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

Summer Research Experience 2025

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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Position Description

Professor's Name	**David Daleke**
Department	Medical Sciences / Biochemistry and Molecular Biology
Lab website	http://mypages.iu.edu/~dldlab
Position Description	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. The student will express, using the bacculovirus expression system, candidate aminophospholipid transporters and purify the proteins by affinity chromatography. Purified proteins will be reconstituted and lipid transport activity will be measured. A related, alternative project is to synthesize, using enzymatic methods, phospholipid analogs to test the substrate specificity of the purified flippases.
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	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. Our students will do wet-lab experiments, some single particle microscopy, data analysis, and some programming.
Desired Skills & Background	Looking for students that are willing to get out of their comfort zone and be self-motivated.

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Position Description

Professor's Name	**Heather Hundley**
Department	Biology
Lab website	www.hundleylab.org
Position Description	ADARs are a family of enzymes that catalyze a hydrolytic deamination of adenosine (A) to yield inosine (I) in double stranded regions of mRNA. 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 *Caenorhabditis elegans*. The student will learn to grow human cell lines/*C. elegans*, 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.
Desired Skills & Background	A good knowledge of basic molecular biology is needed.

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Position Description

Professor's Name	**Jia Shen**
Department	Medical Sciences
Lab website	https://sites.google.com/view/shen-laboratory/welcome
Position Description	Research synopsis: Cancer stem cells, referred to as tumor-initiating cells, constitute a distinct group of cells within a tumor and are thought to share traits with stem cells, such as the ability to self-renew and transform into diverse cell varieties. These cells have a significant impact on tumor progression, recurrence, metastasis, and resistance to therapies. Unless cancer stem cells are eliminated, a cure of cancer is unlikely. Our research focuses on interrogating the biology of cancer stem cells in adult and childhood brain tumors. More importantly, we are dedicated to developing innovative cancer immunotherapies designed to target and eliminate cancer stem cells, with the ultimate goal of improving outcomes for brain cancer patients. Research strategies: (1) Computational and functional genomics to pinpoint pivotal targets (eg. epigenetic regulators, transcription factors, E3 ubiquitin ligases) in brain cancer stem cell maintenance and immune evasion; (2) Harnessing NK and T cells to target cancer stem cells in brain tumors affecting adults and children.
Desired Skills & Background	Background in computational biology, cancer biology, or cancer immunology. Strong interest in pursuing a PhD in the near future.

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Position Description

Professor's Name	**Sara Skrabalak**
Department	Chemistry
Lab website	Skrabalak Research Group: Department of Chemistry: Indiana University Bloomington
Position Description	Researchers will collaborate with a graduate student or postdoctoral mentor to synthesize and characterize nanoparticles with potential applications in catalysis, chemical sensing, or security applications. The specific nature of the project will depend on current project needs and the student's interest and prior research experience.
Desired Skills & Background	Familiarity with materials chemistry or materials science/inorganic chemistry. Ability to calculate molarity and prepare solutions. Good notetaking and observation skills. Enthusiasm to learn something new and interest in collaboration.

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Summer Research Experience 2025

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.