BIOLOGY MEETS ENGINEERING
SUMMER 2026 OPPORTUNITIES
UNIVERSITY OF CINCINNATI

1. **ALVAREZ LAB:** Project Title: Microelectrodes for the detection of biomolecules. Project Description: The Alvarez Lab is looking for a motivated and dedicated high school student who is excited to gain hands-on research experience in chemistry associated with electrochemical sensor development. Our research focuses on building microelectrodes-microscopic tools that can detect chemical in the environment or the human body. Using a "bottom-up" approach we synthesize tiny carbon nanotubes (CNTs) and weave them together to create microelectrodes that work as flexible, reliable, and "biocompatible," sensors. To ensure these implants are as safe as possible, we wrap them in specialized flexible biocompatible polymer coatings, carefully adjusting their thickness and avoid porosities. Currently, we are testing multiple important molecules and biomarkers such as hydrogen peroxide, glucose, melatonin, neurotransmitters, etc.
   Website: https://www.alvarezlab.com
   Total internship duration: 6 weeks
   Internship hours per week: 20-30 hours per week
   Other requirements: Must be open to working with liquid chemicals

2. **BENOIT LAB:** Survival of insects in temperate regions is dependent on the ability to overwinter. The northern house mosquito Culex pipiens pipiens, vector for West Nile virus, endures winter through a period of hibernation (diapause). Diapause of this mosquito is characterized by a shift from blood to sugar feeding, accumulation of storage lipids, increased resistance to cold and dehydration stress and arrestment of oocyte development. Along with these factors, longevity increases from only a few weeks in nondiapausing females to well over eight months for diapausing individuals. It is unknown how activity and sleep dynamics change during dormancy. In this project, we will characterize sleep and activity during mosquito dormancy through combined behavioral and physiological studies, and follow this with sleep manipulation studies to determine impact of sleep deprivation on winter survival. The information generated from this research will be

critical to understand how periods of sleep-like states impact mosquito dormancy, potentially revealing targets of opportunity for mosquito control.
Website: https://insect-biology.com/
Total internship duration: 6 weeks
Internship hours per week: 21-25
Other requirements: No special requirement

3. **CHIURILLO LAB:** The research activities of my laboratory are focused on the study of the protozoan parasite *Trypanosoma cruzi*, which is the etiological agent of Chagas disease (CD). *T. cruzi* is transmitted through direct interaction with insect vectors, known as the "kissing bugs". Recent evidence increasingly supports that Chagas disease should be considered endemic in the United States, as *T. cruzi* infection has been detected in multiple southern states. After infection, CD may remain asymptomatic for years or even decades, but in one third of cases CD can progress to dilated cardiomyopathy. There is no vaccine to prevent the disease, and the treatments available show low effectivity in the chronic phase of CD. Our approach involves the use of various reverse genetics strategies, such as CRISPR, to genetically manipulate the parasite, and study the role of genes encoding protein kinases and/or proteins putatively involved in cytokinesis, which is the last step of cell division. In our molecular parasitology laboratory, we perform routinely basic and state-of-the-art molecular biology, cellular biology and biochemistry techniques, such as cell transfection, cell culture DNA and protein electrophoresis, PCR, DNA extraction, cloning, CRISPR, etc., as well as cell culture and bioinformatics analyses of DNA/protein sequence data. Our final goal is to identify essential targets for the survival of the parasite that will help to the design of new chemotherapy against this pathogen.
Website: https://chiurillolab.wixsite.com/mpuc
Total internship duration in weeks: 4 weeks
Internship hours per week: 20 hours/week
Other requirements: Internship would occur between June 1-June 26 from approximately 10:00 am to 2:00 pm (M-F)

4. **CUADROS LAB:** Digital Epidemiology Laboratory, University of Cincinnati (Mentor: Diego Cuadros). Project Title: The Crisis Within the Crisis: Mapping Overdose Hotspots and Where Mental Health Help Is Hard to Find. Project Description (brief):

Why do some communities face much higher overdose deaths than others, and what happens when the places with the greatest need also have the least access to help? In this summer internship, you'll learn how scientists use real public-health data to understand where problems are most intense and where support is limited. You will explore U.S. county-level data to create easy-to-understand maps that show: (1) where overdose deaths are most concentrated ("hotspots"), and (2) which of those places also have high mental health need and fewer local resources. By the end of the internship, you'll build a simple "map story" that highlights communities facing a double challenge and suggests where support could make the biggest difference. This project is hands-on and guided step-by-step, you don't need prior coding or mapping experience. If you're curious about data, health, or making maps that tell a story, you'll fit right in.
Website: https://diegoc-digital-epidemiology.vercel.app
Total internship duration: 6 weeks (flexible; must occur between June 1–July 17, 2026)
Internship hours per week: 16–20 hours/week
Other requirements:
Comfortable working on a computer (data + map-making).
Reliable schedule and willingness to learn new software.
Interest in public health, psychology, data science, or social issues is a plus.

5. **HAN LAB:** Bioelectronics Laboratory. Project Title: In-vitro evaluation of anticancer drugs for brain cancer therapy. Project Description: We are seeking a motivated and dedicated high school student to participate in a hands-on summer research experience focused on cell-based evaluation of anticancer drug toxicity. We are developing nanofiber-based drug delivery vehicle using various drugs and nanomaterials against brain tumors. The student will gain exposure to fundamental biomedical engineering and laboratory research techniques, with a primary emphasis on evaluating drug effects using animal-derived cancer cell models. Research activities may include (a) culturing and maintaining animal cells using standard cell-culture facilities (e.g. incubator, centrifuge, and biosafety cabinet), (b) performing cell viability assays using cell counting assay kit and a plate reader, (c) assisting graduate students with routine laboratory organization and maintenance, (d) gaining introductory exposure to advanced research techniques such as

nanofiber fabrication, electron microscopy, and UV-visible spectroscopy if applicable.
Website: https://ucbioelectronics.com & www.nanolab.uc.edu
Total internship duration in weeks: 6-8 weeks
Internship hours per week: 20-30 hours per week
Other requirements: Perseverance and responsibility.

6. **KIM LAB:** Project Title: real-time continuous biosensors. Project Description: The Yeongin Kim Group is seeking motivated and curious high school students interested in gaining hands-on research experience in continuous, real-time biosensing technologies. Traditional biomedical measurements often rely on benchtop instruments, such as liquid chromatography–mass spectrometry (LC–MS), which are used intermittently to analyze biological signals. In contrast, our lab focuses on developing at-home, continuous sensors capable of monitoring physiological and biochemical signals in real time. The student's research experience will include introductory literature review, exposure to sensor fabrication processes, and basic electrical and electrochemical measurements under close supervision.
Website: https://homepages.uc.edu/~kim4yg
Total internship duration in weeks: 8 *weeks*
Internship hours per week: 13-15 hours/week
Other requirements: N/A

7. **KLOOS LAB:** Project title: Math Practice and Poverty: Helping children take charge of their learning. Project description: At the Children's Cognitive Research Lab (CCRL), will explore ways in which young children can overcome barriers to learning motivation. The research involves designing, carrying out, and testing the effect of a math-enrichment program that will be rolled out during the summer. Research assistants are expected to help with the math enrichment program, as well as with the data collection that takes place. Research assistants are also expected to participate in lab discussions about children's learning motivation and how our findings relate to already existing research.
Website: https://researchdirectory.uc.edu/p/kloosa
Total internship duration: 8 weeks, starting Tuesday May 26 (the day after Memorial day).

Internship hours per week: 20-30 hours per week; one-site meeting in person during the mornings (9AM – 12PM). Some flexibility is possible.
Other requirements: Must have reliable transportation to partnering schools.

8. **LANDER LAB:** Project title: "A genetic approach for drug target validation in trypanosomes". Research in the Lander Lab focuses on the study of signal transduction pathways in trypanosomes, flagellated protozoan parasites that cause devastating animal and human diseases, such as leishmaniasis, sleeping sickness, nagana, and Chagas disease. Integrating cellular, biochemical and genetic approaches we investigate the mechanisms by which the human pathogen *Trypanosoma cruzi* senses environmental fluctuations and triggers specific cellular responses that lead to differentiation among the main stages of the parasite's life cycle. Our long-term goal is to find alternative strategies to control Chagas disease, a silent but deadly sickness affecting millions worldwide, while contributing to understand the peculiar nature of unicellular eukaryotes. In this project, the student will be involved in the characterization of trypanosome mutant cell lines to study signal transduction pathways in trypanosomes. For this, the intern will be trained in different cell and molecular biology techniques, such as cell culture, gel electrophoresis, DNA isolation, PCR, cell counting, media preparation, bacterial transformation, and other related techniques.
Website: https://homepages.uc.edu/~landerlab/wordpress/about/
Total internship duration in weeks: 4 weeks
Internship hours per week: 16-20 hours/week
Other requirements: Ideally, the intern should be a high school junior or senior student (11th or 12th grade) willing to be in the lab from 9:00 am to 1:00 pm during the internship. The internship period will be June 1-26.

9. **LAYNE LAB:** In the Layne lab research interns will join ongoing, novel research projects in either of two broad areas: 1) spatial navigation, 2) color vision. In the first, spatial navigation, we study how animals know where they are relative to their home. We study this in fiddler crabs, who use a system called path integration, in which they know where their home is by measuring everything they do since they left. In the second, color vision, we study whether animals have 'color vision', that is, whether they are capable of visually discriminating objects based solely on differences in reflected/emitted wavelengths of light. To test this we use a

behavioral assay in which a behavioral response is elicited by a visual stimulus that we vary in wavelength and intensity. Basically, we ask the animal “can you see this?” using different colors. The device we use is novel and invented in the Layne lab.
Website: https://researchdirectory.uc.edu/p/laynejn
Total internship duration: 4 weeks
Internship hours per week: 20 hours/week
Other requirements: No noted requirement

10. **MITTAL LAB:** MICS (Microelectronics Integrated Circuits and Systems) Lab: Dr. Ankit Mittal. Project Title: The Plant Whisperer: Early Disease Detection with IoT. Project Description: Imagine if plants could text you when they felt sick. Right now, by the time a farmer sees a yellow leaf or a bug, the damage has already started. In this project, you will help design an Early Warning System that catches plant stress early before it is visible to the human eye using IoT sensors. It is a hands-on mix of *plant biology and electronics*. You will explore real-world datasets to find "secret signals", like a tiny rise in leaf temperature or a shift in color which can warn us first. By the end, you will propose a simple sensor setup that could be tested in a real field.
    Deliverables:
    1. Pick 3-5 crops (e.g., tomato, grapes, corn) and list common diseases/pests that affect it
    2. List early warning signs that sensors could measure
    3. Shortlist sensors that could work (what they measure + rough cost + "ruggedness" for outdoor use.)
    4. Simple system diagram (sensors to wireless device to phone/PC alert)
    5. Simple deployment plan (where to place sensors and how often to measure)
    6. 4-page report summarizing your design

    Why it Matters:
    1. Stop the Spray: Finding one sick plant means we don't have to spray the whole field with chemicals.
    2. Feed the future: Helping farmers grow more food with less waste.
    3. You will learn how to use the Internet of Things (IoT) to solve real-world environmental problems.

    Website: https://researchdirectory.uc.edu/p/mittala5

Total internship duration: 6 weeks
Internship hours per week: 26-30 hours
Other requirements: Curiosity, a love for tech, and a willingness to get your hands dirty with field testing!

11. **MOREHOUSE LAB**: The Morehouse Lab studies how animals see the world, with a focus on insects and spiders. The student would work on one or more projects related to jumping spider perception of color, motion and/or depth. Approaches would include field work, behavioral assays, gaze tracking, ophthalmoscopy, hyperspectral measurements, retinal histology and microspectrophotometry, and/or computational approaches to video analyses of animal behavior.
    Website: https://homepages.uc.edu/~morehonn/
    Total internship duration in weeks: 8 weeks
    Internship hours per week: 16-20 hours/week
    Other requirements: None noted

12. **REEF SYSTEMS CORAL FARM**
    Location: Reef Systems Coral Farm
    8459 Peter Hoover Rd.
    New Albany, OH 43054
    Please note the location. You must have your own transportation for this opportunity.
    Research Title: Effect of potassium on corals ability to handle higher light intensities in an aquaculture setting. Research Description: Reef Systems Coral Farm is interested in the potential benefit of adding potassium and magnesium to indoor aquarium systems in addition to alkalinity and calcium. This research experience will involve (a) detailed data log tracking of water chemistry, coral husbandry and health observations, (b) tank and equipment maintenance, (c) performing detailed analyses and weight measurements on various genus, species, and subspecies of coral at consistent intervals (e.g., timeline photos, polyp extension measurements, evidence of growth, coral color, etc.).
    Website: https://reefsystemscoralfarm.com/
    Total internship duration: 8 weeks
    Internship hours per week: 13-15 hours

Other Requirements: Must have own transportation and be able to work within the following schedule: Wednesday-Friday: 12pm-7pm; Saturday-Sunday: 10am-5pm

13. **STROBBIA LAB:** Project Title: Optimizing the Automated Synthesis of Nanomaterials. Project Description: The Strobbia Lab is looking for interested, motivated and dedicated high school student interested to gain research experience optimizing a fluidic system designed for the automated synthesis of nanomaterials. Our lab studies the use of nanomaterials combined with Raman spectroscopy to develop tools for diagnostic and environmental applications. This research experience will involve: (1) synthesis and characterization of nanomaterials (basic chemistry skills, pipetting, stirring, using a microplane reader), (2) coding and using a lab-built robotic fluidic system and (3) learning about automation and multi-objective optimization concepts.
Website: www.strobbialab.org
Total internship duration: 8 weeks
Internship hours per week: 16-20 hours per week
Other requirements: Interested in coding.

14. **TANG LAB:** Extended Reality Lab: Project Title: Digitizing Nature: Exploring Nature Through Mixed Reality. Project Description: This project introduces high school students to Mixed Reality (MR) as a hands-on way to explore and better understand the natural world. Students will work with real-world subjects—such as plants, insects, molecules, or even planetary systems—and learn how to turn these physical or observed objects into 3D digital models that can be viewed and interacted with in an immersive mixed reality environment using head-mounted displays. The project starts with creating simplified 3D models based on real-world references. Students will then bring these models into a passthrough-based mixed reality environment and place them into real physical spaces. As the project progresses, students will design simple interactions for their virtual objects. These activities introduce students to core ideas in spatial computing, digital modeling, and interactive design without requiring advanced technical knowledge.
Website: https://ming3d.com/VR/
Total internship duration: 8 weeks
Internship hours per week: 20-30 hours per week
Other requirements: None listed

15. **TU LAB:** Bioprocess Engineering and Bioenergy Lab. Project Title: Biofuels production from biomass with engineered Clostridium. Project Description: Developing alternative biofuels from waste biomass has strong potential to reduce U.S. dependence on fossil fuels, improve national energy security, and address environmental issues. Butanol is one of the promising advanced biofuels being pursued by the Department of Energy (DOE) and the National Science Foundation (NSF) as part of the next generation of alternative fuels. In this research, we will teach students to produce biobutanol from biomass using engineered microorganisms such as Clostridium. Students will learn to conduct microbial fermentation, prepare media, operate a bioreactor, and analyze samples using a high-performance liquid chromatograph (HPLC). Students will also engage in bioinformatics analysis of engineered microbes to identify key genes and enzymes in Clostridium metabolic pathways associated with butanol production.
    Website: https://researchdirectory.uc.edu/p/tumg
    Internship duration: 6-8 weeks
    Internship hours per week: 16-20 hours/week.
    Other requirements: Lab safety training is required.

16. **WENDELL LAB:** Biomolecular Engineering Lab. 711 Rhodes. Project Title: Enzymatic degradation of PET microplastics. Project Description: Developing enzyme and bacterial expression systems specifically to degrade PET microplastics. This will include transformation P. Putida strains with plasmids imparting different secretion tags and promoter strengths. This research will teach students basic microbiological engineering techniques with E. Coli and the soil bacteria P. putida. Students will learn to conduct microbial fermentation, prepare media, operate shaker culture, and analyze samples using a fluorescent plate reader. Students will also engage in data analysis and selection of best plastic degrading microbes.
    Website: https://researchdirectory.uc.edu/p/wendeldw
    Internship duration: 6-8 weeks
    Internship hours per week: 20 hours/week.
    Other requirements: Lab safety training is required.