

Undergraduate Research Opportunities at VIMS Fall 2017 Semester

1. Ocean Acidification – two opportunities

a. Citizen Science Initiative: Oysters and Ocean Acidification

Project Description: The student will assist with an ongoing project aimed at developing methods for a broader citizen science program. As part of the project, the student will collect water quality and oyster size data for a field site on VIMS campus. The student will also have the opportunity to engage in outreach with local high schools that are partners in the project.

Skills needed: attention to detail, works well with others, general science foundation

Project Duration: September 2017-May 2018

b. Effects of water quality on oyster larvae in hatcheries

Project Description: The student will assist with the development and execution of ongoing experiments related to effects of water chemistry, temperature, and salinity on early life history stages of oysters (larvae). Possible tasks include taking care of cultures of oyster larvae, measuring water conditions in experimental tanks, collecting samples of larvae for analysis, taking and analyzing photos of larvae.

Skills needed: attention to detail, ability to keep a detailed lab notebook, works well with others, general science foundation

Project Duration: September 2017-May 2018

Contact (for both opportunities): Professor Emily Rivest, ebrivest@vims.edu

2. Harmful algal blooms and their biotoxins in Chesapeake Bay – two opportunities

a. Position Description: Student(s) will be engaged in bi-weekly field sampling of Chesapeake Bay and Eastern Shore with the goal of understanding the distribution of harmful algal blooms and their toxins in the water and edible shellfish. Students will also learn valuable biological and chemical techniques in the laboratory, including tissue homogenization, toxin extraction, purification techniques, and culturing. Possibilities are also available for the design of independent experiments and experience with analytical chemistry (e.g., mass spectrometry). A completed course in basic Chemistry is preferred, but no prior experience is required.

b. Position Description: Student(s) will gain hands-on experience with novel oceanographic instrumentation, the Imaging FlowCytobot. Student(s) will be trained to calibrate, maintain, and deploy the oceanographic instrumentation in Chesapeake Bay, as well as analyze images captured by the instrument. The overall goal of this project is to deploy and utilize the robotics to build an early warning system for harmful algal blooms in Chesapeake Bay. Experience with MATLAB is preferred, but not required.

Project Duration: Both positions are available immediately, and would continue throughout the semester.

Contact (for both opportunities): Professor Juliette Smith, jlsmith@vims.edu

3. Zooplankton contribution to carbon cycling along the Western Antarctic Peninsula

Position description: The student will join a NSF funded long term project examining the shifting role of zooplankton and quantifying their contribution to carbon cycling along the Western Antarctic Peninsula. The student will be trained to conduct Carbon-Hydrogen-Nitrogen analyses (CHN) on various zooplankton taxa (i.e., Antarctic Krill) and their fecal pellets.

Position duration: The position is available now and throughout the fall semester.

Contact: Patricia (Tricia) Thibodeau, PhD Student, psthibodeau@vims.edu

4. Coastal Fish Physiology and Climate Change

Project Description: The student will primarily assist with ongoing projects examining changes in cardiac function with respect to both environmental conditions (e.g., temperature, ocean acidification) and capture related stress. This will involve direct participation in experiments using isolated cardiac strips to assess the effects of environmental conditions on coastal fishes (e.g., summer flounder and Clearnose skate), data analysis from these and previously conducted similar studies on the effects of capture-related stress. Depending on when experiments can be scheduled, the student may also be involved in experiments to measure of blood oxygen affinity of Clearnose skates as this relates to species-specific tolerance of low ambient oxygen. Duties will also include routine fish husbandry: maintenance of biofilters, water quality monitoring, and feeding.

Students who have taken courses in comparative physiology and chemistry are preferred. Experience with animal husbandry, Microsoft Office, SigmaPlot, and R software is preferred but not required.

Project Duration: The project is available immediately, and will continue at least through December, and possibly through the spring semester depending on the student's interest and motivation.

Contact: Gail Schwieterman (gschwieterman@vims.edu) and Professor Richard Brill

5. Recruitment dynamics of juvenile Striped bass in a recovered population

Position description: The student will help to collect data and process samples from three year-classes of juvenile striped bass to compare population dynamics between pre- and post-recovery populations. The student will be trained to take length and weight measurements and to remove and prep otoliths (i.e., ear bones that help determine daily age). The student must pay attention to detail and ask questions when they need clarification or help.

Position duration: The academic year. This position is best suited for someone who can commit to working several hours at a time (e.g., all afternoon or morning/one full day), but I will work with your schedule.

Contact: Olivia Phillips, MS Student, omphillips@vims.edu

6. Fun with bacteria, viruses, and parasites

Position Description: This position will assist with the study of the ecology and evolution of bacteria, virus, and parasites. The work is heavily focused on how management practices, such as host vaccination and selective breeding, drive disease severity. These studies are conducted in infectious diseases of fish. The research involves a combination of molecular biology, microbiology, virology, and animal research methods, and the assisting undergraduate would gain expertise in these areas. No prior experience is necessary, but a background in molecular biology, microbiology, or animal studies would be beneficial.

Position Duration: Positions are open immediately and through 2018.

Contact: Professor Andrew Wargo, arwargo@vims.edu

7. Salt marsh response to sea level rise

Position Description: We are seeking undergraduate students to assist several projects related to how marshes respond to sea level rise. Responsibilities could include field work, analyzing drone imagery and sediment cores, preparing samples for radiometric dating, and measuring plant biomass. No prior experience necessary, although basic familiarity with lab work is helpful. We are also seeking a student to work on a project related to mapping the drowning of low lying coastal regions for which coursework in GIS/Remote sensing experience is necessary. All work combines ecology and geology.

Position Duration: Opportunities available all semester.

Contact: Professor Matt Kirwan, kirwan@vims.edu

8. Alteration of carbon fluxes by intense phytoplankton blooms in a microtidal estuary.

Project Description: Perfect for a student interested in biogeochemistry and particularly the sources and fates of carbon in an estuary. The student would help run DIC, DOC and nutrient analyses and assist with data analysis. The data analysis requires good familiarity with Excel and some statistical programs. If the schedule worked out, the student might be involved in going out on some of our Dataflow cruises.

Project Duration: The project officially starts in January and will continue for 3 full years and perhaps a fourth; however, we have already been sampling during the harmful algal bloom currently occurring in the York and have many hundreds of samples in our freezer awaiting analysis. There may be opportunities for summer internships.

Contact: Professor Iris Anderson, iris@vims.edu

9. Investigating microbiomes in marine environments

Position description: The student to be recruited will join a NSF funded project examining structure and function of microbiomes in York River Estuary. The student will be trained to conduct DNA/RNA extraction from environmental samples, PCR, gel-electrophoresis, DNA fingerprinting, DNA sequencing and bioinformatic analysis.

Position duration: The position is available now and throughout the academic year.

Contact: Professor BK Song (songb@vims.edu)

10. Morphological Variation of the Swimbladder of Toadfishes

Project Description: Batrachoidiformes, the Toadfishes, comprises approximately 82 species of bottom-dwelling fishes that live in temperate and tropical coastal areas of all oceans around the world. These fishes are capable of a wide variety of vocalizations that are used for mating and nest defense. The sound is produced by sonic muscles attached to the swimbladders, which are unique in that they are formed by two lobes (vs. a single lobe, as in most bony fishes). Previous studies proposed that a heart-shaped swimbladder is a synapomorphy of Batrachoidiformes, although there has yet to be a survey of this character across the diversity of Toadfishes, and significant variation has been observed during preliminary data collection. The person filling this position will be involved in dissection of specimens and the description and illustration of the phylogenetic variation found across the diversity of toadfishes.

Project Duration: beginning Fall 2017; continuing to the spring semester if desired. Independent study credits possible.

Contact: Professor Eric Hilton (ehilton@vims.edu) and Diego Vaz, PhD Student (dbistonvaz@vims.edu)

11. Oyster Bed Community Dynamics

Project Description: This project involves working on oyster bed community dynamics for restoration efforts in Chesapeake Bay. Duties would include help processing oyster samples, sieving and rinsing samples, sorting and identifying benthic invertebrates, and processing samples for biomass.

Duration: These are ongoing projects and I can use help anytime. I am very flexible with undergrads schedules.

Contact: Jenny Dreyer, jcdrey@vims.edu

12. Invertebrate Collection

Project Description: This project involves assisting with the Invertebrate Collection at VIMS. I need help getting specimen data digitized. This would involve entering data in Excel spreadsheets. Also, helping to maintain the collection by filling vials with ethanol and adding specimens to the collection.

Duration: These are ongoing projects and I can use help anytime. I am very flexible with undergrads schedules.

Contact: Jenny Dreyer, jcdrey@vims.edu

13. Collaboration between Physics Department and Fisheries

Project Description: Are you a motivated undergraduate student at the freshmen to junior level with an interest in for-credit research during the Fall 2017 semester? Do you have an interest or even some experience in (a subset of) electronics development, embedded software, data analytics, machine learning, or animal behavior research? Would you like to be part of an interdisciplinary research project that connects the W&M physics department with the VIMS fisheries department through makerspace connections?

Our team has developed an inexpensive arduino-based accelerometer animal tag over the past two years. Accelerometers allow us to measure the detailed behavior of animals that cannot be directly observed (at night, under water). We have deployed this Sharkduino tag on sandbar sharks in captivity at the Eastern Shore Lab and at VIMS during the past two summers and into this upcoming fall.

Application Procedure:

Please send the following documents to both Kevin Weng, kevinweng@vims.edu, and Wouter Deconinck, wdeconinck@wm.edu:

- Email cover letter outlining why you think you are the ideal candidate and detailing relevant skillsets or experience.
- Attached pdf file with your unofficial W&M transcript (pdf from banner is fine).
- The name and contact info for one reference at W&M or VIMS (faculty or staff).

14. Incidental Mortality Estimates of Sea Scallop From AUV Based BACI Surveys

Project Description: The volunteer will assist in processing benthic digital photographic images obtained from an autonomous underwater vehicle (AUV). These data will be used to quantify the incidental mortality of sea scallops exposed to commercial fishing as well as assess the impact of commercial fishing gear on benthic habitat. The volunteer will be trained to identify healthy and comprised sea scallops in the digital images and gain experience using Scallop Image Annotation Software. The volunteer will need some experience with Microsoft Excel. The volunteer will interact with Dr. Dave Rudders and Sally Roman at VIMS as well as colleagues at the University of Delaware.

Dates: 2017 Fall Semester

Contacts: Work will be conducted under Dr. Dave Rudders, Interim Director of Marine Advisory Services, at VIMS within the Marine Advisory Services Program. The undergraduate will have an opportunity to work with Dr. Rudder's staff as well as staff from the University of Delaware. Please contact Sally Roman (saroman@vims.edu) if you are interested.