Independent Study Research Projects

Bose Lab (ibose@wcu.edu) - Accepting sophomores-juniors, Expectations 2 or more semesters
My expertise is in molecular genetics and genomics. I use both lab-based and sequence-based methods to study gene function. The current projects in my lab include studying the genes involved in stress-related pathways in pathogenic yeasts, and determining the genome architecture in multiple fruitfly species.

Coan Lab (hacoan@email.wcu.edu) - Accepting sophomores-juniors, Expectations 3 or more semesters
I am interested in better understanding how biomaterials alter human cell survival and signaling pathways. We currently are investigating human hair derived biomaterials (keratin biomaterials) to determine the mechanism by which they promote cell survival. Students in my lab will learn how to grow human cells using cell culture and aseptic techniques. Students also learn a variety of cell-based assays and become well acquainted with fluorescent microscopy and cell imaging. Student Research Thesis options are encouraged! Please contact me if you want to learn more or have questions!
Link to Video describing research: https://wcu.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=03569f76-79e9-438c-8f59-ae400142c187 (Intro Career Trajectory 0 – 5:48, Role at WCU 5:48-7:11, Research Lab 7:11-end)

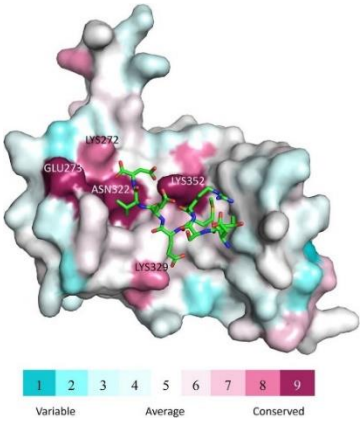
Storm Lab (arstorm@wcu.edu) – Accepting Freshman-Juniors, Expectations 2 or more semesters
I enjoy exploring protein structure and function at the molecular level with a focus on proteins involved in plant metabolism. The current project in my lab is to test whether two specific plant proteins are interacting in the chloroplast using fluorescent microscopy of isolated plant cells. Students involved in this project will gain experience in core molecular lab techniques, cell transformation, and microscopy.

Youker Lab (rtyouker@email.wcu.edu) - Accepting sophomores-juniors, Expectations 2 or more semesters
Plastic particle quantification in small headwater basins of the Southern Appalachians
This is a joint project with Dr. Jerry Miller's lab in the Department of Geosciences and Natural Resources. Students in my lab will quantify the amount, size and shape of microplastic particles from environmental samples using nile red staining and fluorescent imaging.

Measurement of intrafamilial La Crosse virus (LACV) seropositivity rates in Western NC
This is a joint project with Dr. Brian Byrd's lab in Environmental Health Sciences. Students will measure sera samples, collected by the Byrd lab, for the presence of long-lasting IgG neutralizing antibodies to La Cross virus using a commercially available immunofluorescence assay.

Summer 2022 – Research Credit Courses

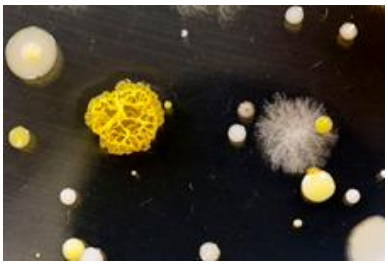
***Cotton Protein Annotation*:** Dr. Amanda Storm
BIOL480-20 CRN 50615 3 Credit Hours WEB Summer Session 1 - 6/01-7/01/2022



We will be partnering with a group of scientists studying the genome of cotton, a major commercial agricultural crop. They have sequenced genomes of 4 different cotton species and identified ~13,000 genes that are shared within the species that have no known function based on automated computer annotation pipelines. We will be helping by taking a few of these genes and using manual bioinformatic analysis to try to better annotate the proteins with potential functions. The long-term objective is identifying high-value proteins with potential impact on agronomic traits that are worth pursuing with in vivo studies. This will be a semester long research project with students developing skills in finding, evaluating, and communicating information from primary literature, public databases and computational tools as well as covering topics in protein structure and function.

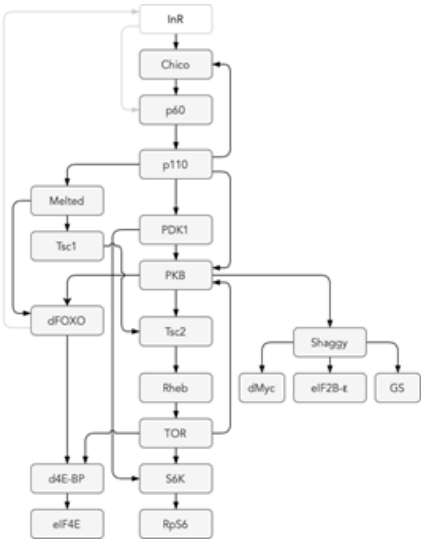
Fall 2022 – Research Credit Courses

Culturing the "Unculturable": Dr. Seán O'Connell
BIOL480-02 CRN 81194 12:20 - 3:10pm 3 Credit Hours



This will be a laboratory based research course that will include designing methods to grow bacteria more efficiently (e.g., improving the ability to culture the "unculturable"), testing the metabolism and physiology of bacterial species as a means of describing new species, and using bioinformatics tools to assess whole genomes of bacterial cultures and metagenomes of microbial communities. Prerequisite: Previous Microbiology course with lab

Annotation of the Genes of the Insulin Pathway in Drosophila species: Dr. Indrani Bose
BIOL480-03 CRN 81196 MW 12:30-1:45pm 3 Credit Hours



DNA differences among species, sub-species, varieties, and even among individuals of the same species, are often the reason for differences in response to the environment, life style, nutrition, drugs, treatments (like vaccine response), etc. To better understand the importance and relevance of these differences, we must first determine the regions of DNA that are functional (making RNA or protein), the parts that are regulatory (maybe serving as binding sites for DNA-binding proteins like polymerases, transcription factors, DNA-altering enzymes, repair enzymes, etc.), and the regions that do not affect phenotype. These questions can now be answered to a large extent by comparing multiple genome sequences. In this project, we will be studying the sequences and genomic architecture of several genes in the insulin signaling pathway in multiple *Drosophila* species to better understand their evolution and function. The insulin signaling pathway is well conserved across animals and critical to growth and metabolic homeostasis. Different strains/species of fruit fly respond very differently to diet like high sugar and high fat, and may be a means to study the genes implicated in obesity and diabetes in humans.