Biology 112: Evolution, Form and Function of Organisms

Asynchronous and Online
Course Syllabus

Instructor: Dr. Heather Spalding
Email: spaldinghl@cofc.edu
Spring 2021

Course Description:

● A foundation course for science majors providing an introduction to evolution with an emphasis on the structure, form and function of plants and animals. Students will be exposed to lectures, activities, readings, discussions, videos, and assessment to ensure a thorough, lasting understanding of the material. Completion of this class and the associated laboratory meets a General Education requirement.

Pre-requisites

● Successful completion of Biology/Honors 111/151, or a high grade in Biology 101. Biology 112 laboratory is normally a co-requisite, unless students already have credit for the laboratory portion of the course.

Course Learning Objectives:

● This general education science sequence provides a background for understanding and evaluating contemporary topics in biology. Students develop a foundational understanding of core concepts to use and on which to expand in upper level courses. They also develop the critical competencies that form the bases for the practice of science and use of scientific knowledge.

Required Course Materials:

● Computer/technology with reliable access to internet
● Software/Apps: OAKS, PowerPoint, Zoom

**This course uses digital course materials designed using Open Educational Resources (OER), high-quality, openly licensed educational materials, rather than a traditional textbook. You can access all readings, videos, quizzes and other activities through our OAKS course. Our course materials were selected by the Department of Biology, with support from CofC’s OER Incentive Program. You will not have any additional cost for textbooks. CofC is committed to student access and excellence. Extra care and effort was involved to assure access to high-quality affordable materials. I am interested in your experience using these materials and welcome your feedback at any time during the course of this class.**
OAKS

- OAKS, including Gradebook, will be used for this course throughout the semester to provide the syllabus, class materials, and grades for each assignment, which will be regularly posted.
- New to Oaks? Get up to speed fast with tutorials here.

Contact/Communication:

Private/Student-To-Instructor Contact

- Students should contact me about issues that are specific to the student by email at spaldinghl@cofc.edu
- My response time with emails will typically be within 24 hours on weekdays and within 48 hours on weekends.

How To Write an Email To Your Professor

- Most organizations are dependent on email for internal and external communications. The way you present yourself in an email says a lot about your work ethic and your priorities. Start practicing email etiquette now so that it will be second-nature when you enter the workforce, graduate school, or medical school.

  - When corresponding with me, please:
    o include BIOL 112 in the subject line
    o include a respectful greeting (e.g., “Hi Dr. Spalding” or “Dear Dr. Spalding”)
    o use complete sentences
    o fully sign your name
    o THEN….proofread your email

Office Hours

- Zoom office hours every Friday from 10:00 – 11:00 am or by appointment. You can click HERE for the Zoom office hours link or copy and paste: https://cofc.zoom.us/j/92877213183

Course Communication and Community Building

- OAKS will be utilized for content, quizzes, discussions, news, updates, and online office hours.
- Email and the OAKS Announcements will be used to communicate important or sudden changes in course information.
- The Discussion Board “Course Lounge” will be used for students to freely ask and respond to questions about the course that are not student-specific. I will respond to these posts within 24 hours on the weekdays and within 48 hours on the weekends.
- We will all work together to build our classroom and online learning community. I will play a facilitating role in helping you get to know, work with, trust, and collaborate with the other
members of our class. Each member of the class must be willing to participate in a dynamic and engaging learning group that is inclusive. Your participation, willingness to contribute, and initiative are paramount to having a successful and enjoyable learning experience. We aim to develop a spirit of camaraderie and team learning that will unite us as a community of learners.

Ask Three, Then Me

- I receive hundreds of emails every week, many from students asking questions that could easily be answered by reading the syllabus or asking a classmate. Thus, before emailing me, please follow these steps:

  1. Consult the class schedule and syllabus.
  2. Check OAKS for announcements and instructions, including the Course Lounge discussion board.
  3. Confer with three classmates.

- If you still don’t know the answer to your question, you may email me. Please help me maintain my sanity by following these steps!

Expectations:

- Students should plan to log into Oaks at least 3 times per week. Remember that I can see when you log into OAKS and will monitor your progress.
- Students should dedicate 6+ hours per week to this course to be successful.
- This class is student-driven. Motivation must come from the student.
- Our class should be interactive and engaging! Students are expected to contribute to our online learning community. Because we don’t meet face-to-face, it’s essential that you maintain an active presence in the class, including posting to and reading discussion board threads within 1 week of being assigned.
- The last day to drop/add this class is Jan 19, 2021. The last day to withdraw with a “W” is March 22, 2021.

Navigating This Course:

- This course requires weekly obligations including chapter readings, quizzes, graded assignments, discussion boards, or exams as described in the course schedule. All assignments can be accessed through links in the Content section of OAKS or directly through the OAKS Quizzes, Discussion Boards, or Dropboxes.
- Every week will entail two Zoom lectures released on Monday and Wednesday (excluding weeks with an exam, which will only have one Zoom lecture) and one Weekly Update.
- To succeed in this course, you will need to read the assigned chapter sections before lecture, take your own notes, and then add to your notes during the Zoom lecture.
● There will be an **open book quiz every weekend** on the material from that week. Students may not work together on the quiz or use the internet. The quiz opens up at 9:00 am on Friday and closes at 11:59 pm on Sunday. All quizzes will be multiple choice or T/F, and composed of 10 random questions (each quiz has different, randomly chosen questions). You will have up to 3 opportunities to take the quiz. Your quiz grade will be the **average** of up to 3 tries. The lowest quiz grade will be dropped.

● Developing a **weekly rhythm** will help you remain engaged and on task. If needed, please see the [Center for Student Learning](#) to get assistance with time management.

**Netiquette:**

To maintain a respectful and supportive environment, please uphold these rules of netiquette. Netiquette is network etiquette, the do's and don'ts of online communication. Use this Netiquette in all Discussion Boards in this class and email communications.

- **Be kind and ethical.** Avoid using sexist, racist, and homophobic language in your writing and speaking; it will not be tolerated. Ask yourself, "Would I say this to the person's face?" If the answer is no, rewrite. [I’m assuming here that you would not feel comfortable saying rude or harassing things to a person’s face. . . ]

- **Be aware** of how your communication may be perceived by others. For example, if you use ALL CAPITAL LETTERS, will folks feel like you are angry or shouting? Or, if you have a dry sense of humor, will your sarcasm be evident or might folks misinterpret your message?

- **Be forgiving.** We all make communication faux pas, so ask clarifying questions rather than attacking. But if you experience any questionable or outright inappropriate behavior from your colleagues, please let me know.

- **Respect disagreement.** I expect everyone in the class to respect others’ rights to speak, to listen attentively to what is said, and to use discretion and sensitivity when speaking. This does not mean you have to agree with everything said. Debate is a valuable component of a learning community. However, I expect you to be respectful of me and of your colleagues.

- **Share your knowledge.** As Bill Nye says, “everyone you will ever meet knows something you don’t.” You are an expert in something (perhaps many things), so if that expertise becomes relevant, share your knowledge!

- **Cite your sources.** When you share opinions, it’s important to support your claims with sources. This doesn’t mean that you must have a citation for everything you post, but providing evidence will strengthen your arguments and will also provide additional resources for your colleagues. But whenever you are using the intellectual property of others, you must always cite your sources.
• **Help each other.** If you notice a colleague has asked a question or written about a problem, jump in and offer assistance. This is especially true in the Course Lounge discussion board.

**Discussion Board Specifics**
- All students must abide by the Netiquette outlined above in Discussion Boards.
- *New to Discussion Boards?* Get up to speed on OAKS Discussion Boards [here](#).
- As the instructor, I will facilitate the posts (questions) while the students are expected to initiate and maintain conversation.
- The Discussion Board posts are meant to foster a sense of community in the class by respectfully responding to your fellow student’s questions, posting your own thoughts, showing your participation and engagement with the course material, and as a forum to ask course-specific questions in the Course Lounge.

**Supplemental Instruction (SI):**
- We have SI scheduled for this class. Your SI instructor is **Caitlyn Moss** (mosscr@g.cofc.edu)
- Days and times for SI will be determined early in the semester.
- SI is for everyone! You are strongly encouraged to attend at least once a week.

**Participation:**
- There is no formal attendance requirement, but you will not do well if you do not participate. You are responsible for all material posted on OAKS or discussed in lecture.

**Late work:**
- Late homework assignments are not accepted without prior approval or notification.
- Late quizzes are not permitted without formal documentation and prior approval due to official College travel, weddings, and funerals. Excused absences due to serious medical issues spanning the entire quiz period may be considered for exemption on a case by case basis.

**Inclement weather:**
- In the event of cancelled class(es) due to inclement weather, make up lectures will be available online through OAKS.

**Accommodation:**
- SNAP students, disabled students, veterans, parents, commuters, nontraditional students, athletes, International, ESL, and all students with life circumstances that may warrant accommodations are encouraged to **discuss any concerns with the Instructor within the first 2 weeks of class**, or in a timely manner. I understand that we all have many important things
going on in our lives in addition to this biology class. I aim to be friendly, approachable, and understanding. But I will challenge you, and hold you to high standards.

**Center for Student Learning:**
- The Center for Student Learning’s (CSL) academic support services provide assistance in study strategies, speaking & writing skills, and course content. Services include tutoring, Supplemental Instruction, study skills appointments, and workshops. Students of all abilities have become more successful using these programs throughout their academic career and the services are available to you at no additional cost. For more information regarding these services please visit [Center for Student Learning](http://counseling.cofc.edu) or call (843) 953-5635.

**Mental & Physical Wellbeing:**
- At the college, we take every students’ mental and physical wellbeing seriously. If you find yourself experiencing physical illnesses, please reach out to student health services (843.953.5520).
- If you find yourself experiencing any mental health challenges (for example, anxiety, depression, stressful life events, sleep deprivation, and/or loneliness/homesickness) please consider contacting either the Counseling Center (professional counselors at [http://counseling.cofc.edu](http://counseling.cofc.edu) or 843.953.5640, 3rd Robert Scott Small Building) or the Students 4 Support (certified volunteers through texting "4support" to 839863, visit [http://counseling.cofc.edu/cct/index.php](http://counseling.cofc.edu/cct/index.php), or meet with them in person at the 3rd Floor Stern Center). These services are there for you to help you cope with difficulties you may be experiencing and to maintain optimal physical and mental health.

**Food & Housing Resources:**
- Many CofC students report experiencing food and housing insecurity. If you are facing challenges in securing food (such as not being able to afford groceries or get sufficient food to eat every day) and housing (such as lacking a safe and stable place to live), please contact the [Dean of Students](http://counseling.cofc.edu) for support.
- Also, you can go to [Student Affairs](http://counseling.cofc.edu) to learn about food and housing assistance that is available to you. In addition, there are several resources on and off campus to help. You can visit the Cougar Pantry in the Stern Center (2nd floor), a student-run food pantry that provides dry-goods and hygiene products at no charge to any student in need. Please also consider reaching out to Professor Spalding if you are comfortable in doing so.

**Inclusion:**
- The College of Charleston offers many [resources for LGBTQ+ students](http://counseling.cofc.edu), faculty and staff along with their allies.
  - [Preferred Name and Pronoun Information](http://counseling.cofc.edu)
**Honor Code and Academic Integrity:**

- Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when suspected, are investigated. Each incident will be examined to determine the degree of deception involved.

- Incidents where the instructor determines the student’s actions are related more to misunderstanding and confusion will be handled by the instructor. The instructor designs an intervention or assigns a grade reduction to help prevent the student from repeating the error. The response is recorded on a form and signed both by the instructor and the student. It is forwarded to the Office of the Dean of Students and placed in the student’s file.

- Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This status indicator will appear on the student’s transcript for two years after which the student may petition for the XX to be expunged. The F is permanent.

- Students can find the complete Honor Code and all related processes in the Student Handbook.
Assessment:
- Formative assessment quizzes are multiple-choice, individual, timed, randomized, approximately 10 questions, and conducted through OAKS. They are open-book and open-notes BUT students must study and prepare ahead of time, as quizzes are challenging and there will not be time to look up individual answers.
- Exams (summative assessment) will be composed of 50 random T/F and multiple choice exams emphasizing higher order cognition.
- Graded assignments will be submitted electronically to the OAKS drop box.

Grades calculated as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Value (% of final course grade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes (9 of 10); lowest score dropped</td>
<td>30%</td>
</tr>
<tr>
<td>Exams (4)</td>
<td>20%</td>
</tr>
<tr>
<td>Cumulative Final Exam (1)</td>
<td>20%</td>
</tr>
<tr>
<td>Graded assignments (4)</td>
<td>20%</td>
</tr>
<tr>
<td>Participation Opportunity Points (10)</td>
<td>10%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Grading scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>100-93</td>
</tr>
<tr>
<td>A-</td>
<td>92-90</td>
</tr>
<tr>
<td>B+</td>
<td>89-87</td>
</tr>
<tr>
<td>B</td>
<td>86-83</td>
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<tr>
<td>B-</td>
<td>82-80</td>
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<tr>
<td>C+</td>
<td>79-77</td>
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<tr>
<td>C</td>
<td>76-73</td>
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<tr>
<td>C-</td>
<td>72-70</td>
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<tr>
<td>D+</td>
<td>69-67</td>
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<tr>
<td>D</td>
<td>66-63</td>
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<tr>
<td>D-</td>
<td>62-60</td>
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<tr>
<td>F</td>
<td>&lt;60</td>
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</table>

Participation Opportunity Points (POP):
- Embedded within the recording of the course lectures will be Participation Opportunity Points (POPs) that pertain to that specific lecture.
- Each POP is worth 1% of your final course grade.
- POPs show that you have watched the lecture, and provide opportunities for interaction and engagement with your fellow students and professor.
- Examples of POPs include assigned posts on the Discussion Board, completing student surveys, creating an original biology joke based on course material, completing a class survey, or answering a specific question relevant to the lecture.
- Each POP must be handed into the corresponding Dropbox within 1 week of assignment.
# Tentative Schedule (subject to change)

<table>
<thead>
<tr>
<th>Module</th>
<th>Class</th>
<th>Day</th>
<th>Theme</th>
<th>Topic</th>
<th>Chapter</th>
<th>Test</th>
<th>Assign</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>11-Jan</td>
<td>Introduction</td>
<td>Syllabus</td>
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<td>POP 1</td>
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<td>2</td>
<td>13-Jan</td>
<td>Review</td>
<td>Study of Life</td>
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<td>Quiz 1</td>
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<td>2</td>
<td>3</td>
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<tr>
<td>3</td>
<td>4</td>
<td>25-Jan</td>
<td>Evolution</td>
<td>Natural selection</td>
<td>18</td>
<td>Quiz 2</td>
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<td>5</td>
<td>27-Jan</td>
<td>Evolution</td>
<td>Evol. processes</td>
<td>18</td>
<td>POP 2</td>
<td></td>
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<tr>
<td>4</td>
<td>6</td>
<td>1-Feb</td>
<td>Evolution</td>
<td>Speciation</td>
<td>19</td>
<td>Selfie #1</td>
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<tr>
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<td>7</td>
<td>3-Feb</td>
<td>Evolution</td>
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<td></td>
<td>Exam 1</td>
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<tr>
<td>5</td>
<td>8</td>
<td>8-Feb</td>
<td>Plants</td>
<td>Plant structure</td>
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<td>POP 3</td>
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<td>10-Feb</td>
<td>Plants</td>
<td>Plant transport</td>
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<td>Plants</td>
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<td>Plants</td>
<td>Plant reproduc.</td>
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<td>Plant reproduc.</td>
<td>32</td>
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<td></td>
<td>Exam 2</td>
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<td>1-Mar</td>
<td>Animals</td>
<td>Form &amp; function</td>
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<td>3-Mar</td>
<td>Animals</td>
<td>Nutrition</td>
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<td>15-Mar</td>
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<td>Exam 3</td>
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<td>28</td>
<td>19-Apr</td>
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<td>Reproduction</td>
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<td>POP 10</td>
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<td>CUMULATIVE</td>
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</table>

**Important Dates**

- **Jan 19** - Last day to Add/Drop a Class
- **March 22** - Last day for students to withdraw with a grade of "W" from full semester classes.
- **April 21** - Last day of classes

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General Education information:

Introduction to Cell and Molecular Biology/Evolution, Form, and Function of Organisms
BIOL 111 & 111L/BIOL 112 & 112L
Department: Biology

Learning Goals & Objectives

This general education science sequence provides a background for understanding and evaluating contemporary topics in biology. Students develop a foundational understanding of core concepts to use and on which to expand in upper level courses. They also develop the critical competencies that form the bases for the practice of science and use of scientific knowledge.

Core Concepts

This 2-semester course sequence in general biology addresses fundamental principles in biology to prepare students for sophomore and upper level courses in biology:

- **EVOLUTION**: The diversity of life evolved over time by processes of mutation, selection, and genetic change. The theory of evolution by natural selection allows scientists to understand patterns, processes, and relationships that characterize the diversity of life.
- **STRUCTURE AND FUNCTION**: Basic units of structure define the function of all living things. Structural complexity, together with the information it provides, is built upon combinations of subunits that drive increasingly diverse and dynamic physiological responses in living organisms. Fundamental structural units and molecular and cellular processes are conserved through evolution and yield the extraordinary diversity of biological systems seen today.
- **INFORMATION FLOW, EXCHANGE, AND STORAGE**: The growth and behavior of organisms are activated through the expression of genetic information at different levels of biological organization and depend on specific interactions and information transfer.
- **PATHWAYS AND TRANSFORMATIONS OF ENERGY AND MATTER**: Biological systems grow and change by processes based upon chemical transformation pathways and are governed by the laws of thermodynamic and will be explored to understand how living systems operate, how they maintain orderly structure and function, and how physical and chemical processes underlie processes at the cellular level (i.e. metabolic pathways, membrane dynamics), organismal level (i.e. homeostasis) and ecosystem level (i.e. nutrient cycling).
- **SYSTEMS**: Living systems are interconnected and interacting and biological phenomena are the result of emergent properties at all levels of organization, from molecules to ecosystems to social systems. The course will explore the dynamic interactions of components at one level of biological organization to the functional properties that emerge at higher organizational levels.

The specific topics covered in **this course** include:

- Biology 112 & Biol 112 L
  - The development of evolutionary thinking
  - Basic evolutionary processes
Core Competencies

- **Nature of Scientific Knowledge**
  - Understand the intellectual standards used by scientists to establish the validity of knowledge, evidence, and decisions about hypothesis & theory acceptance. These standards include: 1) science relies on external and naturalistic observations, and not internal convictions; 2) scientific knowledge is based on the testing of hypotheses and theories, which are under constant scrutiny and subject to revision based on new observations; 3) the validity of scientifically generated knowledge is established by the community of scientists through peer review and open publication of work.
  - Understand that new ideas in science are limited by the context in which they are conceived; are often rejected by the scientific establishment; sometimes spring from unexpected findings; and usually grow slowly, through contributions from many investigators.
  - Understand that science operates in a world defined by the laws of chemistry and physics.
  - Understand the differences and relationships among scientific theories, hypotheses, facts, laws, & opinions.
  - Understand the differences between science and technology, but also their interrelations.
  - Understand the dynamic (tentative) nature of science.

- **Scientific Methods of Discovery**
  - Understand the methods scientists use to learn about the natural world (observing; questioning; formulating testable deductive hypotheses; controlled experimentation when possible; observing a wide range of natural occurrences and discerning (inducing) patterns).
  - Apply physical/natural principles to analyze and solve problems.

- **Develop a Scientific Attitude**
  - Develop habits of mind that foster interdisciplinary and integrative thinking (within biology; between biology and other sciences; between science and other disciplines).
  - Develop an appreciation for the scientific attitude - a basic curiosity about nature and how it works.

- **Develop scientific analysis and communication skills**
  - Develop quantitative reasoning skills (quantitatively expressing the results of scientific investigations, or patterns in nature and using knowledge of biological concepts to explain quantitatively-expressed data or patterns).
  - Understand the probabilistic nature of science and the use/application of inferential statistics to test hypotheses.

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1 This learning goal will be measured as part of the general education assessment. The specific learning outcome to be measured is: **Students can apply physical/natural principles to analyze and solve problems.**

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Develop scientific information literacy (library, internet, databases etc...); find and evaluate the validity of science-related information.

Communicate scientific knowledge, arguments, and ideas in a variety of different contexts (scientific, social, cultural), utilizing a variety of different media (scientific articles, policy statements, editorials, oral presentations etc.).

Develop cooperative problem-solving skills (working effectively in teams), but also habits of mind and skills that foster autonomous learning.

- Develop an appreciation for the impact of science on society.
  - Develop an appreciation of humans as a part of the biosphere and the impact of biological science on contemporary societal/environmental concerns.
  - Knowledge of the history of the biological sciences and the influences of politics, culture, religion, race, and gender on the scientific endeavor.

Signature assignments for measuring learning outcomes

Learning Outcome #1: Students apply physical/natural principles to analyze and solve problems.

This learning outcome is assessed using the poster (or scientific article) generated in Biology 112 lab as part of the multi-week student-directed independent research project. In this project students use data they collect (or has been collected in actual research investigations) to test an hypothesis of their choosing. These projects may be themed, with all student groups addressing different aspects of a larger question, emphasizing the interdependence of various research groups needed to address complicated problems. This multi-week project begins the class identifying what questions need to be addresses in the larger problem. Individual student groups then become experts in these areas of the larger problem. The smaller research teams develop a hypothesis, and write a research proposal to test their hypothesis. Students collect (or use already collected data), summarize and statistically analyze the data, and draw conclusions.

Learning Outcome #2 - Students demonstrate an understanding of the impact that science has on society.

Biology 112 lab students produce a written document based on one of the case-based labs (examples - policy statement, article, stake-holder professional letter or poster) that requires them to research and apply biological knowledge or evidence to defend or critique a proposed solution to a biology-related societal issue. Although the choice of the specific issue or proposed solution is course-section specific, some examples of potential issues include

- exploring environmental/health impacts of genetically modified organisms
- the use of performance enhancing drugs in sports
- the development of antibiotic resistance in disease organisms

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2 This learning goal will be measured as part of the general education assessment. The specific learning outcome to be measured is: *Students can demonstrate an understanding of the impact that science has on society.*