LOYOLA UNIVERSITY CHICAGO
AD • MAJOREM • DEI • GLORIAM 1870

Department of Chemistry and Biochemistry
1032 W. Sheridan Road, Chicago, Illinois 60626
(773) 508-3111 (office); (773) 508-3086 (fax)

Emerging Scientists Workshop – Project List

01- How to Study Proteins by Mutagenesis (Biochemistry A)
We are studying the different roles of individual amino acids in a protein. After we find amino acids that we hypothesize are important, we mutate them and analyze whether the protein activity was affected. For this experiment, you will purify by electrophoresis the gene that produces our protein, and how we can find with computational methods candidates for mutagenesis.

02- Identification of Toxic Chemicals in Water Sources (Chemistry A)
We are studying what potentially toxic compounds may be found in water from various sources (surface waters, drinking water, waste water, etc.) utilizing liquid chromatography tandem mass spectrometry. For this experiment, you will be involved in analyzing a standard solution of two compounds known to exist in the environment. An environmental, tap and/or waste water sample(s) will then be analyzed to determine if the two compounds are present.

03- How to Decipher the Atomic Structure of a Protein (Biochemistry B)
We are studying lactonases, which are enzymes that regulate cell-to-cell communication signals in bacteria. To understand their function, we obtain a 3D map of the atomic structure using X-ray diffraction methods. For this experiment, you will briefly see the Gryphon crystalliation robot before converting X-ray data into a 3D map of atoms within the enzyme.

04- The Synthesis of Biofuel from Renewable Resources (Chemistry B)
We are studying iron-catalyzed isoprene oligomerizations and co-oligomerizations in an effort to determine new potential biofuel sources. To examine our products potential, we must correlate their properties (boiling point, octane rating, etc.) to known biofuel sources. For this experiment, you will synthesize your own biodiesel from vegetable oil and analyze the contents by gas chromatography (GC).

05- Confocal Expression Study of Embryonic Pattern Formation in Zebrafish (Biology A)
We are studying the assignment of regional fates along the long axis of the vertebrate body using transgenic zebrafish. For this experiment, you will chart the dynamics of development using a confocal microscopy, which allows for visual reporting of data in real time in fish embryos.

06- Molecular Modeling of Oxygen Escape Pathways from Globins (Computational Chemistry)
We are studying the pathways by which oxygen can escape from a monomeric globin molecule. For this experiment you will use a molecular modeling program on our computer cluster and the results of molecular dynamics simulations to understand more about how the protein functions due to its motions.

07- Synthesis of a Boron Mimetic for use as an Enzyme Inhibitor (Medicinal Chemistry)
We are synthesizing organic compounds for use as potential inhibitors in the area of medicinal chemistry. For this experiment, you will be performing a step in the synthesis of a potential inhibitor. For this experiment, you will be monitoring the completion of the reaction by utilizing the distinct characteristics of boron through the qualitative technique of thin layer chromatography. *(exact experiment subject to change)*

08- Chemical Structural Features in Catalyst Generation (Chemistry C)
We are developing new catalysts for nitrogen fixation (the central step in agricultural fertilizer production). For this experiment, you will be examining the strength and order of the bonding between catalyst components via UV-vis spectroscopy.

09- Study of Efficacy of Molecular Switches on Surfaces (Materials Chemistry/Nanoscience A)
We utilize molecular switches for smart electronic devices, and accordingly need to understand their switching properties in solid state. For this experiment, you will characterize the switches via the change in their optical spectrum, then prepare and analyze thin (4-30 molecule thick) films via spin coaters and PM-IRRAS.

10- Microscopy Studies of Gold Nanoparticles (Nanoscience B)
We are studying the effect of molecular switches on the collective electron oscillations within gold nanoparticles of various sizes. For this experiment you will utilize a transmission electron microscope (TEM) to view the 13 nanometer gold nanoparticles.