Biology 102: Concepts and Applications in Biology II

Section 4. MWF 11:00 -11:50 AM SSMB 138

Course Syllabus

Instructor Deb Bidwell

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Course Description:

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.

Pre-requisites

- Successful completion of Biology 101, 111, HONS 151. Biology 102 laboratory is a co-requisite and accounts for 25% of overall course grade.

Course Learning Objectives:

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

Contact/Communication

Private/Student-To-Instructor Contact

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

General Student-To-Instructor and Student-To-Student Contact

- Students should contact the Instructor and other students on issues that are not student-specific and may benefit or apply to the entire class using the **Discussion Board Hallway Conversations open 24 hours a day, 7 days a week.**
- My response turnaround time on the hallway conversations discussion board will be **within 24 hours weekdays and within 48 hours on weekends.**

Office Hours

- Online office hours with instant feedback in the **Chat room of Oaks On Wednesdays from 9:30-10:30 PM Eastern Standard Time.**
- In person office hours (drop-in/group) in **SSMB 140: Tuesdays 3:00 – 4:00 PM and/or by email appointment.**

Course Communication and Community Building

- **OAKS** will be utilized for **content, quizzes, discussions, news, updates, and online office hours.** *New to Oaks?* Get up to speed fast with tutorials here: **http://blogs.cofc.edu/oaks/students/getting-started/**
- **Email** will be used to communicate important or sudden changes in course information.
- We will **all work together to build our classroom and online learning community.** I will play a facilitating role in helping you get to know, work with, trust, and collaborate with the other members of our class. Each member of the class must be willing to participate in a dynamic, and engaging learning group that is inclusive. Your participation, willingness to contribute, and your initiative are paramount to having a successful and enjoyable learning experience. We **aim to develop a spirit of camaraderie and team learning that will unite us** as a community of learners.
- This semester we will be doing some group discussion work online using discussion boards through OAKS. **As your instructor and facilitator I'll require you to make OAKS discussion posts about our course readings, as well as expecting you to thoughtfully reply to several of your peers' comments.** You can find a **rubric** about the expectations for quantity and quality of online discussion comments on OAKS.
- **Netiquette:** In our course discussions, we will be using complete sentences and proper grammar and will **not be using abbreviations or slang the way we do while texting on the cell phone.** Because it is difficult to interpret tone from only written text and our online communication in the OAKS discussion boards will lack facial expression, body language, hand gestures and other social clues, it is especially important that we all take special care to be sensitive to possible tone misinterpretation which can lead to inadvertently hurt feelings that result in isolation rather than inclusion. **We will all need to make sure that we are thoughtful, respectful, friendly, professional and considerate in our posts.** For example, when we are challenging each other's ideas, it is vital that we do not allow arguments to become personal. We can disagree about the subject matter in a respectful, intellectual way that still allows for us to work well and collaborate together.

Expectations

- Students should plan to **log into Oaks at least 2 times per week.**
- Students should dedicate **6+ hours per week** to this course to be successful.
- This class is **student-driven**. Motivation must come from the student.
- Our class should be **interactive and engaging**!
- Students are expected to **contribute** to our **learning community.**
- **There are weekly obligations**: quizzes, discussion board posts, or exams.
- **Laptops or tablets are not allowed in class** unless a need for accommodation is documented. Research clearly indicates that note taking by hand is a superior method of learning. You may audio record lectures, but please ask first.
- Please keep **phones** silenced and away during class time.

Required Course Materials

Text is *Biology: Concepts and Applications,* Ninth Edition, Starr, Evers & Starr, 2015. 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.

- Computer/technology **with access to** internet
- **Software/Apps**: (OAKS, powerpoint)
- **Textbook**: Starr *et al* 2015 Biology Concepts and Applications, 9th edition
- **#2 Pencil(s)** on exam days
- Basic **scientific calculator** (exponents & square roots)

Participation

- Students must post to the **online discussion board for each unit's reading or video. Please see rubric regarding posting guidelines and expectations.**
- Classroom activities may require pair/group work.
- There is no attendance requirement, but you will not do well if you do not attend class.
- Online text activities are not required, but are helpful

Accommodation

- SNAP students, Athletes, International, ESL, and all students with life circumstances that may warrant accommodations are encouraged to **discuss any concerns with the Instructor** in a timely manner. I am fluent in Spanish. I understand that we all have way more important things going on in our lives than this biology class. I aim to be friendly, approachable, and understanding. But I will challenge you, and I will hold you to high standards.

Honor Code and Academic Integrity:

- Lying, cheating, attempted cheating, unauthorized collaboration, and plagiarism are violations of our Honor Code. For complete details regarding our updated honor code please see the following link: **http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php**

Assessment:

- Unit quizzes will be multiple-choice, individual, timed, randomized, approximately 15 questions, and conducted through OAKS. They are open-book and open-notes but students must study and prepare ahead of time, as quizzes are challenging and there will not be time to look up individual answers.
- Exams will be in-class short answer/multiple choice exams.
- Discussion posts are made through OAKS and evaluated according to the rubric found in our course content on OAKS. Resources for locating and citing primary literature are also available on OAKS in the content area.

Grades calculated as follows: 25% Laboratory, 75% Lecture

Component of lecture	Value (% of final lecture grade)
Quizzes (5/6) lowest score dropped	**25**
Exams (4)	**40**
Cumulative Final Exam	**20**
Discussions (3)	**15**
Total:	**100% of lecture grade (75% of overall course grade)**

Tentative Schedule for section 4 MWF 11AM class:

Week	**Lecture topic**	**Chapter readings**	**Other Readings or Videos for Discussion**	**Due for grading**	**Suggested home work** (not collected or graded)
Intro Jan. 8	F: Intro, syllabus				Carefully read the syllabus
1 (first full week)	MWF:Natural Selection and Evolution **(labs start)**	16		**Syllabus quiz** (OAKS online) opens F 1/8 9AM closes F 1/15 11:59 PM must earn 100%	
2	**No class on 1/18 for MLK Jr. Day** WF: Evolution and Speciation. **(no labs)**	17	Article on OAKS: Genetic manipulation: the first 50,000 years	**Discussion 1:** GMOs – post by F 1/15 11:59PM. Two peer replies by T 1/19 11:59PM	Study for exam 1
3	M: Myth-busters class activity. W: Exam 1 F: Origins of life, prokaryotes	18		**Exam 1** Wednesday 1/27	Be sure you can bust all the myths!
4	MWF: viruses and Protists	19, 20		**Quiz 2** (OAKS online) opens F 2/5 12PM closes M 2/8 11:59 PM Average of up to three tries	**DARWIN WEEK STARTS 2/4**
5	MWF: Plants and Fungi Evolution, form, function	21, 25	Video available through OAKS – What Plants Talk About (NOVA)	**Discussion 2**: What plants talk about, post by F 2/12 11:59PM. Two peer replies by M 2/15 11:59PM	**DARWIN WEEK EVENTS CONTINUE THROUGH 2/14**
6	MWF: Plant flowers, fruits, seeds	26, 27		**Quiz 3** (OAKS online) opens F 2/19 9AM closes M 2/22 11:59 PM Average of up to three tries	Draw and label a flower. Draw and label the cycle of alternation of generations.
7	M: finish up plants **W: Exam 2** F: animal evolution	23		**Exam 2** Wednesday 3/2	Study for exam 2
8	MWF: animal evolution, Human evolution, animal cells and tissues	24, 28			
9	**<----------S P**	**R I N G**	**B R E A K ---------**	**----------→**	
10	Animal cardiovascular system	33, 35	For fun – how to hold your breath for 20 mins	**Quiz 4**(OAKS online) opens F 3/18 9AM closes M 3/21 11:59 PM Average of up to three tries	Draw, label a mammal heart, show how blood moves. Compare/contrast arteries, veins, capillaries re: structure, function, blood velocity, BP
11	Animal Immunity	34	For fun – journey to science from an anti-vaxxer	**Quiz 5** (OAKS online) opens F 3/25 9AM closes M 3/28 11:59 PM Average of up to three tries	Map out the immune response including both primary and secondary responses
12	Animal reproduction	38	Evolution of the scrotum Birth control reliability NY Times	***Discussion 3: The scrotum is nuts** post by **W** 4/7 11:59PM. Two peer replies by **F** 4/12 11:59PM	Understand what regulates menstruation monthly cycle. See birth control study, NY Times.

13	M: **Exam 3** W: population Ecology F: Community ecology	40, 41		**Exam 3** Monday 4/4	
14	MWF Ecosystems ecology and conservation	42, 44		**Quiz 6** (OAKS online) opens F 4/1 9AM closes T 4/5 11:59 PM Average of up to three tries	
15	M: Biomimicry W: **Exam 4** R: 4/21 is a Monday schedule, last day of classes - review.			**Exam 4** Wednesday 4/20	
	CUMULATIVE	**FINAL EXAM**	**WEDNESDAY**	**APRIL 27**	**8-11 AM**

Addendum: General Education information:

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**

- 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.

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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.*

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 - 8th Ed.) by Starr, Evers & Starr.