Supplemental Material

CBE—Life Sciences Education

Wienhold and Branchaw

Exploring Biology (Biology 100, 2 credits)
Sample Syllabus

Instructors:
Course Director
Teaching Fellows/Assistants
Peer Mentors

Class Meetings: day(s), time(s), and location(s)

Welcome! Exploring Biology (Biology 100) is a freshmen seminar course designed to introduce you to a wide variety of ideas, concepts, and ways of thinking about biology. We will explore core concepts in biology across multiple scales (molecules to ecosystems), learn about the diverse array of learning opportunities inside and outside the classroom offered at [school name], and engage in activities that will prepare you for success in college and beyond.

Throughout the semester we will discuss a number of topics in biology and explore how they are related through five biology core concepts:

1. **Evolution** – the diversity of life evolved over time by of mutation, natural selection, and genetic change.
2. **Structure and Function** – basic units of structure define the function of all living things.
3. **Information Flow, Exchange and Storage** –the growth and behavior of organisms are activated through the expression of genetic information in context.
4. **Pathways and Transformation of Energy and Matter** – biological systems grow and changes by processes based upon chemical transformation pathways and are governed by the laws of thermodynamics.
5. **Systems** – living systems are interconnected and interacting.

After completing this course, you will:

1. Have the knowledge, skills and confidence to successfully pursue a bioscience degree and career.
2. Know about biology extra-curricular learning opportunities and have the navigation skills and knowledge needed to integrate these experiences into your academic plans.
3. Understand the breadth of biology and how it contributes to society.

Course Structure

A variety of biological topics will be introduced and explored from different angles in activities and assignments that use the biology core concepts. Several activities and assignments will also be used to help you define your academic goals and a pathway to achieve your goals. You will work in small groups to discuss, evaluate, and extend your understanding of the topics and time in class will be dedicated to work on assignments and group projects. Each small group will be facilitated by a teaching assistant and peer mentor.

Course Instructors

Each student is assigned to one member of the instructional team, but all members of the team are available to support your learning. The graduate students and postdoctoral researchers are from a wide variety of biological fields and the peer mentors are senior biology students who can answer questions about help you navigate your learning experience at [school name].

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Course Components & Grading

70% Biology Core Concepts

1. **Weekly Assignments (35%)** Weekly online assignment due before class.
2. **Mid-term Exam (15%)** Assessment of understanding of biology topics and core concepts.
3. **Final Exam (20%)** Comprehensive assessment of understanding of biology topics and core concepts.

25% First-year Seminar Semester Projects

1. **Biological Discovery Poster (12.5%)** In this project you will select and learn about a scientific discovery and share that knowledge with your classmates by creating and presenting a scientific poster. This project spans the length of the semester and incorporates several activities and assignments including, a library orientation session, an interview with a local scientist, several reflection essays, and the development and presentation of the poster.

2. **Biology BioMap (12.5%)** In this project you will explore your career and personal interests to make a comprehensive academic plan. This project spans the length of the semester and incorporates information learned through several activities and assignments including, career exploration surveys, major and career fairs, several reflection essays, and explorations of extra-curricular activities. You will work with an advisor to draft your 4-year plan and then develop a cover letter and resume to send as an inquiry to get involved one of the extra-curricular activities.

5% Biology Event Participation

Throughout the semester, you will attend at least 4 biology related events of your choice occurring across campus and submit short reflection essays describing on your experiences. Recommended events will be announced weekly.

Course Policies

Attendance

To learn in Exploring Biology you must attend class where you will participate in discussions with your classmates and engage with the instructors, peer mentors and guest speakers. Excused absences may be granted for personal illness, observance of a religious holiday, an emergency, or another personal or family matter that requires your presence. Each request for an excused absence must be sent to the instructional team prior to the beginning of class and be approved by the instructional team. Absences that are not approved are unexcused.

Academic Plagiarism and Integrity

[insert school specific policy here]

Accommodations

[insert school specific policy here]

Respect and Classroom Climate

[insert school specific policy here]

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Week	Topic	Core Concepts	Biological Scale(s)	Assignments
1	Course Introduction			Weekly Assignment 1
2	HIV	Evolution; Structure & Function	molecular & cellular	Weekly Assignment 2 Poster Assignment 1
3	Library Literacy (at library) Career Fair			Weekly Assignment 3
4	Cancer	Information Flow; Systems	organismal	Weekly Assignment 4 Poster Assignment 2
5	Blood Iron Levels	Pathways & Transformations; Systems	molecular & cellular	Weekly Assignment 5 BioMap Assignment 1
6	Infectious Proteins	Structure & Function; Systems	molecular & cellular; organismal	Weekly Assignment 6
7	Insects and Climate Change	Evolution; Structure and Function	organismal; ecological	Weekly Assignment 7 Poster Assignment 3
8	Advising Majors Fair			Weekly Assignment 8
9	**Mid-Term Exam** Extracurricular Activities Fair			Mid-term Course Evaluation
10	Antibiotic Resistance	Structure & Function; Evolution	molecular & cellular	Weekly Assignment 9
11	Cheese	Pathways & Transformations; Systems	molecular & cellular; ecological	Weekly Assignment 10 BioMap Assignment 2
12	Immunizations	Information Flow; Systems	organismal	Weekly Assignment 11 Poster Assignment 4
13	Stem Cells	Information Flow; Structure & Function	molecular & cellular	Weekly Assignment 12
14	Agricultural Food Systems	Evolution; Systems	organismal, ecological	Final BioMap Assignment Biology Events Assignment
15	Poster Session			Final Poster Assignment 5
16	**Final Exam**			Course Evaluation

*Note: The order in which the core concepts are taught depends on the biology topics covered. The goal is to cover each core concept at each scale at least once and to connect them to one another.

Summary of Frequency Grades Earned in First and Second Semester Introductory Biology
**p=<0.05*

		Pass					*Adverse*
		A	AB	*B*	*BC*	*C*	*D, F, drop*
First Semester	ExB (n = 349)	14.6%	11.5%	44.4%	9.2%	15.8%	4.6%
	Comparison (n=349)	12.9%	10.6%	42.7%	7.7%	17.8%	8.3%
	Z-score	-0.7	-0.4	-0.5	-0.7	0.7	2.0*
Second Semester	ExB (n = 306)	18.3%	12.4%	48.4%	6.2%	14.1%	0.7%
	Comparison (n=286)	17.5%	11.2%	47.2%	8.4%	11.5%	4.2%
	Z-score	-0.3	-0.5	-0.3	1.0	-0.9	2.8*