Biology 102: Concepts and Applications in Biology II

Spring 2016 Syllabus

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Office: 65 Coming St. Room 213 (right at the top of the stairs). However, I will not be in my office as often this semester because I will mostly be teaching at Harbor Walk. You may be able to find me in one of the faculty offices in Harbor Walk West for those of us who have offices far away--HWWE 309 or 311.
Office Hours: I do not set office hours. Rather, so that I may accommodate all students' schedules, I ask that you send me an email with your schedule, so that I may look at my schedule and come up with a time that will work for both of us.
Text: *Biology: Concepts and Applications*, 9th ed., by Starr, Evers, and Starr
Required materials: i>clicker, i>clicker 2, or i>clicker +
Lab Manual: Be sure to purchase the BIOL 102 Lab Manual from the bookstore prior to your first lab.

Course Description: This is a non-science majors' course, which will provide a background for understanding and evaluating contemporary topics in biology and societal/environmental issues. The course emphasizes physiology and anatomy of organisms, ecological and evolutionary concepts, biodiversity, and conservation biology. An understanding of methods, history, and dynamic nature of science will also be emphasized. A case study based approach will be used to learn much of the material in this course. We will apply biological concepts to real-life problems.

Course format: This course will be using a "flipped" course format. You will be watching the majority of your lectures at home online, and in class, we will be doing active learning and discussion-based activities. This requires a lot of discipline on your part to ensure you keep up with the lectures and reading. However, it also offers you the ability to watch the lectures at your own pace and rewind as needed. The course lectures are broken down into shorter segments than a typical class, so you will often have to watch several of the lectures before class. There will be frequent i>clicker quizzes at the beginning of class to ensure that you are keeping up with the material.

My reason for using this format is to benefit you. You will learn a lot of information in this class! It can be difficult to retain it all, but even more difficult to understand it all. It will not do you any good to just memorize information in this class; you must be able understand and apply it. That can be very tough to do on your own. However, there is so much material to "cover" that there is not typically enough time to lecture and do additional activities that help you to understand. Instead, you end up doing those activities at home where there is no one to help you get through it. By "flipping" the classroom, you will have the support of a classroom group and of me to help ensure your understanding.

Lecture attendance: Your grade in this course relies heavily on your participation in class. Excessive absences are guaranteed to affect your grade. Attendance will not be taken in lecture; however, no make-ups will be allowed for missed assignments. Therefore, regular attendance is highly recommended. It is the student's responsibility to find out what was missed in case of unavoidable absence. If you must miss a class due to illness, you may be allowed to complete the missed work or an alternate assignment, but you must obtain an absence memo from the Office of the Associate Dean of Students at 67 George Street. It must be a **documented** absence to be excused; you must talk to me about it, and it is at my discretion. You may access the required forms at the following address: http://studentaffairs.cofc.edu/services/absence.php**.** If you have extenuating circumstances, then speak to me on an individual basis. **MISSING 4-5 CLASSES IN A ROW WILL RESULT IN A "WA"GRADE (WITHDRAWN EXCESSIVE ABSENCE) AT MIDTERM AND/OR FINAL GRADE. A FINAL "WA" GRADE IS CALCULATED AS AN "F" IN YOUR GPA**. This policy does not apply if the absences are due to a **SERIOUS** medical or personal reason; however, in any case, it is the student's responsibility to contact me immediately with any issues.

Inclement weather: In the case that class is canceled due to inclement weather, it is your responsibility to check the news feed on OAKS and the daily course schedule to know what is expected of you by the next class.

Lab attendance: Your attendance is required at all laboratory sessions. If you do not attend lab as required, you will be removed from both the lab and the lecture. Please make sure you have purchased a lab manual before your first lab.

Tests: There will be four tests over the course of the semester. All will be offered in OAKS, and you will be given a specific timeframe in which you must have the test completed. The first three tests will open at noon on the first day of testing and will close at 8 PM on the last day of testing. The timeframe for the last test is different. There will not be a cumulative final exam. *Students should be aware that unauthorized collaboration—working together without permission—is a form of cheating—this includes collaborating with classmates or other individuals on online tests.*

Accommodations for students with disabilities: The College will make reasonable accommodations for persons with documented disabilities. Students should apply at the Center for Disability Services/SNAP, located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying me as soon as possible and for contacting me at least one week before any accommodation is needed.

Missed tests or assignments: There will be **no make-ups** given for in-class assignments, quizzes, or tests. Students with extenuating circumstances must contact me in advance of the class or test that must be missed to discuss their options.

Final project: You will be given a collaborative project to complete at the end of the semester. Details on this project will be given as the time nears.

Extra help: The Center for Student Learning (CSL) now has a walk-in science tutoring lab. You may use the walk-in lab during the scheduled times of operation which can be found at http://csl.cofc.edu/labs/.

OAKS: OAKS is the learning management system that is used by the College of Charleston. It is imperative that you learn to use OAKS if you have not already; it will be used by many of your classes as a way to provide material, give quizzes or tests, as a way to collect assignments, as a way to have class discussions, and as a way to communicate grades. I will be using OAKS extensively for this course, and will keep a running grade average for you on OAKS. You can log in to OAKS through MyCharleston, and there are many tutorials if you have trouble familiarizing yourself on your own. Here are some YouTube links that will walk you through the basics:

--Logging in and navigating OAKS is available at http://youtu.be/9wwktD0z9KE
--Course Content is available at http://youtu.be/BkT7gj5fTRk
--Joining a Discussion is available at http://youtu.be/glIWGZG9l0U
--Submitting Assignments is available at http://youtu.be/wkpEbbP2csw
--How to take a quiz is available at http://youtu.be/lT5ToRjn8w4

Community engagement and extra credit: It is important that as good citizens you engage yourself in the local community. Because of this, I offer extra credit opportunities that encourage good citizenship and community engagement. I will discuss these options with you in class. These will be the only opportunities for extra credit. Please do not ask me for any other extra credit.

Academic dishonesty: Guidelines for this course will follow the College of Charleston Undergraduate Catalog policies for Academic Integrity and the Honor Code, Student Code of Conduct, and Classroom Code of Conduct.

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

Students should be aware that unauthorized collaboration—working together without permission—is a form of cheating—this includes collaborating with classmates or other individuals on online tests. Unless the instructor specifies that students can work together on an assignment, quiz, and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others' exams, fabricating data, and giving unauthorized assistance.

Students can find the complete Honor Code and all related processes in the *Student Handbook* at:
http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php

Grading:

Grade Scale	Final Grade Computation
A 93-100 % A- 90-92 % B+ 87-89 % B 83-86 % B- 80-82 % C+ 77-79 % C 73-76 % C- 70-72 % D+ 67-69 % D 63-66 % D- 60-62 % F 0 – 59 %	In-class and occasional out-of-class assignments will constitute 15% of the final grade. The four tests will count 10% each (40% total). i>clicker quizzes will count 10%. The final project will count 10%. The lab will constitute 25% of the final grade. The instructor reserves the right to adjust the final grade based on lack of participation during group activities.

Weekly Schedule and Relevant Readings (schedule is subject to change):

Week	Date	Topic	Relevant Chapters
1	1-7	Class introduction; Introduction to evolution/Darwin	16
2	1-12	Natural Selection; Evidence of Evolution; Processes of Evolution	16-17
	1-14		
3	1-19		
	1-21		
4	1-26	***NO CLASS—Test I available on OAKS from Sun., Jan. 24th, at noon through Tues., Jan. 26th, at 8 PM***	16-17
	1-28	Speciation and Macroevolution	17
5	2-2		
	2-4	How Life Began—Early Evolution	18
6	2-9	Prokaryotes and Viruses	19
	2-11	Protists	20
7	2-16	Plants	21
	2-18	Fungi	22
8	2-23	***NO CLASS—Test II available on OAKS from Sun., Feb. 21th, at noon through Tues., Feb. 23rd, at 8 PM***	23
	2-25	Introduction to Animals	23
9	3-1	Invertebrates	23
	3-3		
10	3-8	*NO CLASS—Spring Break*	
	3-10	*NO CLASS—Spring Break*	
11	3-15	Invertebrate Chordates	24
	3-17	***NO CLASS—Test III available on OAKS from Thurs., Mar. 17th, at noon through Sat., Mar. 19th, at 8 PM***	23-24
12	3-22	Vertebrate Chordates	24
	3-24		
13	3-29	Ecology Case Studies	material posted on OAKS—selected topics from 39-44
	3-31		
14	4-5		
	4-7		
15	4-12		
	4-14		
16	4-19		
		Test IV available on OAKS from Tues. April 19th, at 1 PM through Thurs., Apr. 21st, at 11:59 PM	24, select from 29-44

Learning Goals & Objectives: This general education science course provides a background for understanding and evaluating contemporary topics in biology and societal/environmental issues. Students develop a general understanding of core concepts and 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 which broadly include:

- 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 transformation 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).
- Biological 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.

These ideas are explored from the perspective of the following topics in each course:

BIOL 101 & 101L

- Chemical and Physical Properties of Life
- Evolution as a unifying principle in biology
- Cell Form & Function
- Energetics and Metabolism
- The Cell Cycle
    - Meiosis and Sexual Reproduction
    - Mitosis and Cell Reproduction
- Mendelian Genetics
- Patterns of Inherited Traits
- Human Inheritance
- The Molecular Basis of Inheritance
- DNA and protein production
- Regulation of gene expression
- Biotechnology

BIOL 102 & 102 L

- Evolutionary Processes
- Origins of Life
- Biodiversity
    - Viruses, Bacteria and Archaens
    - ”Protist” Lineages
    - Plants
    - Fungi
    - Animals
- Plant Form & Function
- Animal Form & Function
- Principles of Ecology

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 outcome of the testing of hypotheses and theories that 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 the real world as defined by the laws of chemistry and physics.
    - Understand the differences between and relations among a scientific theory, hypothesis, fact, law, & opinion.
    - Understand the differences between science and technology but also their interrelations.
    - Understand the dynamic (tentative) nature of science.

- Scientific Methods of Discovery
    - [1]Understand the methods scientists use to understand 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.
- Developing 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.
- Developing 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.
    - Develop scientific information literacy (library, internet, databases etc…); finding and evaluating the validity of science-related information.
    - Communicate scientific knowledge, arguments, ideas in a variety of different contexts (scientific, social, cultural) and 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 [2]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.

<u>Signature assignments for measuring learning outcomes</u>

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 102 lab as part of the multi-week student-directed independent research project. In this project students use ecological data they collect (or which has been collected in actual research investigations) to test an ecological hypothesis of their choosing. This multi-week project begins with students becoming experts in various areas of ecological sampling. Students, working in small research teams, decide on a question they would like to explore. Teams then develop a research proposal to test their hypothesis. Students collect (or use already collected data), summarize and analyze the data, and draw conclusions.

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

BIOL 102 lab students produce a written document (examples - policy statement, article, stake-holder professional letter or poster) which 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 epidemic of diabetes in the United States
- solutions for mitigating global climate change

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

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