. limit of detection) of this assays as implemented in our device, (2) demonstrating the ability to differentiate each of the four viral serotypes, and (3) coupling the assay with suitable multiplexed end point detection.

What kind of student background is required?

We are looking for students with a background in biology (ideally molecular biology), who have meticulous laboratory skills, and ideally prior experience with running PCR, and/or students with background in analytical chemistry, in particular related to biosensors.

What will student learn?

Students will learn how to execute RT-LAMP for pathogen detection, and what is involved in assay optimization and validation for clinical diagnostic applications. Students further will work with different types of biosensors.

Engineering and Microfluidics

Project #	Project Title:	Advisor
23	Development of a remote-control, automated laboratory	Jim Sterling

Project Description:

The student assigned to this project will work with other members of the lab to develop a few laboratory protocols that are performed in an automated manner with minimal set-up requiring human intervention. The goal is to launch and perform experimental protocols with full automation leading to experimental results. The focus will be on the identification of genes or other biomarkers in a biological sample.

What kind of student background is required? Students with any background in science or engineering with one or more years of undergraduate study may apply for this position.

What will student learn? The student will learn the standard laboratory protocols including the use of molecular biology equipment and instruments and will also learn about innovating new approaches for automation of laboratory methods.

Project #	Project Title:	Advisor
24	Characterization of Electrowetting Performance for Polymerase Chain Reaction	Jim Sterling

Project Description:

The student assigned to this project will work to characterize the microfluidic behavior of the electrowetting platform that is used for PCR genetic testing. This project will focus on the instrument function, reliability and engineering performance characterization with the design, test, and refine cycle of development work.

What kind of student background is required? Students with a background in science or engineering with one or more years of undergraduate coursework may apply for this position.

What will student learn? The student will learn details about the design and function of laboratory instruments that automate molecular biology protocols using microfluidics.

Project #	Project Title:	Advisor
25	Open R&D Consortia in the Pharmaceutical Industry	Joel West

Project Description:

Pharmaceutical companies are among the most proprietary US firms in their patent strategies and business models. Meanwhile, in the IT world, large firms such as IBM, HP, Apple and Google sponsor open source software projects where intellectual property is widely shared with members and the world. This project will examine the rise over the past decade of pre-competitive open R&D consortia among pharma and other life science companies, through efforts such as the Biomarkers Consortium and the Structural Genomics Consortium.

What kind of student background is required?

The student researcher will work to compile the history of the 40+ known consortia, identify other consortia and possible contacts for project interviews. If interested, students may also have the opportunity to conduct pilot interviews with some of the consortia founders.

Project #	Project Title:	Advisor
26	Universities and the Emergence of Biotechnology Hubs: The UCSF – Mission Bay Biotech Cluster	Steve Casper

Project Description:

Within the biotechnology industry most biotechnology firms agglomerate within regional clusters, usually anchored by a strong research university. That being said, there are very few successful biotechnology clusters across the world, and most major research universities have not been associated with the development of biotechnology clusters. In October 2002, UCSF opened a new medical research campus in the Mission Bay area of San Francisco. In the decade since the campus opened, Mission Bay has rapidly developed one of the most vibrant biotechnology clusters, encompassing both entrepreneurial spin-offs and numerous corporate R&D laboratories of established companies. While the existence of a large biotechnology cluster within the Bay Area certainly helped in the establishing the new biotech hub, little research has been done to explore why such a vibrant center of biotechnology activity developed so quickly.

What will student learn?

This project will use a variety of methodologies, including social network analysis and qualitative research, to develop a history of how the UCSF Mission Bay biotechnology cluster emerged and become sustainable. For the undergraduate research experience project, we will focus primarily on examining bibliometric and patent evidence, though we might also conduct some interview research.

Project #	Project Title:	Advisor
27	Measuring the Impact of California's Public Investment in Regenerative Medicine	Steve Casper

Project Description:

In 2006, California citizens in unprecedented numbers voted for a state bond that would assure a three billion dollar investment over a ten year period in Stem Cell Research, research that was promoted and understood to be essential to the treatment of a myriad of health issues of deep concern to the citizens of California; Cancer, MS and Alzheimer's. As this initiative approaches its tenth year of funding, an important question is what sorts of effects has this investment had on the state? This project will explore the extent to which the public investment in stem cell research has led to the creation of a sustainable research infrastructure for regenerative medicine research in California. This infrastructure consists of both university capacity to conduct research exploring the application of stem cell technology, and commercial activities to exploit such findings within the state.

What will student learn?

The project will draw on a variety of methods, including bibliometric and patent analysis, comparisons of university stem cell grant funding before and after 2006 within the state, and data gathering on commercialization activities.

Project #	Project Title:	Advisor
28	Socio-emotional Abilities at Work	Sukumarakurup (Kumar) Krishnakumar

Project Description:

This project aims to validate ability-based situational judgment tests of socio-emotional intelligences designed for use in the workplace. The study will evaluate data pertaining to the effects of socio-emotional intelligence on such workplace outcomes as work performance, citizenship behaviors, job attitudes, stress, and leadership.

What kind of student background is required?

The student should preferably have a background (i.e. taken courses) in Human Resource Management and/or Organizational Behavior and/or Psychology. The student should also be well versed in Microsoft word and excel. Some experience in conducting research especially in doing a literature search and integration of findings is preferred.

What will student learn?

The student will learn to conduct research reviews of topics relating to socio-emotional intelligences, integrate findings, collect and analyze relevant data. With guidance from the faculty member, the student will also learn to summarize and present findings in the poster or paper format.