1/6/2021: DONE! - please let me know if you see any errors or have any questions!

**Syllabus - Spring 2021**

**BIOLOGY 102 sec. 01 & 02: Concepts and Applications in Biology II**
(CRNs 21840 & 22381)

**ONLINE, asynchronous**

**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):** **Mondays 2 p.m. - 3 p.m. EST** (access from the links in the calendar on the OAKS course page) or email me to set up another time that works for you. 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. These will not be recorded. **Please attend, introduce yourself and ask questions! I am here to help!**

**Course Description**
This course is meant to provide non-science majors with a general overview of living systems, with emphasis on evolution, organismal diversity, and ecology. The goal of the course is to provide a foundation for students to appreciate, understand and critically evaluate biological issues facing society.

**Prerequisites**
BIOL 101 (or 111) and BIOL 101L are prerequisites to BIOL 102. If you have not passed BIOL 101 (or BIOL 111), you should **not** be in this class.

**Co-requisites**
BIOL 102 Laboratory – you **MUST** enroll in the 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 digital version, borrow it, or share it with a classmate, but you MUST have access to this textbook! You will also need it for your lab. **Keep up with the reading!** If you need a Course Key for Mind Tap access, it is: MTPN-DVPQ-LQ18

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 ALL 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 a fully online course***

Online access through MyCharleston to OAKS (http://blogs.cofc.edu/oaks/students/getting-started/) and Voice Thread (through the OAKS course home page) 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 **Student Instructional Technology Services**: 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.

Class Delivery Format

This course is being presented in an **asynchronous** format - you will be able to watch and listen to the assigned Voice Threads in weekly modules, and read the corresponding sections of the textbook, when it is most convenient for you and at your own pace. You are not required to login to the course at a specific time each day to interact with your classmates or me. There will be quizzes and exams that have specific due dates and times, and these will be posted in the course calendar. Please keep in mind that this course format requires students to be self-motivated, disciplined, organized and task-driven. **Some students are under the impression that online classes are easier than traditional face-to-face classes. This is not true. In fact, online courses are often more challenging than traditional classes and you should be prepared to spend several hours on this class each week, 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. **ALL work for this course will be online - watching and listening to Voice Thread lectures and taking your own notes, and completing quizzes and exams.**

This format requires that, for the duration of the course, you have regular access to a computer with a microphone and web-cam, coupled with a reliable high-speed internet connection. **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, or a quiz or exam.

This class will be administered through OAKS, the College of Charleston’s learning management system (http://blogs.cofc.edu/oaks/students/getting-started/). 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. I highly recommend setting up OAKS notifications for yourself, so that the system will send you alerts when items are posted in the course or due dates arise.

If you are someone 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. A helpful website for all things technology at CoFC is Student Instructional Technology Services: http://blogs.cofc.edu/sits/ And, if you experience technological problems during the class, please contact me immediately at janechk@cofc.edu.

The expectation is that you will regularly check the OAKS course page, as well as your College of Charleston email, for notifications and updates. You are also responsible for accessing all course material posted on Voice Thread in a timely manner, and completing quizzes and exams on time.

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
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.

<table>
<thead>
<tr>
<th>Day Hiker</th>
<th>Backpacker</th>
<th>Trailblazer</th>
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<tbody>
<tr>
<td>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 while watching and listening to the assigned Voice Threads, 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 activities that can help them to incorporate Bloom’s Taxonomy of human cognition as they work toward greater understanding.</td>
<td>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 while watching and listening to the assigned Voice Threads, read all related pages in the book both before and after class so they can ask questions about anything that is not clear, and really spend time digesting all of the information that is contained in the figures in the textbook. They might even drop in to the student hour on Zoom from time to time, or send an email, with a question. Backpackers know that to succeed, they must approach with effort and learn and grow from their mistakes. They work with resources at the Center for Student Learning (CSL), are working to achieve the higher orders of understanding in Bloom’s Taxonomy of human cognition, and practice recalling material from memory.</td>
<td>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 what and the why, but also the how does this connect to other things in the bigger picture? Trailblazers often use different colors when taking notes while watching and listening to the assigned Voice Threads, 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 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 of human cognition. They 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.</td>
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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 can divert us from the path, but by putting all non-course related...
devices away and really focusing while learning material, we are giving our brains the gifts of time and focus.

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

Honor Code
Students are required to adhere to the guidelines of the Honor System, consisting of the Honor Code and Code of Conduct. These are outlined on the following website:
https://deanofstudents.cofc.edu/honor-system/faculty-guide.php
Further information on the expectations of Academic Integrity with regards to the Honor Code can be found in the student handbook, beginning with section 5 on p. 42:

Lying, cheating, attempted cheating, stealing and attempted stealing 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 assignment, 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 by encouraging them to prepare and study/read/review EVERY day. It is your responsibility to keep up with due dates and times! Lockdown Browser and Monitor will be required to be used for each quiz. Quizzes will open at least one or two days before the day that they are due, and close at 5 p.m. on the day that they are due! 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, smart watches, headphones, ear buds, 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 (both regular and final) will be given online through OAKS.** Lockdown Browser and Monitor will be required to be used for each exam. **Exams will open the night before the day that they are due, and close at 5 p.m. on the day that they are due!** 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 email me to discuss ahead of time, **well before the exam date.** **All cell phones, smart watches, headphones, ear buds, 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 25% 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 15% of the lecture portion of your final grade. Grade calculation formula (try for yourself in an Excel spreadsheet):

\[
(\text{Quiz avg.} \times 0.25) + (\text{Exam avg.} \times 0.60) + (\text{Final exam score} \times 0.15) = \text{Final grade}
\]

*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; not taking the final exam when you are supposed to take it = 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 course, you are expected to be respectful of your teacher and other students. Even though we are not physically in the same space, there will still be opportunities to interact online, via email, Zoom and Flipgrid. I expect you to be courteous and respectful. Everyone should feel safe to express themselves. If you have a question, please do not hesitate to ask me, either on email or Zoom – I love questions from students!

2. **Electronic device policy:** 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 as free from outside distractions as possible. 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 watching and listening to a Voice Thread in a module **AND PUT THEM AWAY.** This way, you can focus and take accurate notes and absorb the material.

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.**

4. **Lockdown Browser and Monitor reminders:** Lockdown Browser and Monitor (LDB) is required to be used to take each quiz and exam in OAKS. This is done to assist you, and ALL students in the class, with abiding by the Honor Code in an online testing environment. The LDB software will record video and audio of you while you are taking the quiz or exam, and it uses artificial intelligence to flag suspicious behavior. **NO ONE will be “watching” you while you are testing.** The system alerts me when behavior is flagged, and I can go in to see and hear what happened. If you know that something out of your control happened during the recording, you are welcome to email me and let me know once you are done testing. If I do not find evidence of ACTUAL suspicious behavior (for example, the system said it could not detect your face when all that happened was your mouth and nose were covered by a mask), then I will note that and you will not hear anything from me. **However, if I do see or hear suspicious behavior, there will be the following consequences:** 1. For the first incidence, you will receive a warning email from me, and an expectation that the behavior will not happen again. 2. If you are flagged a second time for suspicious behavior, after already receiving a warning, then 10 points will be deducted from your grade for that quiz or exam. 3. If you are flagged a third time, you will receive a grade of 0 for that quiz or exam. More details will be forthcoming and posted on OAKS.

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**COURSE CALENDAR**

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

<table>
<thead>
<tr>
<th>Module</th>
<th>Weekly Topic</th>
<th>Due Date</th>
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<td>Quizzes A and B will cover separate material, and will have their own due dates on the course calendar</td>
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</table>
| **Module 1** | Parts of Chapters 16 & 17 - Welcome & start Evolution, Galapagos Islands, Hardy-Weinberg Formula and violations of it, *(Last day for Drop/Add is Tuesday, Jan. 19th!)* 5 parts to this module: part 1 - course intro. housekeeping info.; part 2 - Chapter 16.2; part 3 - Chap. 16.2 & Galapagos info.; part 4 - Chap. 17.1 & 17.2; part 5 - Chap. 17.2, 17.6, 17.5, 16.2 | Opens: Mon. 1/11 at 9 a.m EST  
Quiz 1 closes: Tues. 1/19 at 5 p.m. EST |
| **Module 2** | Parts of Chapters 16, 41 and 17 - Evidence for Evolution, Malthus and Darwin’s observations on | Opens: Wed. 1/20 at 9 a.m. EST  
Quiz 2 closes: Tues. 1/26 at 5 p.m. EST |
Natural Selection; 4 parts to this module: part 1 - Chap. 16.6, Chap. 16 p. 271, 16.4, 16.3, 17.3; part 2 - 16.1 (p. 255), 16.7, 16.5, p. 806-807, 16.1; part 3 - 16.8; part 4 - p. 257 in 16.2

<table>
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<tr>
<th>Module 3</th>
<th>Finish Chapter 17 - Camouflage and Mimicry and patterns of Natural Selection Misconceptions about Evolution; Cladistics, Taxonomy and Speciation / Deadline to submit an application to graduate in Spring 2021 is Mon., Feb. 1, Seniors!</th>
<th>Opens: Wed. 1/27 at 9 a.m. EST Quiz 3 closes: Tues. 2/2 at 5 p.m. EST</th>
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<tbody>
<tr>
<td>EXAM</td>
<td><em><strong>Exam 1</strong></em> over material in Modules 1, 2 &amp; 3 (see study guide posted on OAKS)</td>
<td>Opens: Wed. 2/3, at NOON Closes: Fri., 2/5 at 5 p.m. EST</td>
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<tr>
<td>Module 4</td>
<td>Chapters 18 &amp; 19 - Origins of Life and Prokaryotes (Bacteria &amp; Archaea), Viruses / Darwin Week - Happy Birthday Charles Darwin on Feb. 12!</td>
<td>Opens: Mon. 2/8 at 9 a.m. EST Quiz 4 closes: Tues. 2/16 at 5 p.m. EST</td>
</tr>
<tr>
<td>Module 5</td>
<td>Chapters 20 &amp; 21 - Protists: from Prokaryotes to Eukaryotes, Plant Evolution - Bryophytes &amp; Ferns</td>
<td>Opens: Wed. 2/17 at 9 a.m. EST Quiz 5 closes: Tues. 2/23 at 5 p.m. EST</td>
</tr>
<tr>
<td>Module 6</td>
<td>Chapters 21 &amp; 22 - More on Plant Evolution - Gymnosperms &amp; Angiosperms, Plant Tissues, Plant Reproduction &amp; development, Fungi</td>
<td>Opens: Wed. 2/24 at 9 a.m. EST No Quiz 6! (This change is due to the College having “Review and Study” days on Tues. and Thurs. this week, in lieu of a spring break, and I needed to fit the exam in) Everyone will get 100 in the gradebook and it will just be a placeholder</td>
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<tr>
<td>EXAM</td>
<td><em><strong>Exam 2</strong></em> over material in Modules 4, 5, &amp; 6 (see study guide posted on OAKS)</td>
<td>Opens: Wed., 3/3, at NOON Closes: Fri., 3/5, 5 p.m. EST</td>
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<tr>
<td>Module 7</td>
<td>Chapter 23 - Animal Evolution / Mid-term grades available to students on March 9 / Clocks spring forward on Sunday, March 14!</td>
<td>Opens: Mon. 3/8 at 9 a.m. EST Quiz 7 closes: Tues. 3/16 at 5 p.m. EDT (Note that we are now on Daylight Savings Time)</td>
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<tr>
<td>Module 8</td>
<td>Chapter 23 - Invertebrates / Last day with withdraw from individual courses with a grade of “W” is Monday, March 22</td>
<td>Opens: Wed. 3/17 at 9 a.m. EDT (Happy St. Patrick’s Day!) Quiz 8 closes: Tues. 3/23 at 5 p.m. EDT</td>
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</table>
| Module 9 | Chapter 24 - Vertebrates **parts to this module:** | Opens: Wed. 3/24 at 9 a.m. EDT  
Quiz 9 closes: Tues. 3/30 at 5 p.m. EDT |
|---|---|---|
| EXAM | **Exam 3** over Modules 7, 8 & 9 (see study guide posted on OAKS) | Opens: Wed., 3/31 at NOON  
Closes: Fri., 4/2 at 5 p.m. EDT |
| Module 10 | Chapter **parts to this module:** | Opens: Mon. 4/5 at 9 a.m. EDT  
Quiz 10 closes: Tues. 4/13 at 5 p.m. EDT (this is your last quiz!) |
| Module 11 | Chapter **parts to this module** | Opens: Wed. 4/14 at 9 a.m. EST |
| EXAM | **Exam 4** over Modules 10 & 11 (see study guide posted on OAKS) | Opens: Mon., 4/19 at NOON EST  
Closes: Wed., 4/21 5 p.m. EST (This date is also the official last day of classes for the spring semester) |

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<thead>
<tr>
<th>Thurs. April 22nd</th>
<th>Reading Day</th>
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<tbody>
<tr>
<td>Fri. April 23</td>
<td>Final exams begin</td>
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</table>
| Tues., April 27th | Study and take your final exam on OAKS! (see study guide posted on OAKS)  
(Will probably open the Final Exam on OAKS today - I will definitely let you know!) |
| Thursday, April 29th | FINAL CUMULATIVE EXAM on OAKS will be due by 5 p.m. EDT TODAY! It will close and not reopen. |

**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 (https://registrar.cofc.edu/pdf/exam-schedule-spring2021.pdf), 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).”

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


**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 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
  - 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


[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.*