

**Indiana University - Tsinghua University
Summer Research Experience 2023
Position Description**

Professor's Name	Heather Hundley
Department	Medical Sciences / Biochemistry and Molecular 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. Current estimates predict over 1 million 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.</p>
Desired Skills & Background	A good knowledge of basic molecular biology and biochemistry are 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.

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

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Position Description

Professor's Name	Lingling Chen
Department	Molecular and Cellular Biochemistry
Lab website	http://www.indiana.edu/~mcbdept/faculty/chen.shtml
Position Description	Construct molecular clones to express proteins of biological importance. Express and purify the proteins, and characterize them using a variety of biochemical and biophysical techniques. Our lab's current focus is on pathogen-host interactions, and we study several pathogens' virulent proteins.
Desired Skills & Background	Basic biochemistry knowledge. Experience in protein lab is helpful.

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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	Amar Flood
Department	Chemistry
Lab website	http://www.indiana.edu/~floodweb/
Position Description	<p>The summer project involves the preparation and study of cyanostar macrocycles and polymers for binding anions.</p> <p>See related paper: Nature Chemistry, 2013, 5, 704</p> <p>The student will synthesize new receptors, and characterize their ability to bind different anions.</p>
Desired Skills & Background	Good experience with synthetic organic chemistry. Some experience with NMR and UV-Vis spectroscopy would be useful.

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Professor's Name	David P. Giedroc
Department	Chemistry
Lab website	http://www.indiana.edu/~dpglab/
Position Description	This project is to study the manganese (Mn) metalloregulatory protein, PsaR, from the gram positive pathogen <i>Streptococcus pneumoniae</i> . Comparative Mn and Zn binding properties will be carried out, in addition to in vitro transcription studies.
Desired Skills & Background	A good knowledge of basic protein purification will be helpful, but not required.

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Professor's Name	Peter Hollenhorst
Department	Medical Sciences / Biochemistry and Molecular Biology
Lab website	http://hollenhorstlab-iu.strikingly.com/
Position Description	<p>This project is a study of the role of ETS family transcription factors in prostate cancer.</p> <p>The student will express and purify various ETS family transcription factors to study specificity of protein-protein interactions. The student may also do some molecular cloning of new expression constructs.</p>
Desired Skills & Background	An interest in protein biochemistry and skills in general lab techniques such as culturing bacteria and pipetting.

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Professor's Name	Scott Michaels
Department	Biology
Lab website	https://biology.indiana.edu/about/faculty/michaels-scott.html
Position Description	<p>A longstanding interest in my laboratory is the regulation of flowering time. Understanding how undifferentiated cells make developmental decisions is a central challenge in biology. In the model plant <i>Arabidopsis</i>, stem cells in the shoot apical meristem (SAM) give rise to all of the above-ground parts of the plant. Early in development, the SAM gives rise to vegetative structures (e.g., leaves), but later switches to produce the reproductive structures (flowers). The timing of this transition is not predetermined and can be influenced by multiple pathways that integrate both endogenous signals and environmental cues. We are particularly interested in the role of that the floral repressor FLOWERING LOCUS C (FLC) plays in the regulation of flowering. FLC is the major target of the vernalization pathway (the promotion of flowering by cold). Vernalization results in a mitotically stable epigenetic repression of <i>FLC</i> that is mediated by repressive histone modifications, such as H3K27me3. Because of the epigenetic regulation of FLC, our work on flowering time has led to the discovery of a number of epigenetic regulators that play much broader roles in development.</p>
Desired Skills & Background	A good knowledge of basic molecular biology and/or biochemistry. No prior experience with plants is required.

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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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Professor's Name	Jim Reilly
Department	Chemistry
Lab website	http://www.chem.indiana.edu/faculty/james-reilly/
Position Description	<p>This project involves chemically labeling and cross-linking protein molecules and analyzing the products of these reactions using high resolution mass spectrometry.</p> <p>The student will extract proteins from bacterial samples, perform enzymatic digestions, record mass spectra and utilize computer programs to interpret the data.</p>
Desired Skills & Background	Knowledge of basic biochemistry. Some experience in mass spectrometry or computer programming would be helpful.

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Professor's Name	Sara Skrabalak
Department	Chemistry
Lab website	http://www.indiana.edu/~skrablo/
Position Description	This project will involve the synthesis of metal nanostructures of defined size, shape, and composition by colloidal methods. In addition to synthesis, the student will be involved in characterizing the prepared materials by electron microscopy and evaluating their properties for applications in chemical sensing and electrocatalysis.
Desired Skills & Background	General chemistry. Advanced inorganic or physical chemistry preferred and/or materials or nanochemistry.

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Position Description

Professor's Name	Claire Walczak
Department	Medical Sciences / Biochemistry and Molecular Biology
Lab website	http://www.indiana.edu/~cewlab/index.html
Position Description	Understanding the molecular mechanisms governing accurate chromosome segregation
Desired Skills & Background	Courses in cell and molecular biology. Some laboratory experience.