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Indiana University of Pennsylvania

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Indiana University of Pennsylvania undergraduates are going “phage hunting” this fall as part of a national research project.

IUP students in two biology courses in fall 2017 and spring 2018 will do hands-on research to help to find phages (viruses that infect bacteria) in soil through the [Howard Hughes Medical Institute’s Science Education Alliance-Phage Hunters Advancing Genomics and Evolutions Science \(SEA-PHAGES\)](#).

IUP is one of 142 universities in the world to be part of SEA-PHAGES. Biology faculty members Carl Luciano, Seema Bharathan, N. Bharathan, Holly Travis, and Cuong Diep are leading the project at IUP.

SEA-PHAGES is a two-semester, discovery-based undergraduate research course that begins with digging in the soil to find new viruses (phages) and progresses through a variety of microbiology techniques and, eventually, to complex genome annotation and bioinformatic analyses.

“This is a great opportunity to get students interested in a real scientific research project early in their college careers,” Luciano said.

“By working in the project from its very beginning, students are invested. It is our hope that this helps students who are interested in science to persist in the sciences, graduate, and pursue a career in science. This project shows students what it is to be a scientist, including working collaboratively with other institutions and research organizations.

“Too often freshmen do not feel welcome in the sciences. This project allows them to be an active part of the research team.”

At IUP, the program will include 48 students in each semester in two laboratory sections of BIOL 202 (Principles of Cell and Molecular Biology) and BIOL 203 (Principles of Genetics and Developmental Biology). Students will work together in a cohort, and the class will include majors from many CNSM disciplines.

“IUP students and faculty will be doing the ‘grunt work,’ going into the environment, getting the soil samples, and purifying the viruses,” Luciano said.

Soil samples contain microorganisms, and some of these microorganisms are viruses (phages) that affect other microorganisms that live in the soil.

“We are looking for phages from these soil samples. There are zillions and zillions out there, and most are undiscovered. Our students will be finding these undiscovered phages,” Luciano said.

While this project is mostly an exercise in virus diversity and cataloguing the diversity of viruses in the environment, “as we discover new viruses we also are discovering new genes and new genetic information that might be useful in preventing disease or helping agriculture,” he said.

All of the instructions and recipes come from the Howard Hughes Medical Institute. Scientists there will send IUP the host strain to grow the viruses and provide help with any technical difficulties.

“During the spring (second) semester of the project, IUP students will isolate DNA from the phages, sequence them, annotate their gene content, and perform comparative genomics using bioinformatics software provided by the Howard Hughes Medical Institute,” Diep said. “Because these phages will be newly discovered, students can name their own phage, giving a sense of ownership in their discoveries.”

The IUP students also will be invited to participate in the SEA-PHAGES annual symposium in June at the Janelia Research Campus near Washington, DC, to present their work, participate in the symposium as part of the national team, and publish their research findings.

The office of the Dean of the College of Natural Sciences and Mathematics will be assisting with the budget and schedule for the program.

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