

Biology Major – Student Learning Outcomes and Student Assessment Plan

Student Learning Outcomes

In order to develop into well-versed biologists and to be prepared for future education in graduate and professional schools or careers in the life sciences, Biology majors will be able to:

1. Describe, interpret, and integrate the fundamental principles and theories that underlie our understanding of the living world, and the empirical evidence that supports that understanding.
2. Explain the process of science, evaluate and critique its products, and implement it to develop hypotheses and models for experimentation in the context of biology.
3. Produce and deliver clear and effective oral and written communications of biological concepts and discoveries to a variety of audiences.
4. Discuss and investigate how fields of biology are interconnected and engage with other scientific disciplines, including the growing role of interdisciplinarity in scientific research.
5. Relate skills and knowledge of biology to other disciplines in the liberal arts and evaluate the ways in which the life sciences interface with various aspects of our society, including ethics and governance.

Curriculum Map

The curriculum map has been placed at the end of this document.

Student Assessment Plan (SAP)

Student learning outcomes will be *directly* assessed through the following mechanisms:

- **Senior Comprehensive Exam.** This exam will be administered to all Biology graduating seniors as part of their Senior Seminar (BIOL 497) during the semester in which they take the course. This exam will be prepared by the Biology faculty and will cover the central topics covered in the core courses for the major, as well as the upper level Biology electives. All elective courses will be represented in the exam, and students will choose to answer questions from two of the upper level electives they have taken. The comprehensive exam is part of the Capstone Experience for Biology majors and the grade on it will be factored into the senior capstone grade. This exam directly relates to Learning Outcome 1. The comprehensive exam will also include an open response question in which students will provide a feedback on how they are able to “Relate skills and knowledge of biology to other disciplines in the liberal arts and evaluate the ways in which the life sciences interface with various aspects of our society, including ethics and governance” – a rubric will be generated and the grade will be used to assess Learning Outcome 5.

- **Literature Critiques and Discussion.** Students will produce three literature critiques as part of their assignments in Senior Seminar (BIOL 497). The Biology faculty teaching the core courses in Biology will select papers which contain presentations of important concepts in Cell and Molecular Biology, Organismal Biology, and Ecology and Evolution, and the faculty member teaching the course will then choose one paper from each topic area. Students enrolled in Senior Seminar will then be asked to produce critiques of each of these papers and will discuss them in class. All of the critiques will be evaluated using a rubric created by the Biology faculty, and the participation of students in the paper discussions will also be assessed. These critiques and discussions relate to Learning Outcomes **1, 2A, 3A1, 3B1, and 4.**
- **Literature Review, Research Proposal, and Presentation.** In Senior Seminar (BIOL 497), students will conduct a literature review of a topic of their choice and develop a grant proposal using their literature review as background. They will then present their research proposals to their colleagues in the course and the professor teaching the course. Their literature review, grant proposals, and presentations will be evaluated using rubrics created by the Biology faculty. The literature review and research proposal relate to Learning Outcomes **1, 2, 3A1, and 3B1.**
- **Elevator Pitch.** In Senior Seminar (BIOL 497), students will develop an “elevator pitch” that they can use to explain a scientific topic to the layperson. The elevator pitch will also be used as the basis for the generation of a written document. Both of these exercises will be graded and used to assess Learning Outcomes **3A2 and 3B2.**

Student Learning Outcomes will be *indirectly* assessed through the following mechanisms:

- **Tracking students following graduation.** The Biology Chair will be responsible for maintaining a database with information on the career paths of Biology students after they graduate from Hendrix.
- **Senior Survey.** Seniors will be administered a summative survey. Students will evaluate the biology program and the program’s contribution to their knowledge and skill development. Students will also be asked about their background and future plans, and their personal views of the biology program.

Curriculum Map

			Definitions			Course Mapping– Core Sequence			Course Mapping– Electives	
		Biology Learning Goal	Benchmark	Milestone	Capstone	Benchmark	Milestone	Capstone	Benchmark	Milestone
LG1		Describe, interpret, and integrate the fundamental principles and theories that underlie our understanding of the living world, and the empirical evidence that supports that understanding	Describe	Describe and interpret	Describe, interpret, and integrate	BIOL 150	BIOL 190, BIOL 220, BIOL 250, BIOL 260	BIOL 497		BIOL 205, BIOL 215, BIOL 320, BIOL 330, BIOL 340, BIOL 360, BIOL 362
LG2	A	Explain the process of science, evaluate and critique its products	Explain	Explain and evaluate	Explain, evaluate, and critique	BIOL 150, BIOL 190, BIOL 220	BIOL 250, BIOL 260	BIOL 497	BIOL 205, BIOL 215	BIOL 330, BIOL 335, BIOL 320, Biol 340
LG2	B	Implement the process of science to develop hypotheses and models for experimentation in the context of biology	Limited depth and/or High levels of assistance	Moderate depth with some assistance	High depth/complexity, with little to no assistance		BIOL 150, BIOL 190, BIOL 220, BIOL 250, BIOL 260*	BIOL 260*, BIOL 497		BIOL 325, BIOL 320, BIOL 340, Biol 362
LG3	A1	Produce and deliver clear and effective oral communications of biological concepts and discoveries to specialized scientific audiences	Explain	Explain and evaluate	Explain, evaluate, and critique	BIOL 150, BIOL 190	BIOL 220, BIOL 260	BIOL 497	BIOL 205, BIOL 215	BIOL 335, BIOL 465, BIOL 470
	A2	...to the general public	Explain	Explain and evaluate	Explain, evaluate, and critique	BIOL 150		BIOL 260, BIOL 497		
LG3	B1	Produce and deliver clear and effective written communications of biological concepts and discoveries to specialized scientific audiences	Explain	Explain and evaluate	Explain, evaluate, and critique	BIOL 150	BIOL 190, BIOL 220, BIOL 250, BIOL 260	BIOL 497		BIOL 205, BIOL 215, BIOL 340, BIOL 425

	B2	...to the general public	Explain	Explain and evaluate	Explain, evaluate, and critique	BIOL 150		BIOL 260, BIOL 497		
LG4		Discuss and investigate how fields of biology are interconnected and engage with other scientific disciplines, including the growing role of interdisciplinarity in scientific research.	Recognize connections	Discover connections	Integrate, investigate, and apply connections	BIOL 150, BIOL 190, BIOL 220, BIOL 250	BIOL 220	BIOL 260, BIOL 497		BIOL 205, BIOL 215, BIOL 335, BIOL 355, BIOL 360, BIOL 470
LG5		Relate skills and knowledge of biology to other disciplines in the liberal arts and evaluate the ways in which the life sciences interface with various aspects of our society, including ethics and governance	Recognize connections	Discover connections	Integrate, evaluate, and apply connections	BIOL 150	BIOL 190, BIOL 220	BIOL 260, BIOL 497		BIOL 205, BIOL 215, BIOL 300, BIOL 320, BIOL 325, BIOL 335, BIOL 370, BIOL 425, BIOL 460, BIOL 470
		<i>*Most semesters, students achieve capstone level through an independent project; however occasionally students engage in more directed research, and thus reach milestone level</i>								