

8-21-2020: This is it! Please let me know if you see any errors.

Syllabus – Fall 2020

BIOLOGY 101 sec. 06: Concepts/Apps in Biology I (CRN 10067)

ONLINE



INSTRUCTOR:

Mrs. Kathleen E. Janech, M.S.

janechk@cofc.edu

(email is the best way to reach me – please make sure to use your CofC email only!) I do my best to reply the same day if the email is received before 5 p.m., but I do not check my emails after 5 p.m. or over the weekend.

Also, please include your **course number and section number**, and don't email my husband by mistake!

STUDENT HOURS (drop-in on Zoom): Sundays 3 p.m. - 4 p.m. EDT (access from the Zoom portal at the top of the OAKS course page). These are optional, and feel free to drop-in at any time during the hour, and stay for only as long as you need to. You are welcome to email me to schedule an alternate appt. time or location. These will not be recorded. **Please attend, introduce yourself and ask questions! I am here to help!**

Course Description

To provide non-science majors with a general overview of living systems, with emphasis on cellular and molecular concepts, including biochemistry, cell structure and function, respiration, photosynthesis, genetics and molecular biology. The goal of the course is to provide a foundation for students to appreciate, understand and critically evaluate biological issues facing society.

Co-requisites

BIOL 101 Laboratory – you **MUST** enroll in a lab section in addition to this lecture.

Required Course Materials

1. **Textbook:** *Biology: Concepts and Applications*, by Starr, Evers & Starr, 10th Edition, 2018 (Cengage Publishers). You can buy it, rent it, get the ebook, borrow it, or share it with a classmate, but you **MUST** have access to this textbook! You will also need it for your lab, and for Biology 102. **Keep up with the reading! If you need a Course Key for Mind Tap access, it is: MTPP-GZVQ-ZQS1**



2. **Computer and online access:** All students must have access to a computer equipped with a web camera, microphone, and Internet access. **You will be required to download, install and use Respondus Lockdown Browser and Monitor for certain quizzes and exams. Prof. Janech will be providing further instructions**

about this. Resources are available to provide students with these essential tools if they need assistance - please let me know if you need help accessing those resources. *****This is especially important since this is an online course, and we are starting the Fall 2020 semester remotely due to the pandemic, and might also be necessary if there are any issues with inclement weather this semester.*****

Online access through MyCharleston to OAKS (<http://blogs.cofc.edu/oaks/students/getting-started/>) and Voice Thread will be essential. You also must regularly check your CofC email, since that is how I will send updates. A helpful website for all things technology at CofC is: <http://blogs.cofc.edu/sits/> The Remind app will also be used as a backup communication resource.

Suggested Course Material

Center for Student Learning – I encourage you to utilize the Center for Student Learning (CSL) and their academic support services for assistance with study strategies and course content. They offer tutoring, Study Skills appointments, and workshops that help students of all abilities become more successful throughout their academic career. Services are available to you at no additional cost. For more information, please visit the CSL website at <http://csl.cofc.edu>, or call (843) 953-5635, or drop by their location on the first floor of the Addlestone Library.

Institutional Syllabus Statement Regarding the Fall 2020 Semester (since this course is online, some of this may not apply, but I wanted you to be aware)

The College of Charleston is committed to promoting the health and safety of our campus community. To that end, all faculty and students must abide by public health guidelines that include practicing social distancing in the classroom and elsewhere on campus, following signage indicating the entrance, exit, and traffic flow in and around campus buildings, wearing a mask or cloth face covering while in the presence of others, washing or sanitizing hands frequently, sanitizing individual and shared learning and work spaces, and staying home when sick. These practices are mandatory.

Before the drop/add deadline, students should decide whether the course plan on the syllabus matches their own circumstance. All faculty will use OAKS to facilitate student access to the course syllabus, course materials, and the gradebook. The College of Charleston's standard grading system is in effect.

There is a possibility that the semester will be disrupted by weather or the pandemic. Every course syllabus will include a plan for a change in modality to ensure the continuity of learning in the event in-person classes must be suspended. Regardless of the method of instruction, all courses will move online for one week after Thanksgiving. Final exams will be administered online. Therefore, all students must have access to a computer equipped with a web camera, microphone, and Internet access. Resources are available to provide students with these essential tools.

The College anticipates that some members of the community will fall ill or test positive for the coronavirus, and then be required to quarantine thereby missing class, assignments, and assessments. Faculty are expected to provide reasonable accommodations as determined by the content, level, and expectations of their courses for students who become ill or indicate a need to isolate themselves. **Communication with the instructor will be essential so that alternate plans can be arranged, and it is imperative that, even if ill or in difficult circumstances, the student finds a way to communicate in a timely manner.** To the extent possible, arrangements will be made for students with COVID-19 related absences to continue in the class. Faculty are encouraged to make explicit in their syllabus what sorts of accommodations students can expect with respect to

missed course meetings, assignments, and assessments. However, students should be aware that extended absences for any reason cannot be accommodated in every course. Missed assignments and assessments may result in poor or failing grades. If a student is absent from class for an extended period, a withdrawal (W) before the deadline should be strongly considered. In all cases, assigning course grades is the responsibility of the instructor consistent with the grading policy published on the syllabus.

Inclement Weather, College Closure, and the Class Schedule

If the College of Charleston closes and members of the community are evacuated due to inclement weather or for any other reason, students are responsible for taking course materials with them in order to continue with course assignments consistent with instructions provided by faculty. In cases of extended periods of institution-wide closure where students have relocated, instructors may articulate a plan that allows for supplemental academic engagement despite these circumstances.

Teaching Philosophy

I encourage participation and interaction in my lectures and will do my best to create a fantastic learning environment. However, it is not all up to me. I depend on you, the student, to also take an active role in your education (after all, you pay to be here!) by challenging me with questions and participating.

How to Take This Course

(with credit & thanks to, and in memory of, Dr. Conseula Francis)

Any course, in any given semester, is a journey, often to a place you haven't been before. You may be super excited about the trip, eager to get going and explore the sites. Or maybe you are here because you were told to take this course. Or maybe you are somewhere in-between. Imagine, if you will, that we're all standing at the base of a mountain. We all have to decide how we're going to climb it, and you alone can decide the manner of your exploration.

<p><u>Day Hiker</u> You're sticking to the trail because you're certain of where it goes. You want the basics - lists, order of processes, details to memorize. There is nothing wrong with this approach, especially if the material is new to you. A successful day hiker will take notes during class, read all related pages in the book after class, and review their notes at least twice a week. A day hiker may do well on quizzes, but they will have to dig a little deeper for exams to really understand the connections between all aspects of the material. They will use the resources at the Center for Student Learning (CSL), and be familiar with</p>	<p><u>Backpacker</u> You're ready to spend a few days on this mountain and you have supplies (already existing knowledge, interest, inclination) to help you. You have a grasp of the basics, and are ready to explore beyond them. Backpackers will hone their note-taking skills in class, read all related pages in the book both before and after class, and really spend time digesting all of the information that is contained in the figures in the textbook. They ask questions of the professor, either during student drop-in hours at the office or by email. Backpackers know that to succeed, they must approach with effort and learn and grow from their mistakes. They work with</p>	<p><u>Trailblazer</u> You are blazing your own way, finding new routes up the mountain and new connections between all aspects of the material, things others may not see. You are passionate about, and interested in, not only the <i>what</i> and the <i>why</i>, but also the <i>how does this connect to other things in the bigger picture?</i> Trailblazers often use different colors when taking notes, and read more in the book than is required, because they really want to understand the whole picture. They study the figures and try to draw them on their own for mastery. They ask questions and spend a lot of time with the material. For</p>
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<p>Bloom's Taxonomy as they work toward greater understanding.</p>	<p>resources at the Center for Student Learning (CSL), are working to achieve the higher orders of understanding in Bloom's Taxonomy, and practice recalling material from memory.</p>	<p>trailblazers, this course is part of the expedition to discover all that science has to offer. They take advantage of EVERY opportunity to learn from their mistakes. They often make use of resources at the Center for Student Learning (CSL), actively work with the material to achieve the higher orders of understanding in Bloom's Taxonomy, and often quiz themselves and those that they study with, because they know that practicing information recall from memory as often as possible is one of the best ways to learn.</p>
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No matter which path you choose, remember that all explorers need to do their best to **limit outside distractions. Yes, life happens, and the current situation with coronavirus is challenging, but really try to give your brain the gifts of time and focus - try to find a good work space and a routine that works for you.**

Course Policies and Requirements

Accommodations

Any student in this class who has a documented disability should speak to me as soon as possible, as well as contact the Center for Disability Services (CDS/SNAP program), located on the first floor of the Lightsey Center, Suite 104, (843) 953-1431, SNAP@cofc.edu

Class Delivery Format

Due to the coronavirus pandemic and the difficulty of properly social distancing a large class, our interaction will occur entirely online and not in a traditional face-to-face classroom setting. This type of "Distance Education" course requires students to be self-motivated, disciplined, organized and task-driven. **Some students are under the impression that distance education classes are easier than traditional face-to-face classes. This is not true. In fact, distance education courses are often more challenging than traditional classes and you should be prepared to spend several hours on this class each day, including additional time on the weekends.** It is critical that you complete work for this class each day and not wait until the day before a deadline to begin working on a module.

This class is being presented in an **asynchronous** format - you will be able to complete lectures and quizzes when it is most convenient to you—you are not required to login to the Internet at a specific time each day to interact with your classmates or me. **However, you must have regular access to a computer with a reliable high-speed internet connection and computer with a microphone and/or web-cam throughout the duration of this course. Computer failure/unavailability does not constitute an excuse for not completing work by the due dates.** So please do not wait until the last minute to complete work for a module.

This class will be administered through OAKS, the College of Charleston's learning management system. To access OAKS go to <http://my.cofc.edu> and login to My Charleston. The OAKS icon is the acorn located in the upper righthand corner of the screen.

Since we are not meeting face-to-face for class, I expect you to regularly login to OAKS to complete lecture videos and Voice Threads, look for course updates (in the News section on the course homepage), complete quizzes, etc. Please also check your email regularly as I will send e-mail updates to the class through OAKS to update you on class events and assignments.

If you are one who feels uncomfortable with technology, the College offers a number of resources to help you develop your technological competency, in general, but specifically within the context of this online class. Visit <http://blogs.cofc.edu/studentreadinessforonlinelearning/> to access those resources. And, if you experience technological problems during the class, please contact me immediately at janechk@cofc.edu.

Honor Code

Students are required to adhere to the guidelines outlined by the Honor Board in the Student Handbook (please see <http://deanofstudents.cofc.edu/policies-and-procedures/honor-code-and-code-of-conduct.php>) **This includes lying, which will not be tolerated in this course.** All work that you turn in for this course (whether for assignments, quizzes, or exams) must be **your own independent scholarship.** *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 quizzes or exams.* 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. Any form of plagiarism (intentional and unintentional), cheating, or presenting someone else's work as one's own will be treated as a serious academic transgression and will be communicated accordingly by the instructor as an honor code violation to Student Affairs. Be especially cautious of plagiarism when using Internet sources. Cheating, attempted cheating, or plagiarism will result in a grade of zero on that quiz or exam and may result in a final overall grade of F or XXF (failure due to academic dishonesty) for the course.

Quizzes

Weekly quizzes will be given throughout the semester on OAKS. They are intended to assist students in keeping up with the large amount of information in this course. **It is your responsibility to keep up with due dates and times!** A missed quiz will result in a 0 for that quiz, unless you talk to me to explain the situation (serious illness, including but not limited to COVID-19, family responsibilities, other extreme circumstances). The College will not be using Absence Memos this semester, so it is imperative that you communicate with me and tell me the truth, so that I can work with you. **Your 2 lowest quiz scores will be dropped in the final grade calculation.** All cell phones, Apple watches, pagers, iPods, iPads, tablets, laptops, etc. are to be turned off and put away during each quiz, and you are **expected to take them by yourself without other people, notes, books or websites.** **The use of any wireless communication device during a quiz, test, or final exam is a violation of the Honor Code.**

Exams

In this course, there are 4 regular exams scheduled during the semester (see calendar below for dates) and 1 cumulative final exam scheduled during the final examination period. **Due to the online nature of this course,**

all exams will be given online through OAKS. Anyone who misses an exam will receive a 0, unless you talk to me to explain the situation (serious illness, including but not limited to COVID-19, family responsibilities, other extreme circumstances). The College will not be using Absence Memos this semester, so it is imperative that you communicate with me and tell me the truth, so that I can work with you. If you have any conflicts with the scheduled exams, you must see me ahead of time, well before the exam date. **All cell phones, Apple watches, pagers, iPods, iPads, tablets, laptops, etc. are to be turned off and put away completely during each exam. The use of any wireless communication device during a quiz, test or final exam is a violation of the Honor Code.**

Grading

The quizzes will count for a total of 20% of the lecture portion of your final grade. The 4 regular exams will count for a total of 60% of the lecture portion of your final grade. The cumulative final exam will count for 20% of the lecture portion of your final grade. Grade calculation formula (try for yourself in an Excel spreadsheet):

$[(\text{Quiz avg.}) * 0.20] + [(\text{Exam avg.}) * 0.60] + [(\text{Final exam score}) * 0.20] = \text{Final grade.}$

Students who have a SOLID “A” average (93 or higher) at the end of the semester FOR THE LECTURE PORTION OF THE COURSE can opt to be exempt from the final exam, BUT you must talk to me to confirm; no show = 0.

Letter grades will be determined by the following breakdown:

≥93% = A 90-92 = A- 87-89 = B+ 83-86 = B 80-82 = B- 77-79 = C+ 73-76 = C
70-72 = C- 67-69 = D+ 63-66 = D 60-62 = D- ≤59 = F 0 due to acad. dishonesty = **XXF**

Please teach yourself how to check on your grade in this course on OAKS, and follow along during the semester. Any errors can be brought to my attention, and are much easier to fix the sooner they are detected!

My Expectations of Students in my class:

- 1. Proper Deportment:** In this class, you are expected to be respectful of your teacher and other students. I know that we are all online and not in a classroom together, but in any emails or communications or Zoom student hours, please be patient and courteous. We are all trying our best to get through these challenging times. If you have a question, please ask me – I love questions from students!
- 2. Electronic device policy:** Research has shown that learning is negatively affected when students and those around them use phones or other devices during class. Therefore, because we all deserve a learning-focused environment, the use of wireless communication devices during class is prohibited, other than to respond to a Cougar Alert announcement - therefore please **SILENCE** all cell phones, pagers, iPods, iPads, tablets, laptops and anything with alarms before coming into my class **AND PUT THEM AWAY**. Yes, I know that you will be on your own with this one, but give yourself a serious opportunity to do your best. Set yourself up for success by finding a good workspace, and try to develop a consistent working routine.
- 3.** This is a large class, and I will try my best to learn your names, even though we are remote. It is important that you start presenting yourself as a serious, professional student when dealing with faculty and other students in the

class. One day you will be asking for letters of recommendation – start thinking now about what you want those letters to say about you, and act accordingly.

COURSE CALENDAR

(module schedule and Quiz & Exam closing dates are firm – but topics covered in certain modules are subject to change)

Module	Weekly Topic	Due Date
	Quizzes A and B will cover separate material, and will have their own due dates on the course calendar	
Module 1	Chapter 4 - Cell structure <i>(Last day for Drop/Add is Monday, Aug. 31st!)</i> 2 parts to this module	Opens: Wed. 8/26 at 10 a.m EDT Quiz 1 closes: Tues. 9/1 at 11:30 p.m. EDT
Module 2	Chapter 4 - Prokaryotic & Eukaryotic cells, Chap. 5.6 & 5.7 on the movement of substances across membranes, Start Chapter 2 - Life's Chemical Basis 3 parts to this module: part 1 chapters 4.7, 4.8, 4.9; part 2 chapters 4.3, 5.6; part 3 chapters 5.7, 4.10, 2.1	Opens: Wed. 9/2 at 10 a.m. EDT Quiz 2 closes: Tues. 9/8 at 11:30 p.m. EDT
Module 3	Finish Chapter 2	Opens: Wed. 9/9 at 10 a.m. EDT Quiz 3 closes: Tues. 9/15 at 11:30 p.m. EDT
EXAM	***Exam 1*** over material in Modules 1, 2 & 3	Opens: Wed. 9/16, time TBD Closes: Thurs., 9/17, 11:30 p.m. EDT
Module 4	Chapter 3 - Molecules of Life	Opens: Wed. 9/16 at 10 a.m. EDT Quiz 4 closes: Tues. 9/22 at 11:30 p.m. EDT
Module 5	Chapter 3 - carbs, lipids, proteins, nucleic acids	Opens: Wed. 9/23 at 10 a.m. EDT Quiz 5 closes: Tues. 9/29 at 11:30 p.m. EDT
Module 6	Chapter 8 - DNA, some on signaling molecules from Chap. 31 maybe	Opens: Wed. 9/30 at 10 a.m. EDT Quiz 6 closes: Tues. 10/6 at 11:30 p.m. EDT
EXAM	***Exam 2*** over material in Modules 4, 5, & 6	Opens: Wed., 10/7, time TBD Closes: Thurs., 10/8, 11:30 p.m. EDT
Module 7	Chapter 5 - Energy, Enzymes & Metabolism	Opens: Wed. 10/7 at 10 a.m. EDT Quiz 7 closes: Tues. 10/13 at 11:30 p.m. EDT
Module 8	Chapter 6 - Photosynthesis	Opens: Wed. 10/14 at 10 a.m. EDT Quiz 8 closes: Tues. 10/20 at 11:30 p.m. EDT

Module 9	Chapter 7 - Aerobic Respiration / <i>Midterm grades available Wed., Oct. 21st</i>	Opens: Wed. 10/21 at 10 a.m. EDT Quiz 9 closes: Tues. 10/27 at 11:30 p.m. EDT
EXAM	**Exam 3** over Modules 7, 8 & 9	Opens: Wed., 10/28 time TBD Closes: Thurs., 10/29 11:30 p.m. EDT
Module 10	Chapter 11 - Cell cycle, Mitosis and Cancer (activity with bead kits and worksheets?) / <i>Wed., Oct. 28th is the last day for students to withdraw with a grade of "W"</i>	Opens: Wed. 10/28 at 10 a.m. EDT Quiz 10 closes: Wed. 11/4 at 11:30 p.m. EST (deadline extended since we are off on Tues., Nov. 3)
OFF - Tues., Nov. 3	Tues., Nov. 3rd is Election Day and the College is OFF for the day - please vote!!!	Daylight Savings time ends on Nov. 1, so please note that the times in Nov. and Dec. will be Eastern Standard Time
Module 11	Chapter 12 - Chromosome terminology and Meiosis (activity with bead kits and worksheets?)	Opens: Wed. 11/4 at 10 a.m. EST Quiz 11 closes: Tues. 11/10 at 11:30 p.m. EST
Module 12	Chapter 13 - Patterns in Inherited Traits	Opens: Wed. 11/11 at 10 a.m. EST Quiz 12 closes: Tues. 11/17 at 11:30 p.m. EST
Module 13	Chapter 13 and Chapter 14 - Human Inheritance	Opens: Wed. 11/18 at 10 a.m. EST Quiz 13 closes: Tues. 11/24 at 11:30 p.m. EST (this is your last quiz!)
OFF - Nov. 25, 26 & 27	Happy Thanksgiving!!! (We are SO going to need a break by this point!)	
EXAM	**Exam 4** over Modules 10, 11, 12 & 13	Opens: Wed., 12/2 time TBD Closes: Thurs., 12/3 11:30 p.m. EST
Module 14	This will be smaller, finishing up Chapter 14	Opens: Wed. 12/2 at 10 a.m. EST No Quiz! This material will be covered on the Final Exam, in addition to the cumulative material
Fri. Dec. 4	Official last day of classes for the fall semester	
Tues. Dec. 8	Final exams begin	
Wed. Dec. 9th	Study and take your final exam on OAKS!	(Will probably open the Final Exam on OAKS today - I will definitely let you know!)

Friday, Dec. 11th	FINAL CUMULATIVE EXAM on OAKS will be due by 11:30 p.m. TODAY! It will close and not reopen.	
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**** Please note: as stated in the Undergraduate Catalog:**

<http://catalog.cofc.edu/content.php?catoid=14&navoid=671#final-examinations>

Examinations **must** be taken at the time scheduled, **except** when:

1. Two or more exams are scheduled *simultaneously*.
2. Legitimate **AND** documentable extenuating circumstances prevent the student from completing the examination at the scheduled time (e.g., burial services for an immediate family member) *Note: Forms for requesting permission to reschedule one exam may be found on the Student Academic Forms channel on the Academic Services tab on MyCharleston. Written permission of the instructor and all relevant signatures must be obtained at least 24 hours prior to the scheduled time for the final examination.*

Make it a habit to always check out your final exam schedules:

<https://registrar.cofc.edu/pdf/exam-schedule-fall2020.pdf>

CONCEPTS AND APPLICATIONS IN BIOLOGY I & II

BIOL 101 & 101L/BIOL 102 & 102L

Department: Biology

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 Archaeans**
- **"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.

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 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

Textbook: The text book (Biology: Concepts and Applications (currently - 10th Ed.) by Starr, Evers & Starr.

[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.*