

Biology 112 Section 01

MWF 1000 - 1050

Room 138 SSMB

Spring 2018

Instructor: William Roumillat

Textbook: Freeman, Biological Science 6th edition. Student workbook/study guide are suggested (helpful) but not required. If you have purchased a used book you can purchase a code for online access to Mastering Biology through the publisher.

Mastering Biology access is not required but students review it favorably.

Instructor:

William (Bill) Roumillat

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Personal Background: BS from the College of Charleston (Marine Biol), MS from Old Dominion University (Fish Biol). Recently retired from SC Department of Natural Resources in position of Fisheries Biologist researching life-history dynamics of estuarine fin-fishes (37years). Involved with undergraduate/graduate CofC students since 1985. Served on thesis committees of multiple graduate students. Regularly guest lectured in both undergraduate and graduate fish biology classes at the CofC. Taught Fish Biology 4 times recently. Taught Biol 112 in spring 2014, fall 2015 and fall 2017. Have also guest-lectured in CofC Histology course each spring since 2002, and recently taught the undergraduate Histology course for the College. Taught Biol 101 fall 2015 and summer 2017. Taught Biol 102 fall 2017.

Office Hours: Monday 8:30 AM – 9:30 AM; Wednesday 8:30 – 9:30 and 11:00 AM – 1:00 PM; and by appointment. Your best bet is to contact me is through email. I check my email frequently and I will reply, but please anticipate a 24-hour response time.

Course Description and Objectives: A foundation course for science majors providing an introduction to evolution and a study of the major groups of organisms with an emphasis on their structure, form and function. You will be exposed to lectures,

readings, discussions, and written assignments to ensure a thorough, lasting understanding of the material.

Pre-requisites: Successful completion of Biology 151 or 111, or a high grade in 101. Biology 112 laboratory is a co-requisite, unless you already have credit for the laboratory portion of the course.

Class Attendance : Class attendance is very highly recommended. Students are responsible for all content for each class that is missed. Exams will be based predominantly on lectures/class discussions. Assigned text readings are absolutely necessary for thorough understanding of material. Lecture notes (PowerPoint, PDF) *may be posted on Oaks*. You are responsible for your own note-taking.

Parity Statement: SNAP students, Athletes, International or ESL students are encouraged to discuss any concerns with the Instructor in a timely manner.

Honor Code and Academic Integrity:

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code, that when identified, will be investigated. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information stored on or texted to a cell phone/device), copying from others' exams, fabricating data, and giving unauthorized assistance. Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor. For complete details regarding our updated honor code please see the following link:

<http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>

Exams: There are 3 exams scheduled during the semester and a cumulative final exam scheduled during the final examination period which will also include new material.

Exams will be short answer, multiple choice, true-false, fill-in-the-blanks, and matching style. If you have any legitimate conflicts with the scheduled exams, please see me well ahead of time, before the exam date. Students must provide a valid and documented excuse (through the Dean of Students at 67 George Street) for missing a scheduled exam. Acceptable excuses include severe illness requiring immediate medical attention, personal tragedy or circumstances beyond the student's control. For details on absence memo procedures see <http://studentaffairs.cofc.edu/services/absence.php> Anyone who misses an exam without an acceptable excuse will receive a grade of zero for that exam. Makeup exams must be arranged promptly.

Quizzes: Four announced quizzes will be given during the semester. *Probable* dates are given in the syllabus. Quizzes are planned to take the first 15 minutes of the lecture time for the announced date. *There will be no make-up quizzes.* If you miss a quiz assignment without a validated, excused absence you will receive a zero. Excused absences will drop that quiz from average. Otherwise, the highest 3 of 4 quiz grades will count.

Written assignments: a graded primary literature worksheet will encourage you to read and understand primary literature, explore database searching and learn how to format scientific citations. Other homework assignments will be encouraged and suggested but not collected or graded. Answer keys will be available when/if appropriate.

Re-grade policy: Requests for re-grading must be made in writing within one week of work being returned. Students must include the original, graded document along with a detailed, printed justification. Late submissions will not be accepted. Discussion of regarding requests can only be made once written requests have been submitted. In other words, make your request in writing.

Other Important Course Policies:

- You are expected to log onto Oaks regularly.
- You are expected to check your email account frequently.

- Assignments/quizzes are due at the *beginning* of the class period
- Late assignments are marked down one half letter grade (5%) if turned in late on the same day or one full letter grade (10%) for each day delayed.
- Students will be expected to retain a printed (not just electronic) copy of each written assignment until the graded work is returned to you by the instructor.
- Students are expected to retain all graded assignments and exams returned to you until the final grade has been determined.

Grading:

Component	% of final grade
Exams (3)	45
Cumulative Final (some new material)	25
Written assignment*	10
Quizzes (best 3 of 4)	15
Class participation	5
Total:	100

* used to establish Gen Ed requirements

Letter grades will be strictly determined by the following breakdown:

Numerical Grade	Letter Grade
93-100	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-
<60	F

Class Rules:

- Please be prompt.
- Cell phones off/silent and out of sight
- No messaging/surfing
- Do not leave class expecting to return. Stay. Or leave. Do not come and go.
- Please stay awake, participate and be attentive
- Please don't chat with classmates during lecture
- You may raise your hand to interrupt any time to ask a question

Helpful Advice:

1. **Attend class!**

2. **Try Supplemental Instruction! (SI)**

The SI Leader can help to make a real difference in your comprehension of lecture material.

3. Get involved. Ask questions (of both the instructor and your peers).

4. Don't just take notes, LISTEN and LEARN during class time (active learning).

5. Read through your notes regularly and try the online media that are associated

with the text.

6. Keep up. To pass, you should expect to spend a bare minimum of **5 hours** a week on biology. **To excel, 10 hours.**

7. Make studying fun and social by getting together regularly with a partner or group and TALKING through the information. If you can explain concepts to another person, you will be on the way to having them mastered.

8. Study to understand, not to remember. Remember to think logically about biological concepts; you will frequently be able to reason out an answer instead of just memorizing it.

9. You or someone you love is paying for you to take this course – please attempt to make the most of the experience.

TENTATIVE SCHEDULE

<u>DATE</u>	<u>TOPIC</u>	6th ed. <u>CHAPTER</u>
8 Jan.	Intro, Review, Natural Selection	1, 22
10 Jan.	Evolution by Natural Selection	23
12 Jan.	Evolution by Natural Selection	23
15 Jan.	MLK Day – No Classes	
17 Jan.	Evolution of Populations	23
19 Jan.	Evolution (cont.)	23
22 Jan.	Speciation	24
24 Jan.	Intro to Development	21
26 Jan.	<u>Quiz 1.</u> Plant Development	38, 34
29 Jan.	Plant Form and Function	34
31 Jan.	Plant Form and Function	34
2 Feb.	<u>EXAM 1</u>	
5 Feb.	Plant Transport	35
7 Feb.	Plant Transport	35
9 Feb.	Plant Transport	35
12 Feb.	Plant Nutrition	36
14 Feb.	<u>Quiz 2.</u> Plant Nutrition	36
16 Feb.	Plant Sensory Systems	37

19 Feb.	Plant Reproduction	38
21 Feb.	Plant Reproduction, Pathogens	37, 38
23 Feb.	<u>EXAM 2</u>	
26 Feb.	Animal Development	30, 39
28 Feb.	Animal Form and Function	39
2 Mar.	Animal Form and Function	39
5 Mar.	Animal Water Balance and Osmoregulation	40
7 Mar.	Animal Water Balance and Osmoregulation	40
9 Mar.	The Kidney	40
12 Mar.	Animal Nutrition	41
14 Mar.	Animal Nutrition	41
16 Mar.	<u>Quiz 3 Due.</u> Animal Gas Exchange and Circulation	42
19 Mar.	Spring Break	
21 Mar.	Spring Break	
23 Mar.	Spring Break	
26 Mar.	Gas Exchange and Circulation	42
28 Mar.	Gas Exchange and Circulation	42
30 Mar.	<u>EXAM 3</u>	
2 Apr.	Nervous Systems	43

4 Apr.	Animal Nervous System	43
6 Apr.	<u>Class Assignment Due</u> - Nerves and Sensory Systems	43
9 Apr.	Movement/ Chemical signaling	45,46
11 Apr.	Animal Reproduction	47
13 Apr.	<u>Quiz 4 Due.</u> Animal Reproduction	47
16 Apr.	Animal Reproduction	47
18 Apr.	Animal Reproduction/ Immune System	47,48
20 Apr.	Animal Immune System	48
23 Apr.	- Last day of class - Review	
30 Apr.	<u>CUMULATIVE FINAL EXAM 8:00 - 1100</u>	

Introduction to Cell and Molecular Biology/Evolution, Form, and Function of Organisms

BIOL 111 & 111L/BIOL 112 & 112L

Department: Biology

Learning Goals & 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.

Core Concepts

This 2-semester course sequence in general biology addresses fundamental principles in biology to prepare students for sophomore and upper level courses in biology:

- **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 TRANSFORMATIONS 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).
- **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.

The specific topics covered in each course include:

Biology 111 & Biology 111L

- Chemical and physical properties of life
- Cell form & function
- Energetics, metabolism, and photosynthesis
- The cell cycle
 - Mitosis and cell reproduction
 - Meiosis and sexual reproduction
- Mendelian genetics / Patterns of inheritance
- Human Inheritance
- The molecular basis of inheritance
- DNA and protein production
- Regulation of gene expression
- Some aspects of biotechnology

Biology 112 & Biol 112 L

- The development of evolutionary thinking
- Basic evolutionary processes
- Comparative plant form & function
- Comparative animal form & function

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 testing of hypotheses and theories, which 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 a world defined by the laws of chemistry and physics.
 - Understand the differences and relationships among scientific theories, hypotheses, facts, laws, & opinions.

- 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 learn about 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.
- **Develop 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.
- **Develop 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...); find and evaluate the validity of science-related information.
 - Communicate scientific knowledge, arguments, and ideas in a variety of different contexts (scientific, social, cultural), 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 112 lab as part of the multi-week student-directed independent research project. In

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

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

this project students use data they collect (or has been collected in actual research investigations) to test an hypothesis of their choosing. These projects may be themed, with all student groups addressing different aspects of a larger question, emphasizing the interdependence of various research groups needed to address complicated problems. This multi-week project begins the class identifying what questions need to be addresses in the larger problem. Individual student groups then become experts in these areas of the larger problem. The smaller research teams develop a hypothesis, and write a research proposal to test their hypothesis. Students collect (or use already collected data), summarize and statistically analyze the data, and draw conclusions.

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

Biology 112 lab Students produce a written document based on one of the case-based labs (examples - policy statement, article, stake-holder professional letter or poster) that 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 use of performance enhancing drugs in sports
- the development of antibiotic resistance in disease organisms