Department of Biology
Faculty Research Interest/Opportunities

Dr. Eric Annis – HT 149, annis@hood.edu

I study the early life history of marine and freshwater organisms with a focus on the impacts of climate change and invasive species. The model systems I work on most are lobster larvae in the Gulf of Maine and crayfish in the streams around Frederick. I am interested in the physiological response of organisms to temperature stress and the impact it has on the distribution of organisms in the field. I'm also very interested in behavioral responses to temperature and developing research on local zooplankton populations. I will be on sabbatical for the 2024-25 academic year but could still be able to advise a student on an independent study project.

Dr. Drew Ferrier - HT 308E, dferrier@hood.edu

My research interests encompass environmental science, sustainability, and biology - particularly as they apply to aquatic habitats. As Director of the Center for Coastal and Watershed Studies at Hood, many of the projects I work on deal with local environmental issues for clients of the Center. Undergraduate students can become involved in these activities through Independent Studies, Honors Projects, or Internships in the Center. Center staff also operate the Frederick Food Security Network where students can be involved in urban gardening and hydroponic food production. As I near retirement, I will limit my involvement to shorter-term projects of one or two semesters, rather than activities that may require longer-term commitments.

Dr. Yanting Guo – HT 310, guo@hood.edu

As the endowed chair of sustainability studies, I am generally interested in finding sustainable solutions to environmental challenges the community faces. Specifically, my current research focuses on the bioconversion of organic waste using insects (Black *Hermetia illucens*), and the application of the products and byproducts of this process to improve soil quality and protect water quality. I have worked with student on research topics such the efficiency of Black Soldier Fly larva on converting horse manure, zebra manure, alpaca manure, coffee ground, milk, soda, compostable plates, etc., the comparison of nutrient contents between Black Soldier Fly larva byproduct, peat moss and coconut fiber, the impact of Black Soldier Fly larva byproduct on plant germination rate and growth. I also work with students to explore creative use of these products and byproducts, such as using it to make recycled paper and crafts. With studies like these, our goal is to establish a closed-loop agriculture model that generates zero waste, zero carbon and low water footprint. With close partnership with the Frederick Food Security Network, our research findings can be applied directly on organic farming practice, producing health food and fighting environmental injustice.

Dr. Robert Kambic – HT 157, kambic@hood.edu

I am a broadly trained organismal biologist. My research interests span paleontology, musculoskeletal anatomy and physiology, and neuroscience. I maintain collaborations on the subjects of dinosaur paleontology and avian biomechanics, but my main current research program focuses on the intersection of neuroscience and biomechanics in human walking. I am working to understand how healthy people walk, how different pathologies impact walking, and the impact of different tools that might be used for gait rehabilitation in the physical therapy clinic. I am not a clinician, so I collaborate with scientists at Kennedy Krieger Institute and Johns Hopkins School of Medicine on this work.

Dr. Daehwan Kim – HT146, kimd@hood.edu

My lab work applies a multidisciplinary approach drawing on biochemical reactions, enzyme catalysis, microbial and bioprocess engineering principles for the beneficial conversion of various food, food wastes/agricultural residues, and microbial fermentations to produce value-added products such as renewable/sustainable energy (bioethanol, biohydrogen), alternative proteins/fats, and biochemicals. Our research seeks to understand the characterization of various food waste/agricultural biomass (e.g., coffee mucilage, soybean hull, hemp wastes and other lignocellulosic materials) and their enzymatical reaction, with an emphasis on potential applications in food, renewable energy, biomaterials, and secondary metabolites. Current research supported by the Maryland Soybean Board focuses on the valorization of soybean waste for lactic acid production using a co-fermenting strain of *Lactobacillus pentosus*. Another focus area concentrates on further utilization of coffee mucilage and hemp wastes using biological/catalytic approaches and microbial fermentation.

Dr. Eric Kindahl – HT 161, kindahl@hood.edu

I am a broadly trained scientist interested in conservation biology, earth system science, and sustainability. I study restoration ecology and the use of biomonitors, such as amphibians, birds, and lichens, to assess environmental quality and ecological function. I am especially interested in working with students on projects involving biodiversity field work with animals or plants, geographic information systems, remote sensing, or modeling. I perform monitoring and assessment for a 50-acre stream and forest restoration project near campus. I am the department liaison to the Frederick Bird Club and the Audubon Society of Central Maryland. One of my current projects is getting Hood recognized as a Maryland Bird Campus. I am interested in working with students on independent study projects, field or lab studies, and honors projects. I recently served as the Hood advisor for off-campus internships in wildlife rehabilitation, reforestation, and environmental legislation.

Dr. Craig Laufer – HT 160, laufer@hood.edu

I am a molecular biologist/biochemist. Most of my current research is related to the development of biofuels. Second generation biofuels begin with lignocellulosic materials, often agricultural wastes (e.g. sugarbeet pulp, wheat straw, hemp stems and leaves) and breaks the biomass into simple sugars. These sugars can be fermented into liquid fuels such as ethanol. One of the key steps in the process requires enzymes to break down the complex carbohydrates in the biomass, structural polymers like cellulose, pectin, and hemicelluloses, into their component sugars. Students and I are addressing this part of the problem in two major ways. Over the years the students taking the microbiology course have each isolated and identified an environmental bacterial strain that is pectinolytic (it can grow on media with pectin as the sole carbon source). We now have a large and diverse collection of such bacteria, and these are a source for genes encoding potentially novel pectinolytic and cellulytic enzymes. One project for students is to further characterize these strains and to clone and express candidate genes from them. The second avenue of research is to manipulate the genes encoding these enzymes through a process called directed evolution to develop pectinolytic enzymes with desirable properties.

Dr. Cherry Liu – HT 150, liuyc@hood.edu

Research interest: cell biology & gene editing: understanding the function of the antenna of the cell, a tiny cellular organelle called the primary cilium through cell culture and gene editing experiments.

Student projects: I'm open to discussing projects for BIOL375 Independent Study for Spring 2025 semester or later.

Dr. Chia-Hua Lue - starting Fall, 2024

As an entomologist, I study host-parasitoid interactions, focusing on fundamental ecological questions such as what determines host ranges and how species evolve in response to climate change and host availability. I enjoy collaborating with researchers from diverse areas, bridging the gap between field observations and laboratory experiments to enhance our understanding of natural phenomena and improve predictions. I currently have two ongoing projects. The first project involves exploring biodiversity through wild Drosophila-parasitoid networks. Given the specialist lifestyle of parasitoids, they play a crucial role in sustainable agriculture. This project aims to understand the community compositions of parasitoids that attack the invasive Spotted Wing Drosophila, with the added opportunity to discover new parasitoid species. The second project focuses on understanding how temperature impacts host-parasitoid interactions. Climate change significantly affects ecosystems, but the mechanisms altering species interactions require further study. In this project, students will investigate the influence of rising temperatures and heatwaves on the reproductive performance of parasitoids that disturb community functioning. Both projects aim to explore the

effectiveness of parasitoids on the invasive fly under changing climates, ideal for students interested in both basic and applied ecology. In addition to the Drosophila-parasitoid system, I am open to working on other insect systems and strongly encourage students to bring their own unique interests and perspectives to collaborate with me.

Dr. Sean J Sharp – starting Fall, 2024

I am a broadly trained ecologist who focuses on wetlands and estuarine systems. My research investigates how wetland plant communities influence ecosystem function, like carbon cycling, greenhouse gas emissions, and ecosystem stability. This work is largely motivated by the impacts of global change on ecosystems – including species invasions, land-use change, and climate change – a grand challenge for scientists and humanity. My previous projects with students involved investigating the effects of disturbance on wetland ecosystem function, setting up mesocosms to isolate the role of individual plant species in controlling carbon cycling, and simulating the effects of future climate and land-use change on greenhouse gas emissions in a dynamic wetland ecosystem model. My current work at Hood College continues to investigate how wetland plants influence carbon dynamics, particularly in the soil and rhizosphere, and includes field surveys and monitoring, characterizing plant physiology, performing greenhouse experiments, and using process-based simulation models. I am devoted to teaching and mentoring and I'm always happy to involve students in any facet of my research, playing to individuals' strengths and passions.

Dr. Oney Smith – HT 147, osmith@hood.edu

My broad interests include the biology of insects and plants with a particular interest in insects as vectors of plant viruses. I also have an ongoing interest in the use of E. coli to express foreign proteins that can be used for the development plant disease diagnostics, especially plant viral proteins for use in antibody-based assays to detect plant viruses.

Dr. Meredith Yeager – HT 156, yeager@hood.edu

I am trained in evolutionary and population genetics but have been studying the genetic contribution to traits and diseases in humans for many years. Current projects include determining the genetics of several Mendelian traits (e.g., coat patterns, color, length) in domestic cats and related species as well as patterns of genetic inheritance in large pedigrees of Asian leopard cats, domestic cats, and their hybrids (Bengal cats). A future goal is to determine the genetics behind behavior and domestication. I also study Human papillomaviruses and their relationship to cancer at the genetic level, with a special emphasis on virus types that are closely related to potent human carcinogens that never (or rarely) cause cancer. I am also open to new ideas and studying the genetics of other organisms!