

# BIOLOGY CORE CURRICULUM (BIOCORE)

## BIOCORE 181 – BECOMING A SCIENTIST: DOING BIOLOGY RESEARCH

2 credits.

Orientation to biology research on campus, work in a research team to investigate a novel research question, and do biology research on a choice of topics: from ecology and physiology to cell biology. Emphasis is on critical thinking required in designing and conducting experiments, analyzing and interpreting data, and communicating findings orally and in writing.

**Requisites:** None

**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Elementary

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Honors Only Courses (H)

**Repeatable for Credit:** No

**Last Taught:** Fall 2025

**Learning Outcomes:** 1. Apply approaches for being a successful college student

Audience: Undergraduate

2. Communicate what biology research looks like, sounds like, and feels like at UW Madison

Audience: Undergraduate

3. Do biology research and engage as a member of a biology research community

Audience: Undergraduate

## BIOCORE 381 – EVOLUTION, ECOLOGY, AND GENETICS

3 credits.

Basic principles of ecology and interrelations between individuals, populations, communities, ecosystems and their environment; transmission genetics and introduction to population genetics; origin of life, evolutionary mechanisms, ancestral relationships among species, and the diversity of life.

**Requisites:** Declared in Biology Core Curriculum Honors Certificate

**Course Designation:** Gen Ed - Communication Part B

Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Honors Only Courses (H)

**Repeatable for Credit:** No

**Last Taught:** Fall 2025

**Learning Outcomes:** 1. Understand what we know, how we know, and what we don't know in ecology, transmission genetics and evolution at the intermediate level

Audience: Undergraduate

2. Apply scientific theory, concepts, reasoning, and quantitative and qualitative approaches to understand and solve problems

Audience: Undergraduate

3. Use terminology accurately and effectively within appropriate conventions of the discipline

Audience: Undergraduate

4. Find, evaluate and relate relevant information found in primary scientific literature using core library resources

Audience: Undergraduate

5. Build a logical argument in writing based on critical reading, and use of evidence and scientific reasoning

Audience: Undergraduate

6. Analyze a problem using a systems approach, recognizing levels of biological scale and organization

Audience: Undergraduate

7. Work as a member of a productive, collaborative group

Audience: Undergraduate

8. Demonstrate scientific communication skills and the ability to translate scientific concepts to a broader community using appropriate style and disciplinary conventions

Audience: Undergraduate

### **BIOCORE 382 – EVOLUTION, ECOLOGY, AND GENETICS**

#### **LABORATORY**

2 credits.

Writing-intensive with opportunities to make observations and generate and test questions. Includes ecology field trips and research projects that focus on genetics and evolution.

**Requisites:** BIOCORE 381 or concurrent enrollment

**Course Designation:** Gen Ed - Communication Part B

Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Honors Only Courses (H)

**Repeatable for Credit:** No

**Last Taught:** Fall 2025

**Learning Outcomes:** 1. Ask testable, relevant, creative scientific questions related to ecology, transmission genetics and evolution.

Audience: Undergraduate

2. Search, sort and gather relevant background information from texts and primary literature.

Audience: Undergraduate

3. Make predictions and formulate clear, testable hypotheses.

Audience: Undergraduate

4. Develop protocols that test hypotheses.

Audience: Undergraduate

5. Evaluate assumptions associated with experimental design and the biological system.

Audience: Undergraduate

6. Analyze data and make logical conclusions utilizing statistical reasoning.

Audience: Undergraduate

7. Communicate effectively about science through writing and oral presentations.

Audience: Undergraduate

8. Work as a member of a productive, collaborative research team.

Audience: Undergraduate

### **BIOCORE 383 – CELLULAR BIOLOGY**

3 credits.

Cellular and molecular basis of life. The main themes are the structure and function of cells and organelles, the flow of energy in cells, and the storage, expression, and regulation of genetic information.

**Requisites:** BIOCORE 381

**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Honors Only Courses (H)

**Repeatable for Credit:** No

**Last Taught:** Spring 2026

**Learning Outcomes:** 1. Apply scientific concepts, reasoning, and quantitative and qualitative approaches to solve problems in cell biology, cell signaling, and molecular genetics at the intermediate level.

Audience: Undergraduate

2. Use scientific terms to accurately describe the concepts of cell biology, biochemistry, cell signaling, and molecular genetics.

Audience: Undergraduate

3. Build logical arguments to explain how cellular systems and processes function.

Audience: Undergraduate

4. Analyze cell biology problems that require synthesizing knowledge about cellular structure, function, and genetics.

Audience: Undergraduate

5. Diagram and explain the complex interplay of how cellular function is regulated through biochemical and genetic processes.

Audience: Undergraduate

6. Make predictions about cell biology and molecular genetics data based on evidence and quantitative reasoning.

Audience: Undergraduate

**BIOCORE 384 – CELLULAR BIOLOGY LABORATORY**

2 credits.

Writing-intensive with opportunities to generate and test questions utilizing concepts and procedures of cell biology. Includes research projects in subcellular fractionation, protein structure and enzyme catalysis, molecular genetics of *C.elegans* worms, and signal transduction in yeast.

**Requisites:** BIOCORE 383 or concurrent enrollment

**Course Designation:** Gen Ed - Communication Part B

Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Honors Only Courses (H)

**Repeatable for Credit:** No

**Last Taught:** Spring 2026

**Learning Outcomes:** 1. Search, sort, and gather relevant background information from texts and primary literature in cellular biology.

Audience: Undergraduate

2. Make predictions and formulate clear, testable hypotheses supported by biological rationale at an intermediate level.

Audience: Undergraduate

3. Develop protocols and work with tools and procedures to test hypotheses in cellular and molecular biology.

Audience: Undergraduate

4. Communicate effectively about science through writing and oral presentations.

Audience: Undergraduate

5. Give and receive constructive feedback using professional communication and effective interpersonal skills.

Audience: Undergraduate

6. Utilize quantitative and scientific reasoning skills to analyze, evaluate, and interpret data to make logical conclusions based on evidence.

Audience: Undergraduate

7. Work as a member of a productive, collaborative research team.

Audience: Undergraduate

**BIOCORE 401 – PEER MENTORING**

1 credit.

Develops mentoring, group facilitation, leadership, and interpersonal skills used in peer learning and leading mentored study groups. Focuses on the pedagogy, skills, and effective techniques used to facilitate learning in small groups. Discuss lower order to higher order cognitive levels using Blooms Taxonomy, and reciprocal mentor observations.

**Requisites:** BIOCORE 381, 383, and (BIOCORE 382 or 384)

**Course Designation:** Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** No

**Last Taught:** Fall 2025

**Learning Outcomes:** 1. Facilitate small group discussion by questioning and challenging biological misconceptions.

Audience: Undergraduate

2. Develop biological problems and questions at increasingly more challenging cognitive levels using Bloom's taxonomy.

Audience: Undergraduate

3. Recognize essential problem solving skills and develop activities to foster those skills.

Audience: Undergraduate

4. Provide support for mentee development of effective study habits and time management.

Audience: Undergraduate

5. Create a positive and inclusive environment to help foster community development and reduce mentee course anxiety.

Audience: Undergraduate

6. Develop as a reflective leader.

Audience: Undergraduate

7. Mentor and contribute to development of your peers through observations and feedback.

Audience: Undergraduate

8. Facilitate development of autonomous study groups in a Biocore course.

Audience: Undergraduate

**BIOCORE 485 – PRINCIPLES OF PHYSIOLOGY**

3 credits.

Study the physiology of and consider how plants and animals interact with their environments to survive, obtain nutrients, exchange gases, and reproduce, also how the complex systems of neural and endocrine regulation in animals and hormonal and environmental regulation in plants allow cells and organs to communicate.

**Requisites:** BIOCORE 383

**Course Designation:** Breadth – Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Honors Only Courses (H)

**Repeatable for Credit:** No

**Last Taught:** Fall 2025

**Learning Outcomes:** 1. Frame biological questions about physiological systems, formulate testable hypotheses to guide in answering the questions, design experiments to test hypotheses (including appropriate controls), and predict/recognize/graph data that support these hypotheses.

Audience: Undergraduate

2. Build logical arguments about the operation of physiological systems based on evidence.

Audience: Undergraduate

3. Use and manipulate basic mathematical equations that model physiological systems.

Audience: Undergraduate

4. Integrate past experience, accumulated knowledge, and creativity to solve complex physiological problems.

Audience: Undergraduate

5. Recognize diversity in organismal design and response to environmental challenges

Audience: Undergraduate

6. Define the components of regulatory systems, propose models to explain observed physiological phenomena, and explain the fundamental role of regulation in physiological processes.

Audience: Undergraduate

7. Explain and give specific examples to demonstrate how structure – function relationships underlie/determine physiological phenomena.

Audience: Undergraduate

8. Evaluate the reliability and validity of scientific information.

Audience: Undergraduate

9. Use scientific terminology precisely and appropriately.

Audience: Undergraduate

10. Demonstrate effective scientific discourse as a member of a group.

Audience: Undergraduate

**BIOCORE 486 – PRINCIPLES OF PHYSIOLOGY LABORATORY**

2 credits.

Experience the process of science by collaborating on independent experiments to investigate your questions about animal and plant physiology. Emphasis is on critical thinking required in designing and conducting experiments, analyzing and interpreting data, and communicating findings orally and in writing.

**Requisites:** BIOCORE 485 or concurrent enrollment

**Course Designation:** Breadth – Biological Sci. Counts toward the Natural Sci req

Level - Intermediate

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Honors - Honors Only Courses (H)

**Repeatable for Credit:** No

**Last Taught:** Fall 2025

**Learning Outcomes:** 1. Appropriately utilize Biocore 485 lecture concepts in an applied setting.

Audience: Undergraduate

2. Engage in the process of science, including the problem-solving involved in designing and executing experiments, and the critical thinking required to carefully analyze and interpret results.

Audience: Undergraduate

3. Work with tools & procedures to investigate biology.

Audience: Undergraduate

4. Concisely, clearly, and precisely communicate your plans and findings to others using written and oral communication

Audience: Undergraduate

5. Utilize quantitative reasoning skills (statistical analysis skills).

Audience: Undergraduate

6. Work as a member of a productive, collaborative research team

Audience: Undergraduate

7. Build on, apply, and integrate concepts & skills that you learn in other Biocore courses.

Audience: Undergraduate

8. Contribute to a safe, sustainable, socially and ethically responsible learning environment

Audience: Undergraduate

**BIOCORE 587 – BIOLOGICAL INTERACTIONS**

3 credits.

A capstone course to build on and integrate the knowledge and skills gained in previous Biocore coursework through readings and analysis of primary scientific literature. Work in small groups to analyze current and emerging topics through the lens of scientific research. Topics include signaling pathways, systems biology, genetic disease, and cancer.

**Requisites:** BIOCORE 485

**Course Designation:** Breadth – Biological Sci. Counts toward the Natural Sci req

Level – Advanced

L&S Credit – Counts as Liberal Arts and Science credit in L&S

Honors – Honors Only Courses (H)

**Repeatable for Credit:** No

**Last Taught:** Spring 2026

**Learning Outcomes:** 1. Work as a productive, collaborative member of a team.

Audience: Undergraduate

2. Explain why there is not always just one right answer to a question.

Audience: Undergraduate

3. Draw on experience, accumulated knowledge, and creativity to solve complex biological problems.

Audience: Undergraduate

4. Build a logical evidence-based argument.

Audience: Undergraduate

5. Describe how a whole system works from the molecular to the organismal level.

Audience: Undergraduate

6. Frame sophisticated biological questions and formulate testable hypotheses, using appropriate methods to test your hypothesis.

Audience: Undergraduate

7. Read and analyze primary scientific literature.

Audience: Undergraduate

8. Think as a biological scientist and be able to communicate your knowledge to others.

Audience: Undergraduate

**BIOCORE 699 – DIRECTED STUDY**

1-3 credits.

Independent mentored study as arranged with a faculty member

**Requisites:** Consent of instructor

**Course Designation:** Level – Advanced

L&S Credit – Counts as Liberal Arts and Science credit in L&S

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Fall 2025