

**Indiana University – International Summer Undergraduate Research Program
(IU-ISURP)**

Summer Research Experience 2024

Position Description

Professor's Name	Silas Cook
Department	Chemistry
Lab website	http://www.indiana.edu/~cooklab/index.php
Position Description	The student will synthesize a series of small molecules to test as substrates for new catalysts developed in the group. Sensitive organic chemistry techniques will be used for setting up organic and organometallic reactions, working them up, and purifying and analyzing the desired products from the reactions.
Desired Skills & Background	A good knowledge of basic organic chemistry. Some experience in organic synthesis or organometallic chemistry is necessary.

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Professor's Name	David Daleke
Department	Medical Sciences / Biochemistry and Molecular Biology
Lab website	http://mypages.iu.edu/~dldlab
Position Description	<p>This project is a study of novel proteins (“flippases”) that transport lipids across membrane bilayers. These proteins regulate the organization of lipids in biological membranes.</p> <p>The student will express, using the baculovirus expression system, candidate aminophospholipid transporters and purify the proteins by affinity chromatography. Purified proteins will be reconstituted and lipid transport activity will be measured.</p> <p>A related, alternative project is to synthesize, using enzymatic methods, phospholipid analogs to test the substrate specificity of the purified flippases.</p>
Desired Skills & Background	A good knowledge of basic biochemistry. Some experience in protein purification, enzymology, or membrane biology will be helpful.

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Position Description

Professor's Name	Bogdan Dragnea
Department	Chemistry
Lab website	https://dragnea.lab.indiana.edu/
Position Description	<p>Professor Dragnea's lab is interested in the physics and chemistry of mesoscale materials which have properties that are often very different from both bulk and single molecules, due to the dominance of interfacial effects (e.g. changes in the bulk melting temperature in confinement conditions) and/or coordinated collective behavior (e.g. virus-like particles). The group develops optical characterization methods and experimental models aimed at understanding phenomena in thermoplasmonics, room-temperature super-radiance, and virus mechanics and self-assembly.</p> <p>Our students will do wet-lab experiments, some single particle microscopy, data analysis, and some programming.</p>
Desired Skills & Background	Looking for students that are willing to get out of their comfort zone and be self-motivated.

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Professor's Name	Amar Flood
Department	Chemistry
Lab website	http://www.indiana.edu/~floodweb/ https://smiles.iu.edu/
Position Description	<p>The summer project involves the preparation and study of cyanostar macrocycles for making either the world's brightest fluorescent materials (called SMILES), or supramolecular polymers. See related papers: Nature Chemistry, 2013, 5, 704 Chem, 2020, 6, 1978</p> <p>The student will synthesize new receptors, and investigate their use in binding anions and making materials</p>
Desired Skills & Background	<p>Good experience with synthetic organic chemistry. Some experience with NMR and UV-Vis spectroscopy would be useful.</p>

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Professor's Name	Heather Hundley
Department	Biology
Lab website	www.hundleylab.org
Position Description	<p>ADARs are a family of enzymes that catalyze a hydrolytic deamination of adenosine (A) to yield inosine (I) in double stranded regions of mRNA.</p> <p>Current estimates predict hundreds of millions of editing sites in the human transcriptome and decreased editing has been observed in a number of neurological diseases and many types of cancer. The project will be to determine A-I RNA editing levels in human glioblastoma (brain tumor) cell lines and/or the model organism <i>Caenorhabditis elegans</i>. The student will learn to grow human cell lines/<i>C. elegans</i>, isolate RNA and perform editing assays. In addition, depending on the student interest, there is the possibility to learn how to perform immunoprecipitation and RNA expression analysis as well as CRISPR genome engineering.</p>
Desired Skills & Background	A good knowledge of basic molecular biology is needed.

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Professor's Name	Jared C. Lewis
Department	Chemistry
Lab website	https://www.indiana.edu/~lewisgrp/
Position Description	Research in the Lewis group focuses on identifying solutions to challenging synthetic problems through the development of new catalysts for a variety of key chemical transformations. Small molecule transition metal catalysts, enzymes, and artificial metalloenzymes are being explored toward this end and comprise the three major areas of emphasis within the group.
Desired Skills & Background	There are opportunities for rigorous training in organic and organometallic synthesis, protein engineering and evolution, molecular biology, structural and biophysical characterization of proteins, and computational modeling.

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Professor's Name	Hengyao Niu
Department	Molecular and Cellular Biochemistry
Faculty Profile	http://www.indiana.edu/~mcbdept/faculty/niu.shtml
Position Description	Mechanisms and regulation of DNA break repair.
Desired Skills & Background	Biochemistry, Molecular Biology or related fields, e.g. Genetics etc. General molecular biology techniques, e.g. molecular cloning and PCR based site-directed mutagenesis, are desired but not required.

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Position Description

Professor's Name	Xingchen Ye
Department	Chemistry
Lab website	https://www.chem.indiana.edu/faculty/xingchen-ye/
Position Description	(1) Design and synthesis of complex colloidal nanocrystals for electro- and thermo-catalysis. (2) In-situ liquid phase electron microscopy imaging of nanomaterials. (3) Self-assembly of nanocrystals into functional mesoscale superstructures
Desired Skills & Background	Major in Chemistry, Materials Science and Engineering, Chemical Engineering, Physics, or Mechanical Engineering.