
BIOLOGY 111: INTRO TO CELL & MOLECULAR BIOLOGY

Instructor

Dr. Jessica McCoy

Email

TBA (xx@cofc.edu)

Office Location

65 Coming Street,
Rm 102

Office Hours

Please come see
me: Tues and Thurs
7:15-8:15pm
(after class)

Or by appointment.

*Please email me to
schedule.*

Course Description

Introduction to Cell and Molecular Biology is a foundation course for science majors emphasizing critical thinking skills and comprehension of structure and function in biological systems at the molecular and cellular levels. Topics include the scientific process, biochemistry, molecular biology, cell structure and function, respiration, photosynthesis, and genetics. Completion of this class and the associated laboratory meets a General Education requirement.

Pre-requisites: None; Co-requisites: Biol111 Laboratory

Time/Location: T/R 6:00-7:15pm, SSMB 138

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.

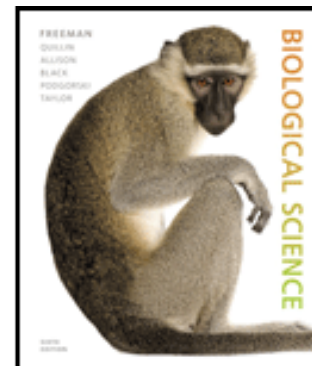
Our Text Book (required)

Biological Science

6th Edition by Freeman et al.

ISBN# 978-0321976499

This text book is an excellent resource and will be an **essential** for test and quiz preparation as well as supplementing lecture materials. For Biol111, we will focus on Chs 1-21.



My Charleston and OAKS

Assignments, announcements, study guides, this syllabus and some grades will be available online through OAKS. You can access OAKS via MyCharleston. This will also be how I stay in touch with

you in the event of a campus closure due to weather. New to Oaks? Online tutorials are available, ask and I will show you where to find them.

Assessments & Grading

Comprehension will be assessed through quizzes, (3) exams, and one final comprehensive exam. There will be at least two opportunities (optional) to earn extra grade points.

Quizzes and Assignments will be administered as part of this course. The objective is to encourage active engagement with the current lecture materials. You will be notified of upcoming quizzes in advance.

Exams (3) will be in-class, short answer, and multiple-choice exams. The final exam will be comprehensive and will take place on December 13, 2016 from 7:30-10:30pm in SSMB 138.

Make up exams will not be administered except under the most severe situations such as a documented medical emergency or death in the immediate family.

Grading Breakdown

Quizzes/Assignments	25%
Exams	55%
Final Exam	20%

≥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 academic dishonesty = XXF

Attendance and Class Etiquette

You are expected to attend all meetings of the class. Students are responsible for getting their own notes from a classmate for any class missed. Exams will be based almost entirely on lectures with the text used for background information and reinforcement. All electronics must be silenced during class. Cell phones are not allowed.

Accommodating Disabilities

The College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying me as soon as possible and for contacting me one week before accommodation is needed.

Fall 2016- Tentative Course Syllabus

DAY	DATE	TOPIC	BOOK REFERENCE	SCOPE
T	23-Aug	What is Life?	Ch 1	Molecular Origin & Evolution of Life
R	25-Aug	What is Science?	Ch 1	
T	30-Aug	The Chemical Basis of Life	Ch 2	
R	1-Sep	The Chemical Basis of Life	Ch 2	
T	6-Sep	Carbohydrates	Ch 5	
R	8-Sep	Proteins	Ch 3	
T	13-Sep	Nucleic Acids (DNA & RNA)	Ch 4	
R	15-Sep	Nucleic Acids (DNA& RNA)	Ch 4	
T	20-Sep	EXAM 1	(Ch 1-5)*	
R	22-Sep	Meiosis	Ch 13	Gene Structure & Expression
T	27-Sep	Mendel & Inheritance	Ch 14	
R	29-Sep	Making and Breaking DNA	Ch 15	
T	4-Oct	What exactly is a gene?	Ch 16	
R	6-Oct	Transcription and Translation	Ch 17	
T	11-Oct	Transcription and Translation	Ch 17	
R	13-Oct	Regulating DNA	Ch 18,19	
T	18-Oct	New & Exciting DNA technology!	Ch 20	
R	20-Oct	EXAM 2	(Ch 13-20)*	
T	25-Oct	A look inside a Cell	Ch 7	Cell Structure & Function
R	27-Oct	Intro to Metabolism/Respiration	Ch 8,9	
T	1-Nov	Intro to Metabolism/Respiration	Ch 8,9	
R	3-Nov	Photosynthesis	Ch 10	
T	8-Nov	FALL BREAK/ELECTION DAY	no class	
R	10-Nov	Cell Interactions / Cell Cycle	Ch 11,12	
T	15-Nov	Cell Interactions / Cell Cycle	Ch 11,12	
R	17-Nov	EXAM 3	(Ch 7-12)*	
T	22-Nov	Genes/Development and Evolution	Ch 21	Tying it all together
R	24-Nov	THANKSGIVING BREAK	no class	
T	29-Nov	Tying it All Together	synthesis / review	
R	1-Dec	Tying it All Together	synthesis / review	
T	13-Dec	FINAL EXAM	Comprehensive	

* Not all chapter sections, more details to come

Honor Code and Academic Integrity

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated.

Each incident will be examined to determine the degree of deception involved. Students should be aware that unauthorized collaboration--working together without permission-- is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. 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. 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. Students can find the complete Honor Code in the Student Handbook: <http://studentaffairs.cofc.edu/honorsystem/studenthandbook/index.php>

Incidents where the instructor determines the student's actions are related more to a misunderstanding will be handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student's file. Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student's transcript for two years after which the student may petition for the XX to be expunged. The F is permanent. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

General Education Requirement

**Introduction to Cell and Molecular Biology/Evolution, Form, and Function of Organisms
BIOL 111 & 111L/BIOL 112 & 112L Department: Biology Learning Goals & Objectives.**

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 TRANS FORMATIONS 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 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

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 soci*