BIOLOGY MEETS ENGINEERING
SUMMER 2025 OPPORTUNITIES
OHIO UNIVERSITY

1. **ANDERSON LAB:** *Project Title:* Investigating the Biomechanical Changes and Injury Risk Following Concussion. *Project Description:* The Neuromuscular Biomechanics and Health Assessment Laboratory (NMBHAL) investigates the mechanisms, risk factors, and preventative solutions for musculoskeletal injuries, with a specific focus on the increased risk of injury following a concussion. We are seeking a highly motivated high school student interested in gaining hands-on research experience in biomechanics and sports medicine. The research experience will involve assisting with various aspects of research studies, including participant recruitment and scheduling, equipment setup (motion capture, force plates), data collection, and data entry/analysis. Duties will progress with the student's skill level and interests, including potential involvement in manuscript preparation and presentation of research findings. The student will participate in weekly lab meetings and maintain a detailed lab notebook.
   Website: https://research.ohio.edu/nmbhal/
   Requirements: Interest in health sciences and sports medicine is essential. Must be comfortable working with research participants and possess strong organizational skills.
2. **FAIK AND SHARMA LABs**: *Project Title:* Improving plant biomass using computational molecular docking and biochemistry.
   Introduction: One of the targeted research areas to achieve United States energy needs (and independence from foreign oil) is the improvement of the yield and quality of plant biomass as sustainable raw materials for production of alternative biofuels. Because the dry weight of plant biomass is made up of more than 50% of cell wall polymers, improvement of bioenergy crops relies largely on the cell wall (CW) components and structure. This project seeks to enhance our understanding of plant CW polysaccharides synthesis, a process carried out by glycosyltransferases (GTs) that work in a concerted manner as multi-protein complexes.
   Project Description: The Faik Lab is looking for high school student(s) interested in working on a project that combines computational, and biochemical experimental

work to first determine the three-dimensional structure of multi-protein complexes that can be validated through inhibition of protein-protein interactions using a novel technology (called NAPPA assay) developed in Faik lab. The computational work will be performed in Dr. Sharma lab and NAPPA assay will be performed in Faik lab. This research experience will involve using molecular docking software on a laptop or a desktop; and molecular biology (cloning) and biochemistry (NAPPA assay) experimental work.
Sharma website: https://sharma-research.com/
Faik website: https://faiklab.weebly.com/
Requirements: Willing to work in a wet lab to perform experiments and learn the use of some computer programs.

3. **KRUSE LAB PROJECT 1:** Sampling for microplastics in the water of Tappan Lake: A Case Study with Muskingum Watershed Conservancy in Ohio. *Project Description:* Looking for interested, motivated, and dedicated high school students interested to gain hands on experience working in the field researching for microplastics in water. Tappan Lake is used for many purposes, and this study will be sampling at Tappan Lake multiple times, and each time taking 16 samples that will then be taken back to the lab to be analyzed for microplastic particles. Students will work in the field collecting samples from the lake, and then analyze these samples in the lab. Students will learn how to separate organic matter in the water samples from the microplastic particles before analyzing the samples. This research experience will involve hands on field work at Tappan Lake, data collection, and work in the lab.
Website: https://www.ohio.edu/voinovich-school/research-impact/energy-environment
Requirements: Must be open to working outdoors in the field in various weather conditions, possibly getting wet since research will be done at a lake, and must be willing to travel to Tappan Lake and Ohio University for lab work.
4. **KRUSE LAB PROJECT 2:** A Comparative Assessment of Wetlands Ecosystem Services in Restored vs. Natural Wetlands: A Case Study in Ohio. *Project Description:* Looking for interested, motivated, and dedicated high school students eager to gain research experience in wetland ecosystem studies. This study seeks to compare the ecosystem services provided by restored wetlands versus natural wetlands in Ohio, with a focus on pollinators, water quality improvement, carbon storage, and flood control. Students will engage in hands-on research, including field surveys within two hours drive time of Athens, Ohio, including setting and

collecting pollinator traps, water and soil sampling, and biomass measurements to assess differences in ecosystem functionality between these two wetland types. With targeted field surveys to establish transects from wet-to-dry gradients for measuring soil moisture, carbon content, and respiration rates along the transects. Vegetation surveys will be conducted to evaluate biomass production and plant diversity in wetland ecosystems. Samples collected will be analyzed in lab facilities in Konneker Research Center on Ohio University's campus. This research provides valuable experience in data collection, environmental analysis, and wetland conservation strategies.

Website: https://www.ohio.edu/voinovich-school/research-impact/energy-environment

Requirements: must be willing to work outdoors in full field days in various weather conditions, walk up and down slopes and through wetland habitat carrying some equipment, and travel up to 2 hours from Ohio University's Athens Campus.