

ABSTRACT

Purdue University has been a member of the SEA-PHAGES (Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science) program since 2011. This program, created in conjunction with the Howard Hughes Medical Institute (HHMI), facilitates undergraduate curriculum for the authentic discovery of novel bacteriophages within the classroom. Since joining the program, undergraduates at Purdue have harnessed wet lab and bioinformatics principles to contribute over 200 previously uncharacterized bacteriophages and 25 novel genomes to the wider scientific literature. The SEA-PHAGES classes at Purdue have resulted in tangible professional deliverables for students through conference presentations and publications. Student outcomes also include transferable skills such as knowledge of aseptic technique, the nature of science, and genomic annotation which positions the classes as ideal platforms for workforce development for the biotechnology industry.

PRESENTER BIO INFORMATION

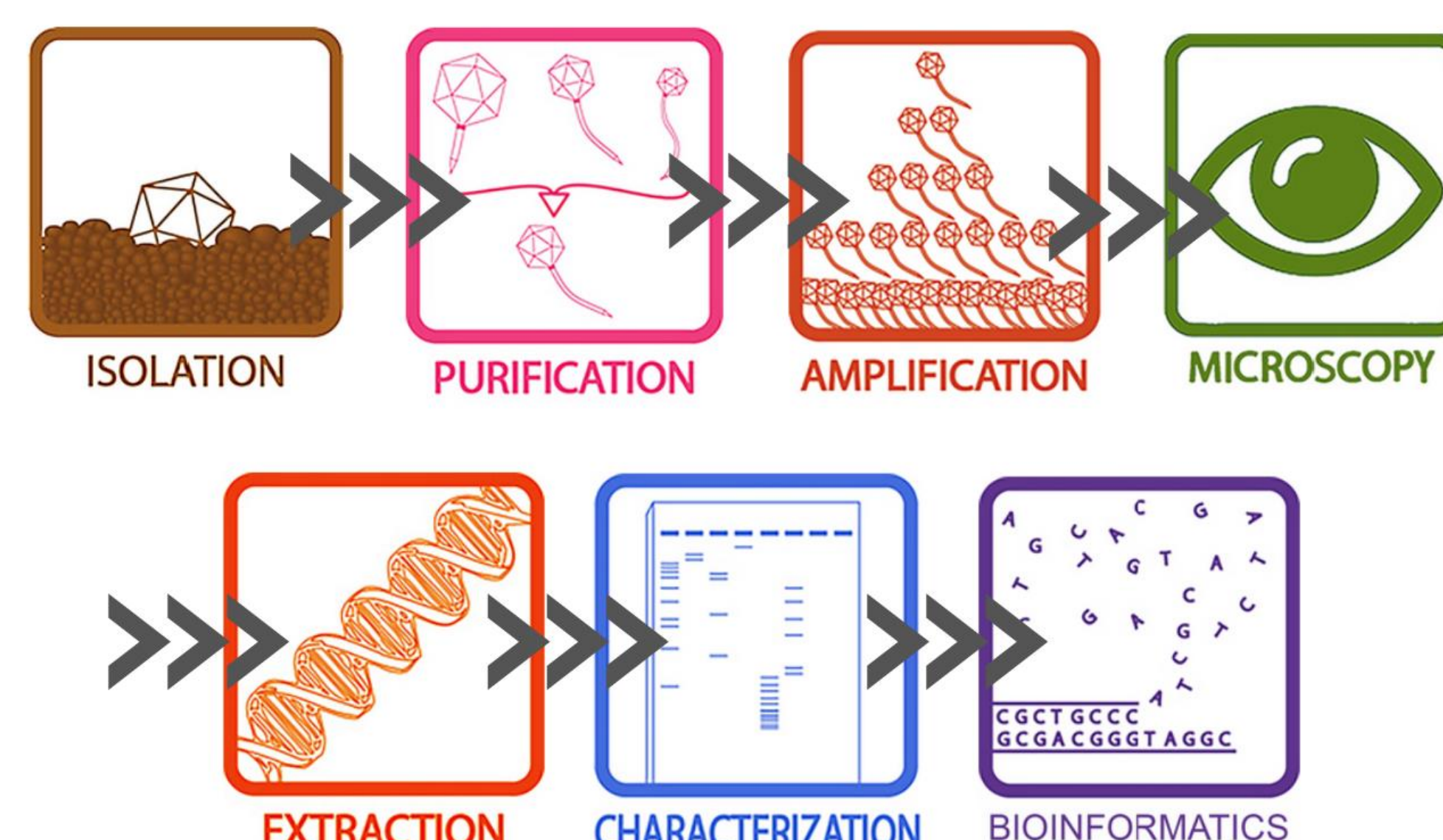
Daphne Fauber (she/her)
MS Ag and Bio Engineering
BS Technology Education

Research Interests:
Biotechnology Education,
Open-Source Biological Data
Sharing, Medical Access
Anthropology



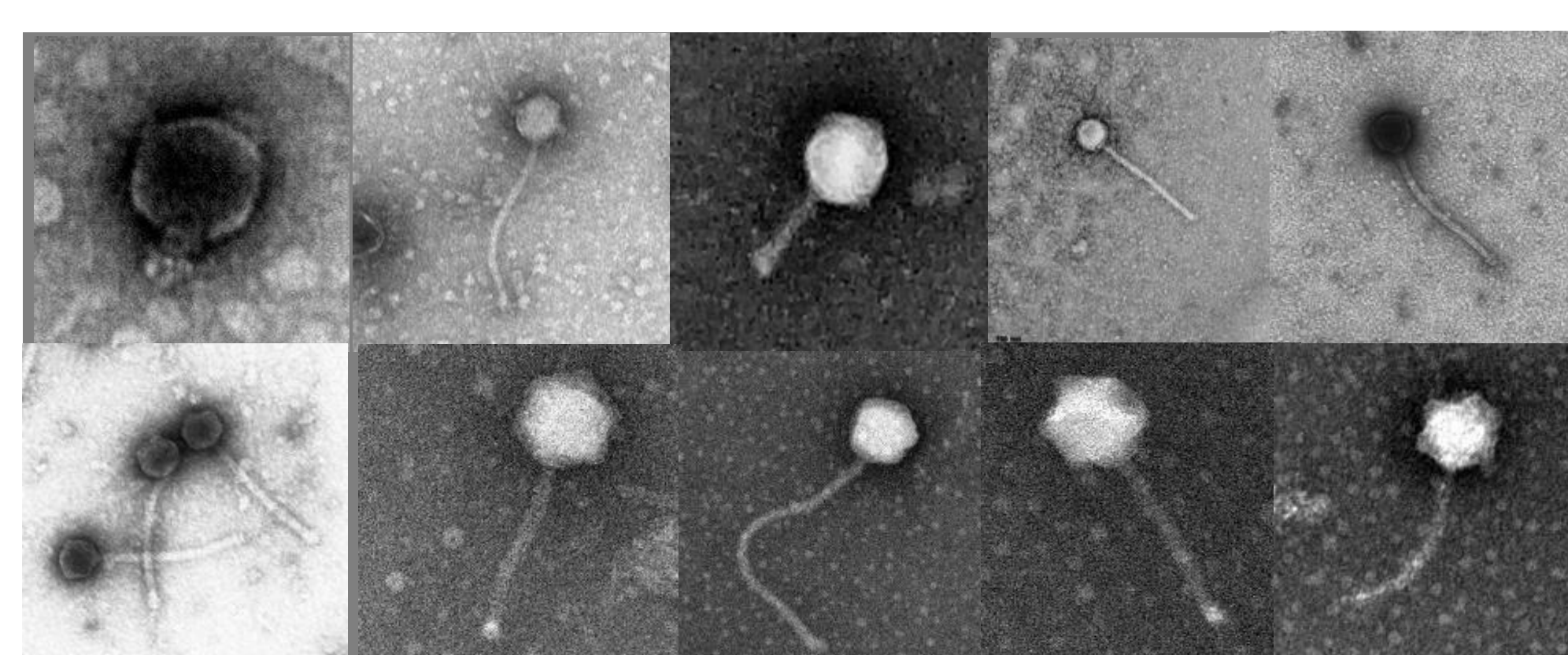
AUTHENTIC DISCOVERY

- ABE 226 & 227 are the SEA-PHAGES courses taught at Purdue
- In ABE 226 students learn about the nature of science and research as well as basic wet lab skills through the context of discovering novel bacteriophages
- IN ABE 227 students learn about bioinformatics by annotating the genomes of recently sequenced bacteriophages



Images adapted from the SEA-PHAGES Discovery Guide to show the scientific discovery steps undertaken by students.

- Throughout both courses students create professional deliverables in the form of research papers, conference presentations, formal publications, and public contributions to research repositories

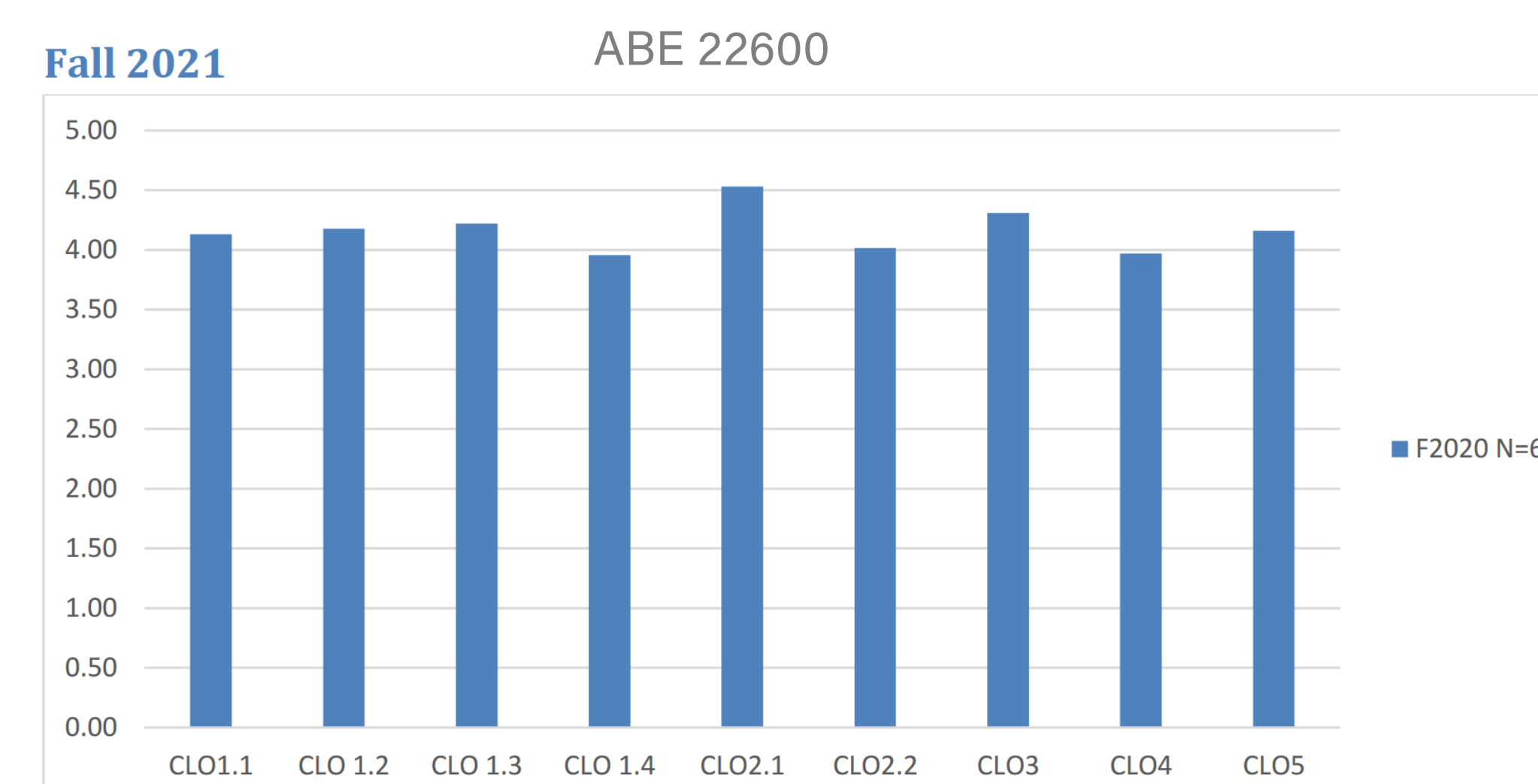


Select phages discovered by the Purdue students. From left to right: Phabuloso, RiverMonster, SilverDipper, Melana, Bobi, DeLaCroix, VioletNova, GreenWhale, Sharklegs, Zaza

PROFESSIONAL OUTCOMES

Through the courses students have discovered 221 novel bacteriophages, annotated 31 genomes, and made all data publicly available.

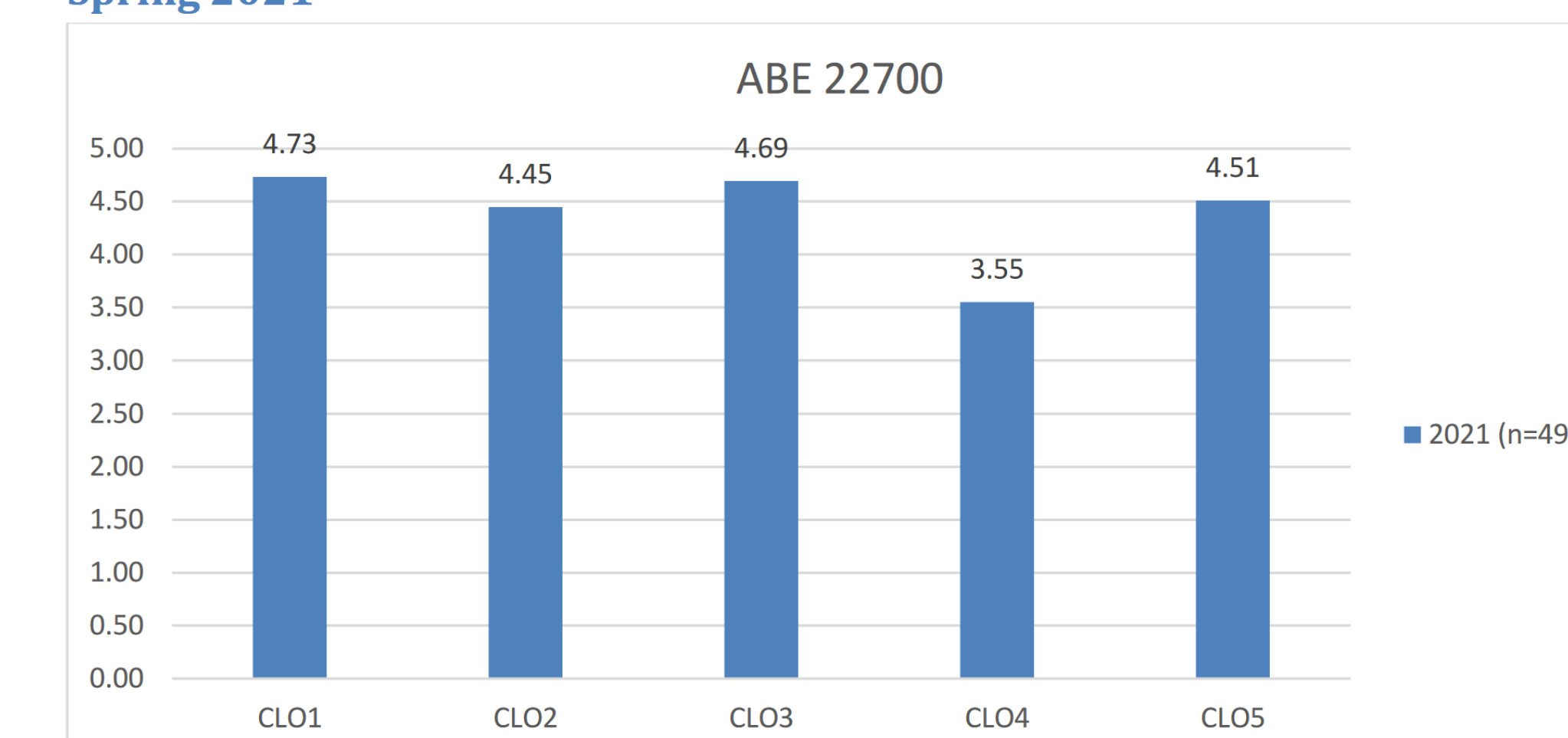
- Since 2017, (when the SEA-PHAGES class joined the ABE department) 397 students have taken ABE 226 and 371 have taken ABE 227



ABET Accreditation survey self-reported outcomes for ABE 226 students in Fall 2021 on a Likert Scale, (5 = Strongly Agree).

- CLO 1.1 The student will be able to explain the experimental basis of techniques used.
- CLO 1.2 The student will be able to define the basic biotechnology terms.
- CLO 1.3 The student will acquire basic research skills.
- CLO 1.4 The student will gain experience in utilizing scientific journal articles.
- CLO 2.1 The student will isolate and characterize a unique mycobacteriophage
- CLO 2.2 The student will be able to navigate uncertainty.
- CLO 3 The student will propose a synthetic biology experiment with bacteriophage.
- CLO 4 The student will work on a team and communicate their results
- CLO 5 The student will contribute new knowledge about the unique phage

Spring 2021



ABET Accreditation survey self-reported outcomes for ABE 227 students in Spring 2021 on a Likert Scale, (5 = Strongly Agree).

- CLO 1 The student will determine potential genes.
- CLO 2 The student will discover the genomic organization of their phage.
- CLO 3 The student will define potential genes, and assign functions to them.
- CLO 4 The student will utilize scientific literature related to their research project.
- CLO 5 The student will share information with others in the scientific community.

LOOKING AHEAD

ABE 226 & 227 will continue to evolve in order to align with accreditation standards and pedagogical best practices as a means to best prepare Purdue undergraduates for their future careers. Students will continue to make important discoveries and advance both their own knowledge and the knowledge of the whole bacteriophage community.

CITATIONS

- Howard Hughes Medical Institute. (2018). *Phage Discovery Guide*. <https://seaphagesphage.discoveryguide.helpdocsonline.com/home>
- Howard Hughes Medical Institute (2023). *SEA-PHAGES*. <https://seaphages.org/>.
- Phages DB. (2023). *The Actinobacteriophage Database*. <https://phagesdb.org/>

Thank you to the ABE 226 & 227 instructional teams from the past to the future for the endless work you've done to make this a reality. Extra big thanks to the admin team that manages and tracks the class data for the ABE department, we'd be lost without you!