

2011 STUDENTS AND TEACHERS AS RESEARCH SCIENTISTS



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MENTOR SELECTION FORM

I. Applicant Information

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____ - _____

School Attending: _____

Telephone Number: Home (____) _____ Cell: (____) _____

E-mail: _____

II. Research Interest Areas Available for Study

Please look at the entire list of research topics and **rank your top seven choices** (1 = high, 7 = low). Put an **X** on the choices you absolutely would **NOT** consider.

A. Biological Science

1. ____ Dr. Robert D. Aldridge: The lab is working on identifying the sex pheromone of the female African Brown House Snake, *Lamprophis fuliginosus*. This pheromone is secreted through the skin and is used by male snakes to determine if a female is ready to mate. By comparing the components of male and unattractive female skin secretions with attractive female skin secretions, we have identified a few potential chemicals found in only attractive females, some of which we believe are components of the sex pheromone. We are currently testing one potential steroid, lathosterol, using behavioral experiments. The lab is also working on determining the role of the sexual segment of the kidney in snakes. Using African Brown House Snakes as our model organism, we plan to surgically manipulate male snakes by cutting one of the two ureters (the tube that carries uric acid and sex segment secretions from the kidney to the cloaca) of the snakes. Then by mating these partially nephrectomized males, we will be able to determine whether or not the secretions of the sex segment aid in the fertilization of female ova. Additionally, this study will determine whether one or both kidneys are used to secrete sex segment secretions during a single mating event.
2. ____ Dr. Rajeev Aurora: Our lab works on the cross-regulation between the immune and the skeletal system. This is an emerging field known as osteoimmunology. Osteoclasts are the body's sole bone resorbing cells. It is known that immune cells, specifically T-cells, secrete factors in inflammation that persistently activates osteoclast activity. The increased activity is responsible for the bone erosion in diseases such as rheumatoid

arthritis and osteoporosis. We have found that subsets of T-cells, called regulatory T-cells can regulate osteoclasts. Interestingly, under non-inflammatory conditions, osteoclasts can also recruit and convert naïve T-cells to become regulatory T-cells, indicating bidirectional regulation.

3. ___ Dr. Godfrey Bourne: Competition and species diversity in two butterfly pollinator assemblages in Guyana. In behavioral ecology and evolutionary biology there is little payoff in repeating other researcher's experiments, and, unlike molecular biology, these disciplines are not self-correcting because few studies depend on the accuracy of earlier ones. [Why might this be so?] However, when relatively inexpensive opportunities present themselves to us we should exploit them. At CEIBA Biological Center in Guyana, South America, the butterfly community is well known, and pollination studies are underway for two common butterfly bushes, the forest daisy, *Wulffia baccata* (L.) Kuntze, synonym, *Tilesia baccata* (L.) Pruski (Asteraceae), and sweet sage, *Lantana camara* (L.; Verbenaceae). Preliminary observations have also been made on a different pair of vine producing plants also frequented by butterflies. This second project will involve studying competition by pollinators of two trailing vines, a forest cucumber, *Gurania subumbella* (Miquel; Cucurbiaceae) and white aster, *Chromolaena odorata* (L.; King et Rob.; Asteraceae). The majority of ecological communities examined to date exhibit skewed species abundance distributions, with few numerically dominant species, and several rare species (Kunte 2008 and citations therein). This pattern is posited to be caused by the extent and nature of niche apportionment and competitive dominance in communities (MacArthur 1957, Hutchinson 1959, Tokeshi 1999). The effects of dominance and competition on species abundance relationships have only been studied within a trophic level by one researcher (Kunte 2008). The aim of these two STARS discovery experiences are to reexamine Kunte's (2008) study in Guyana at CEIBA by answering the question—does removal of dominant species in Guyanaian butterfly pollinator assemblages increase butterfly diversity?
4. ___ Dr. Michael Brent: Molecular systems biology. We try to understand the regulation of genes involved in metabolism – sensing and using nutrients – in brewer's yeast. Remarkably, many of the same molecular mechanisms are found in humans. We use molecular biology (which is what the student would be involved in) as well as mathematical and computational modeling).
5. ___ Dr. Joseph C. Eissenberg: Mechanisms by which cells sort proteins for degradation; we use *Drosophila* as a model genetic organism.
6. ___ Dr. Decha Enkvetchakul: Ion channels are proteins that control the passage of ions into and out of the cell, which in turn is important in a vast array of physiological phenomena, e.g. the electrical activity of neurons and muscles that allow us to think and move. My lab is interested in the structure of ion channels, i.e. how ion channels are built, what is the shape of an ion channel and how their structure allows them to control the flow of ions. Students will have a chance to make and purify proteins that form an ion channel, manipulate DNA to make mutant ion channels, and study purified ion channel protein using gel electrophoresis.
7. ___ Dr. Jonathan Fisher: Skeletal muscle plays predominant roles in clearance of glucose from the blood and whole body energy metabolism. The lab investigates aspects of muscle metabolism including regulation of glucose transport into muscle, alteration of growth-related and metabolic signaling within muscle cells, and control of mitochondrial function. In particular, we are interested in regulation of glucose transport under basal conditions, under the influence of hormones such as insulin (which stimulates glucose

transport into muscle), and under conditions of metabolic stress. STARS researchers would have the opportunity to contribute to a variety of cell culture and in vitro approaches to answering the lab's questions. Learn more at:
<https://sites.google.com/a/slu.edu/fisher-lab/>

8. ___ Dr. Amy Harkins: Topics studied in the laboratory include: cell signaling involved in nerve regeneration, 3D scaffolds and materials to better regenerate nerves, and nerve communication for functional regeneration.
9. ___ Dr. Blythe Janowiak: This project focuses on how specific pathogenic bacteria evade the host cell defenses during an infection. We use Group B Streptococcus, bacteria that cause neonatal meningitis, as our model system. Our long-term goal is to identify drug targets and to develop potential antibiotics against this dangerous pathogen. Students will grow and analyze bacteria in their response to chemical and cellular stresses. Methods will include molecular biology, microbiology, and cellular biology. Particular projects will be assigned based on the student's interest.
10. ___ Dr. Jack Kennell: The study of intracellular pathways involved in communication between the mitochondrion and nucleus.
11. ___ Dr. Sergey Korolev: 1. How proteins bind and modify DNA during recombination and repair, 2. Structure and function of human signaling phospholipases and comparative studies with pathogenic homologous enzymes.
12. ___ Dr. Elaine Krul, Dr. Robin Connelly, and Dr. Barry Tulk: The area of research interest we would like to have students participate in is the development of a protein-based beverage for use in clinical nutrition products for elderly people. This group often has difficulty swallowing (dysphagia), therefore products with increased thickness (i.e., viscosity) are needed. A student will learn principles of protein processing, viscosity measurements, and nutritional formulation to meet the requirements of this type of product.
13. ___ Dr. Toni Kutchan: We investigate how plants make special chemicals called natural products. These chemicals frequently are used as medicines, either as pure compounds by pharmaceutical industry, or as mixtures in traditional medicines. Selected natural products are currently being investigated in the laboratory in mature plants and in tissue and cell culture. We participate in three national and international projects that involve deep transcriptome sequencing of medicinal plants using next generation sequencing technologies. In general, in our research we strive to understand the formation of medicinal compounds in selected plants at the enzyme and gene levels and then to use this information to improve upon production of pharmaceuticals either *in planta* or in a heterologous host such as yeast or bacteria.
14. ___ Dr. Robert Marquis: My lab studies the ecology of tritrophic interactions, that is, interactions among plants, herbivores, and the carnivores that eat herbivores. These interactions have been found to be important in a wide variety of ecosystems, from open ocean, marine tide pools, and freshwater streams, to savannas and forest. We focus on the herbivores and carnivores associated with oak trees in the St. Louis region. We combine lab and field work to determine which natural enemies influence the abundance of insect herbivores, and how their impact varies with oak species. This summer we will be studying bird predation on caterpillars (think "The Birds") and parasitism of caterpillars by parasitic wasps and flies (think "Alien").

15. ___ Dr. Amit Mathur and Dr. Terrie Inder: The Washington University Neurodevelopment Research (WUNDER) group co-directed by Drs. Terrie Inder and Amit Mathur (Associate Professor of Pediatrics), is interested in understanding human brain development and injury using novel magnetic resonance imaging (MRI) techniques including diffusion tensor imaging (DTI), brain metrics, and surface based morphometry. The number of premature births in the US continues to increase and prematurity is the leading cause of developmental delay and cerebral palsy in children. While there have been significant advances in neonatal care, the cause and timing of brain injury in premature infants is unclear. Using non-invasive MRI techniques we are conducting clinical studies to evaluate the impact on neonatal factors on brain growth. We are also studying brain surface folding as it evolves from a relatively smooth surfaced organ in the fetus (or premature infant) to a complexly folded structure by the time a mature infant is born. Understanding these biological mechanisms is key to improving the long term outlook for this vulnerable population.
16. ___ Dr. Jason Mills: Gastric epithelial stem cells and cancer. My lab is using a multipronged approach to understand the cellular and molecular details of adult stem cell biology in the mouse and human GI tract. We are interested both in normal developmental pathways from the multipotent stem cell and in uncovering the aberrations that occur when those pathways go awry (e.g., in stomach cancer).
17. ___ Dr. Steven Mumm and Dr. Michael Whyte: We study molecular genetics of rare inherited bone diseases, such as hypophosphatasia, juvenile Paget's disease, and many others. The major goal is to identify specific gene mutations in patients' DNA as the cause of their bone disease.
18. ___ Dr. Wendi Neckameyer: Genetics and behavior – developmental neurobiology using fruit flies as a model system.
19. ___ Dr. J. Gail Neely: Facial expressions and facial neuromuscular anatomy and function.
20. ___ Dr. Colin Nichols: Research in animal electricity, focused on basic mechanisms and in diseases.
21. ___ Dr. Sona Pandey: Role of Heterotrimeric G proteins, plant signal transduction.
22. ___ Dr. Dilip Shah: His lab investigates plant-microbe interactions at molecular levels. Specifically, we are investigating a class of plant defense proteins known as defensins that are capable of inhibiting the growth of fungal pathogens. The current research focus involves deciphering the mechanisms of antifungal action of these proteins and expressing these proteins in transgenic crops to engineer resistance to fungal pathogens.
23. ___ Dr. Vijay Sharma: His research interests are at the interface of radiopharmaceutical chemistry, medicinal chemistry, and biology, to discover and develop molecular probes, for addressing important biological questions across multiple disciplines. Specific emphasis is towards the design of small organic molecules, peptides, and metalloprobes, including their radiolabeled counterparts for diagnosis of diseases, such as Alzheimer's disease and coronary artery disease (Myocardial Perfusion Imaging), tumor imaging, to understand protein-protein interactions via imaging of reporter gene expression *in vivo*, and to investigate biological mechanism(s), using agents designed and developed within the group for rapidly emerging fields of molecular imaging.

24. ___ Dr. Laurie P. Shornick: Infants are very susceptible to infection. My laboratory is interested in understanding the differences between the neonatal and adult immune response to respiratory viral infections.
25. ___ Dr. Dorota Skowrya: 1) Principles of protein structure-function analysis (biotechnology); or 2) regulation of the cell division cycle in yeast *S. cerevisiae* (cell biology); or 3) characterization of new pharmacological regulators of the 26S proteasome (drug discovery); or 4) role of immunoproteasome in autoimmune destruction of pancreatic β – cells (diabetes).
26. ___ Dr. Thomas Smith: My lab is mainly interested in structural biology with an eye for application. We are currently involved in a wide array of projects. We are making transgenic soybean and corn that express viral proteins that kill fungi and determining which fungi are killed by these protective proteins. We are expressing and crystallizing a number of proteins that are involved in carbon fixation in algae and the synthesis of morphine. We are designing drugs to treat insulin disorders based on a compound found in green tea and are working on a possible vaccine candidate that may be useful in treating the common cold. Our emphasis is cloning, purification, crystallization and analysis.
27. ___ Dr. Phyllis Stein: Studies will involve analysis of information from heart rate patterns based on heart rate variability numbers or based on different types of graphic representation of heart rate patterns. Our lab has thousands of analyzed recordings of heart rate patterns in different populations based on 24-hour ambulatory monitoring and thousands of sets of heart rate patterns from overnight sleep studies. Especially interesting will be analysis of the relationship of heart rate patterns and various sleep disorders including sleep apnea. Multiple possible projects to choose from.
28. ___ Dr. Paul Taghert: a) Eurobiology of Circadian Rhythms b) Neuronal Development.
29. ___ Dr. Michael Tomasson: Human genetics, cancer biology, leukemia, and multiple myeloma.
30. ___ Dr. Xuemin (Sam) Wang: Plant response to nutrients (N,P), molecular biology, biochemistry, and biotechnology.
31. ___ Dr. Daniel Warren: Research is directed at understanding the cardiovascular adaptations that allow turtles to survive for extended periods of time without oxygen, such as occurs naturally while overwintering. Participants would be involved in ongoing experiments examining the cellular mechanisms of pH regulation in the muscle cells isolated from the hearts of turtles and other reptiles. The results of these experiments will provide important insights into the turtle's unusual physiology, how the mechanisms of cellular pH regulation have changed over evolutionary time, and may also reveal potential targets for therapeutic intervention in human diseases where heart failure results from oxygen deprivation, such as myocardial ischemia.
32. ___ Dr. Wenyan Xiao: Genetics and plant biology. His laboratory studies the mechanisms underlying DNA methylation and demethylation in regulating imprinting and reproduction in plants.
33. ___ Dr. Peter Zassenhaus: We work on technology targeting bioterrorism, infectious pandemics, and cancer diagnostics. All of these areas involve the detection and decoding of DNA. The best way to detect agents of bioterrorism is by their unique genomic

sequence. Last year's swine flu pandemic was greatly exasperated because of the lack of a rapid but sensitive and specific means to detect the H1N1 flu virus. Research is revealing that tumor DNA biomarkers circulate in the blood which one day may be used to detect cancers at an early stage when cures are much more likely. Our technology detects DNA with ultrasensitivity circumventing the need for PCR. Detection is completely automatic and hands-off. Our goal is to further develop this technology into a practical method for the detection of infectious agents and tumor mutations. Students working on this project will pick a specific target for detection. Their goal will be to pick that needle out of a haystack so that less than a zeptomole of targets are detected in real world samples like blood.

B. Chemistry

34. ___ Dr. Samuel Achilefu: Perfluorocarbon micelles for cancer detection and targeted drug delivery to tumors.
35. ___ Dr. Eike Bauer: Energy conservation has become an area of concern in recent years. Catalysts are compounds that speed up chemical reactions without being consumed and help save energy and resources. Our research is directed towards the development of new catalyst systems based on ruthenium and iron. If successful, the research may lead to catalysts which might find applications in pharmaceutical production. The project involves setting up catalytic reactions on a small scale and subsequent investigation if and to what extent product formation took place. Product formation will be investigated applying instrumental analysis: gas chromatography (GC), gas chromatography coupled to mass spectrometry (GC/MS) and High Performance Liquid Chromatography (HPLC). Students will gain hands-on experience with these instruments, which are frequently applied in forensic medicine or sports doping analysis.
36. ___ Dr. Dana Baum: We are interested in using DNA as a catalyst for a variety of applications. DNA is known for its coding role in cells, but DNA also has properties that make it a useful tool outside of the cell. Possible projects involve using DNA as a catalyst in biofuel cells and using DNA in sensors for pollutants in the environment.
37. ___ Dr. Alicia Beatty: Our group conducts research in the area of Crystal Engineering. Using small molecules, we crystallize solids having interesting structure and functionality. We synthesize both small molecules and crystals from solution, and investigate the thermal and other properties of the solids. Applications of the research include designing solid hosts for contaminants in drinking water for cleanup. The projects are tailored for the interests of the researcher, and working with a teacher in developing experiments appropriate for the high school chemistry classroom are of special interest.
38. ___ Dr. John Bleeke: Our research is in the area of chemical synthesis, particularly the synthesis of new organometallic catalysts. Catalysis is a key technology to achieve the objectives of sustainable (green) chemistry. The student involved in this project will learn the techniques of air-sensitive organometallic synthesis and will also learn how to characterize new compounds using NMR spectroscopy and X-ray crystallography.
39. ___ Dr. Steven Buckner: We are working on novel nanomaterials for applications in dye-sensitized solar cells. Researchers work on synthesis on new nanomaterials. Further work involves characterization using electron microscopy and spectroscopy, and application in solar cells.

40. ___ Dr. James Chickos: The projects center around the measurement of physical properties of interest to chemical engineers, environmentalists and those working in the thermochemical community using gas chromatography and differential scanning calorimetry. The projects involved measurements of phase change enthalpies and vapor pressures of materials that often cannot be measured by other means.
41. ___ Dr. Robert Fleming: Our lab uses transgenic mice and cell culture model systems to study the relationships between oxygen, iron, and inflammation. We are interested in determining the cellular signal transduction molecules influencing the gene expression of the iron regulatory hormone hepcidin. These regulatory pathways have relevance to human diseases of iron deficiency, and iron overload – including hemochromatosis, thalassemia, and sickle cell anemia – as well as response to inflammation and infection.
42. ___ Dr. Sophia Hayes: The Hayes Group conducts basic research studies on materials useful for electronics, solar cells, photodetectors, and other applications. Projects include sample preparation for single-crystal studies, thin-film studies, and measurements, such as photoluminescence, nuclear magnetic resonance (similar to MRI's used in medicine.) Students who are ideal for this type of research generally have a strong interest in physics or engineering, and in physical chemistry. In the past, students have engaged in single-crystal growth, photoluminescence measurements on nanoclusters, and fitting of data using mathematical tools.
43. ___ Dr. Istvan Kiss: Complex Electrochemical Dynamics – Synchronization and Chaos. Current generating chemical reactions produce a variety of dynamical responses that exhibit striking similarities to living systems. These abiotic systems can produce, for example, synchronization similar to those observed with flashing fireflies and chirping crickets. Our research group investigates self-organization in electrochemical systems and how such critical behavior could affect our present and future fuel cell and battery technologies.
44. ___ Dr. Michael Lewis: How aromatic molecules bind certain molecules is important for enzyme-substrate recognition and catalyst development. Our research lab explores the binding properties of aromatic molecules. We are interested in a student researcher performing computational modeling studies to investigate novel binding of aromatics with biological and chemical significance.
45. ___ Dr. Richard Mabbs: Using mass spectrometry, ultrahigh vacuum equipment and pulsed lasers, we image photoelectrons to probe molecular electronic structure. STARS participants will experience state of the art physical chemistry research techniques and develop simple qualitative models to explain experimental results. These will serve to provide better understanding of the fundamentals of chemistry. Participants will also explore methods of incorporating this material into pedagogical tools aimed at illustrating and clarifying essential basic concepts of quantum chemistry.
46. ___ Dr. Joshua Mauer: Our group aims to learn more about the development of zebrafish retinotectal maps through the use of self-assembled monolayer chemistry and site-specific protein attachment strategies in conjunction with molecular biology and protein expression of retinal guidance cues. In order to accomplish this feat, we must develop a simple yet robust methodology for sorting zebrafish expressing green fluorescent protein (GFP) in retinal neurons from those that do not express GFP. A student joining our group for the summer will build a RepRap rapid prototyping system (reprap.org) for the fabrication of zebrafish sorting chambers, design and produce these chambers and sort zebrafish expressing GFP.

47. ___ Dr. Ryan McCulla: The McCulla lab is broadly interested in the use of photocatalysts to neutralize or degrade chemical toxins and in the development of new reactions. These photocatalysts are expected to find application to homeland security and the manufacturer of natural products. To these ends, we use computational chemistry, synthetic organic chemistry, and physical organic chemistry techniques to create and explore the properties of new photocatalysts. Other projects include the investigation of reactive intermediates in physiology.
48. ___ Dr. James O'Brien and Dr. Leah O'Brien: Studies of the high-resolution, electronic spectra of diatomic transition metal containing species created in a hollow cathode plasma discharge. Species intended for study include: Zinc Oxide, Palladium or Platinum Bromide, Chloride, Fluoride or Nitride species and the Pt or Pd Dimers. The technique to be employed in this work is Intracavity Laser Spectroscopy, which is a special, ultra-sensitive method for recording the absorption spectra of gas phase species. The plasma discharge where the species are formed is contained inside the laser cavity. Because of laser amplification, the effective path-length used in this work is about 1 mile. Over the past several years, STARS students have been engaged in studies of species such as Nickel Chloride, Nickel Hydride, Gold Oxide, Platinum Carbide, and Titanium Fluoride examined in a similar manner, and such students (~9 of them) have been co-authors of papers published in prestigious journals (*Journal of Molecular Spectroscopy* and the *Astrophysical Journal*). In summer 2010, STARS students studied PtCl, PtC, and HCl (used as a source of chlorine to make PtCl). The latter study already has resulted in a publication with a STARS student as co-author.
49. ___ Dr. Nigam Rath: 1). Single crystal x-ray diffraction for solid state structure determination; 2). Polymorph crystallization and characterization; 3). Development of undergraduate laboratory experimental in crystallography.
50. ___ Dr. Keith Stine: The research project will involve aspects of nanomaterials chemistry and biochemistry. The goal of developing immunoassays for disease biomarkers will be pursued using gold nanorods and particles as a support for immobilized antibodies and enzymes. These materials will be used to detect disease related antigens using optical spectroscopic methods in solution. Students involved in this project will learn some basic aspects of nanomaterials chemistry, electron microscopy, biochemical interactions, and chemical analysis using instrumentation such as a uv-visible spectrometer or fluorescence spectrometer. Some of the particular antigens of interest include those related to early detection of different forms of cancer.
51. ___ Dr. Chung F. Wong: Participants take part in one of two projects related to computer-aided drug design: 1) Analyzing next-generation DNA sequencing data to decipher the genetic origins of diseases and to suggest new biological targets for drug development; 2) Developing drug candidates for the protein tyrosine phosphatase YopH of the bacterium *Yersinia pestis*.
52. ___ Dr. Brent M. Znosko: There is a need for reliable, rapid methods to predict secondary (hydrogen bonding pattern) and tertiary (3D) structures of RNA, which would provide a foundation for determining structure-function relationships and for targeting RNA with therapeutics. Research in the Znosko lab focuses on the thermodynamics (stability) and structural features of RNA motifs. Currently, the primary focus is on two projects. The first attempts to understand the thermodynamics and structure of RNA secondary structure motifs. The second investigates the role of substituent interactions in DNA/RNA base stacking intercalator stacking. We utilize chemical, biochemical, and computational techniques, in addition to various nucleic acid-specific software, computer programming, and website design.

C. Engineering / Earth & Atmospheric Science

53. ___ Dr. Ramesh K. Agarwal: Energy and Environment, Aerospace.
54. ___ Dr. Jeffrey Catalano: My group investigates chemical processes that control how contaminants and nutrients migrate and distribute in the environment. We are currently focused on how iron oxide minerals trap certain elements that act as both micronutrients and water contaminants.
55. ___ Dr. Young-Shin Jun: The Environmental Nanochemistry lab (PI: Young-Shin Jun) is conducting highly interdisciplinary researches which aim to explore the environmental impact of human activities through improved understanding of the fate and transport of contaminants and nanoparticles. In addition, our group is performing a comprehensive analysis of the potential risks associated with CO₂ sequestration strategies to mitigate climate change.
56. ___ Dr. Srikanth Singamaneni: Soft Nanomaterials Laboratory at Washington University focuses on the development of chemical and biological sensors based on metal nanostructures and smart polymers. The ultimate goal of the research effort is to develop an inexpensive, point of care diagnostic method for early and rapid detection of kidney cancer. The student working with us will be involved in the synthesis, surface modification and assembly of metal nanostructures at polymer surfaces and interfaces. The surface modified metal nanostructures will be employed in the detection of biomolecules (kidney and prostate cancer biomarkers) in physiological liquids (saliva, urine, blood). Over the course of the project, the student will be exposed to a wide variety of microscopic and spectroscopic tools.
57. ___ Dr. Michael Swartwout: Project 1: History and Future of Space Mission Failures – We are building a specialized database detailing every space mission ever flown. We are particularly interested in studying the ways that some missions fail, in order to better organize future space mission activities. The summer research would be in assisting in the development and maintenance of the database, as well as developing hypotheses about the success and failure of missions and testing them via the database; Project 2: In-Space Detection of Thruster Plumes (Argus) – As spacecraft begin to operate in closer proximity (e.g., formation flying, space stations, docking, robotic assembly), it would be helpful to have a simple, automated way to detect another spacecraft as it draws within 3-5 km. Much of the time, the maneuvering spacecraft will fire thrusters, which would be visible to infrared (and possibly UV) cameras. The summer research task is to help develop numerical models of the thruster plume and to test various detection schemes using simple thrusters in a vacuum chamber. This work would support an upcoming SLU space mission.
58. ___ Dr. Abuduwasiti Wulamu: My research interests include remote sensing, geographic information system (GIS) and applications of geospatial technologies in monitoring of environmental issues, e.g. droughts, earthquake destruction and deformation. This summer, I will be involved in the following projects: 1) monitoring the health and status of critically endangered lowland rainforest habitat in Madagascar using integrated remote sensing and GIS in which satellite data including synthetic aperture radar (SAR) data will be used to measure tree height and health; 2) 3D campus GIS project that involves generating 3D virtual city using LiDAR, RADAR and GIS; 3) Monitoring land subsidence due to mining and groundwater extraction using satellite-based InSAR.

59. ___ Dr. Grigoriy Yablonsky/Eugene Redekop: (1). Washington University in St. Louis. Project “Mathematical characterization of complex catalytic material”: Catalysis and catalytic processes are main driving forces of the contemporary chemical and biological industry. Also only catalysis provides many solutions for solving the urgent sustainability problems. The project will be devoted to the construction of the mathematical model of chemical process over the solid catalyst, in particular complete oxidation process. Project will be based on the experimental data obtained using a unique transient pulse-response experiment. (2), Saint Louis University, Parks College. Project “Mathematical Analysis of Accidents in Aviation”: This project will be devoted to the primary mathematical analysis of different types of accidents in aviations and influence of many factors on arising these accidents. This analysis will be based on the literature data and data which are collected by the SLU scientists and engineers.

D. Psychology / Public Health

60. ___ Dr. Michael Anch: Our laboratory is concerned with the basic mechanisms of sleep initiation and maintenance using rat animal models to investigate neuroanatomy and physiology. Students will learn the basic skills required for animal neuroscience research, including surgical implantations, sleep recording, sleep record scoring, and care of laboratory animals. Students will also receive instruction on neuroanatomy and neurophysiology. The intended research focus for Summer 2011 will be the relationship between Parkinson’s Disease and sleep.
61. ___ Dr. David Balota: Experimental psychology, learning, memory and aging. He works on issues related to visual word recognition, semantic memory, priming on implicit memory tests, and attention systems that modulate performance within each of these domains. He investigates these phenomena within young adults, older adults, and individuals who have dementing illnesses such as senile dementia of the Alzheimer’s type.
62. ___ Dr. Terri Rebmann: The Institute for Biosecurity in the School of Public Health studies bioterrorism and pandemic preparedness. Research projects include examining pandemic preparedness of local businesses, schools, healthcare providers, and response agencies in the St. Louis region and across the U.S. Current research projects involve: a) the assessment of physiological and psychological effects of wearing N95 respirators (i.e., masks) by healthcare workers in a hospital intensive care unit for long periods of time, b) survey of healthcare compliance related to the H1N1 vaccine, c) survey of school nurses in Missouri, Illinois, and Kentucky on their schools’ experiences during the 2009 H1N1 pandemic, and d) survey of human resource professionals in Missouri and Illinois on their employers’/businesses’ experiences during the 2009 H1N1 pandemic. A variety of research practices are used: focus groups, surveys, interviews, physiological and psychological monitoring, etc.

PLEASE RETURN THIS MENTOR SELECTION FORM WITH ALL OF THE FOLLOWING:

- 1) application form; 2) complete transcript; 3) scores of all tests taken; 4) essay; 5) one letter of recommendation; 6) financial aid application (if needed) and (7) your \$75.00 non-reimbursable application fee check made out to UMSL NO LATER THAN MARCH 26, 2011. Send to:**

**Dr. Kenneth R. Mares, Director, (STARS)
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