

Biology 102-04
Concepts and Applications in Biology I
Fall 2020

Lecture Time: Online- asynchronous

Instructor: Lauren H-R Senn
E-Mail: sennl@cofc.edu

Office Hours: By appointment

Co-requisite: BIOL 102L

Textbook: *Biology Concepts and Applications, 10th edition; Starr, Evers and Starr*

MindTap course code: MTPPX8VQPR9M

Course Objectives: 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 Evolutionary processes, biodiversity, plant and animal form & function, and an introduction to ecology.

Class attendance and participation:

- Lectures will be posted each Monday, with MindTap assignments for the chapters covered that week due that Friday.
- For this online course attendance and participation will be evaluated via assignments completed for each chapter in MindTap. These assignments can be found on OAKS. **Late assignments will not be accepted.**
- Students unable to take an exam on its scheduled day must contact the instructor within 24 hours of the missed exam to schedule a make-up. **An excused absence must be documented through Student Affairs to make up an exam.**
Students are responsible for any missed material, whether the absence be excused or unexcused.
- Acceptable excuses include illness, death of a family member or close friend, *pre-excused* CofC athletics event, religious holiday, military or jury duty. These must be appropriately **documented** through Student Affairs: <http://studentaffairs.cofc.edu/about/absence-memo/index.php>. **I will not accept undocumented excuses.**

Online Course Materials: Readings, exams dates, and grades will be available online through OAKS. You can access OAKS via MyCharleston (<http://my.cofc.edu>).

Honor System: All students are expected to abide by the College of Charleston Honor System. The Honor System text may be viewed on the Student Affairs web site: <http://studentaffairs.cofc.edu/honor-system/index.php>. **Violation of the Honor Code may result in a final grade of XF for all parties involved.**

Accommodation: Students needing special accommodations to complete the requirements for this course should contact me as soon as possible.

Center for Student Learning: I encourage you to utilize the Center for Student Learning's (CSL) academic support services for assistance in study strategies, speaking & writing skills, and course content. They offer 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 the CSL website at <http://csl.cofc.edu>/or call (843)953-5635.

Assessment

Lecture Exams: There will be 3 exams and a cumulative final on the lecture content. **AN EXCUSED ABSENCE MUST BE DOCUMENTED THROUGH STUDENT AFFAIRS TO MAKE UP AN EXAM.**

***Grading (subject to change)**

A 93-100 %	B- 80-82	D+ 67-69
A- 90-92	C+ 77-79	D 63-66
B+ 87-89	C 73-76	D- 60-62
B 83-86	C- 70-72	F Below 60

Grades	% of grade
Lecture Exams 1-3	60
Participation	20
Final Exam (cumulative)	20
TOTAL	100%

Tentative Sequence of Lecture Topics

LECTURE TOPICS	Chapter(s)
Evolutionary Processes and Origins of Life	16-18
Viruses, Bacteria, and Archaea	19
Protists and Fungi	20; 22
Plant Development, Nutrient Transport, and Reproduction	21; 25-27
Animal Development	23-24
Animal Tissues and Organ Systems	28
Animal Circulatory and Respiratory Systems	33; 35
Population and Community Ecology	40-41
Ecosystems	42
The Biosphere and Human Impact	43-44

Important Dates

Date	Event(s)
Tues, Aug 25 th	Classes begin
Mon, Aug 31 st	102 Labs begin
Thurs, Sept 17 th	EXAM 1
Thurs, Oct 15 th	EXAM 2
Tues, Nov 3 rd	Election Day- College closed
Nov. 25-29	Thanksgiving Break
Tues, Dec 1 st	EXAM 3
Thurs, Dec. 10 th	FINAL EXAM (3:30-5:30pm)

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

- ¹Understand 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 ²impact 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.*