



The HHMI SEA-PHAGES project offers a year-long research-based laboratory course for undergraduates with little or no background in college-level biology.

Course Structure

The course is intended for first-year students, spans two terms, and culminates in a research symposium.

- **First term:** Students isolate phages from environmental samples they collect. Once isolated, students characterize their phage using a variety of techniques, including electron microscopy and DNA restriction analyses. Collectively, students then select 1 or 2 phages for which the genomes will be sequenced.
- **Second term:** Students annotated and analyze the genomes through bioinformatics.
- **Research Symposium:** A select number of students from each participating institution will be invited to share and discuss their data at the annual SEA-PHAGES symposium.

Course Objectives

The course is designed to provide students with an authentic research experience, where students gain a sense of ownership of the scientific problem and of the discoveries made. In particular, the course provides:

an Opportunity for Critical Thinking

- Data analysis and interpretation
- Experimental design
- Reading and analysis of primary literature
- Understanding applications of mathematical modeling in problem solving

an Introduction to Scientific Skills

- Aseptic technique
- Microbiology
- Molecular biology
- Electron microscopy
- DNA sequencing
- Comparative genomic analysis
- Functional genomic analysis
- Genome annotation

an Opportunity for Professional Development

- Effective presentation of research
- Networking with other SEA participants
- Dissemination of research findings including co-authorship on peer-reviewed publications and submissions to genomic databases