

Syllabus – Fall, 2016
BIOLOGY 111 : Intro. to Cell and Molecular Biology
(within the Chem/Bio Learning Community)
TR 8:30-9:45 a.m., HWWE 213

INSTRUCTOR: Ms. Aarti Narang

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OFFICE LOCATIONS: CofC 65 Coming – 213, Children Research Institute, Rm. 204 (MUSC). Office hours will be held at Harbor Walk 309 and 311!

OFFICE HOURS: TR 9:50-10:50 a.m. You may also email me to schedule an appt. at another time.

Course Goals

This course is intended to be a foundation course for science majors, providing an introduction to basic principles of biology and emphasizing the concept of structure and function in biological systems at the molecular and cellular levels. By the end of this course you should be actively aware of many of the intricate connections between the study of biology and chemistry.

Supplemental Instruction (SI):

Supplemental Instruction, or SI, is a collaborative, peer-assisted group study session, led by a student who has previously successfully completed the course. The SI leader helps students, in weekly sessions outside of class, to develop strategies in order to successfully master the material. More info. can be found at <http://csl.cofc.edu/?referrer=webcluster&> The SI instructor for this class is **Sarah Davidson**(sarahdavidsonm@g.cofc.edu). Session times and locations will be announced during class. **Attending at least one session each week is highly recommended.**

Co-requisites

BIOL 111 Laboratory – you **MUST** enroll in a lab section in addition to this lecture.

Required Course Textbooks

1. *Biological Science* by Freeman, Quillin & Allison, Fifth Edition (Pearson Publishers). 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! You will also need it for Biology 112 (and Biology 211 if you are a Bio. major). Use the text and figures to preview and to reinforce what you are learning in class. There are self-quizzes that can be great study guides, as well as a variety of web links to help you understand the material. There is a lot of material to cover in this course, **so keep up with the reading!**

Suggested Course Material

The Study Guide for *Biological Science* by Freeman, Fifth Edition (Pearson Publishers). This is not required, but it is usually available in the book store and is very helpful for many students.

Online Course Materials: Assignments, announcements, study guides, this syllabus and some grades will be available online through OAKS. You can access OAKS via MyCharleston. This (and your CofC email) will also be how I stay in touch with you in the event of a campus closure due to weather.

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. I will also help you discover learning resources available to you that will help you throughout your education.

Course Policies and Requirements

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

Class Attendance

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. **You will not do well in this course if you miss lectures.** Also, missed surprise quizzes CANNOT be made up (see below). **This material can be challenging and requires work on your part for success!**

Assignment

You will have one additional homework assignment assigned during the semester, and the due date is listed on my calendar below. This assignment is intended to reinforce material covered in class and to encourage critical thinking. It will require you to seek information from sources outside of class and in addition to your textbook. **Because of this assignment and other actual credit opportunities in this course, I do not offer any extra credit projects.**

You are expected to turn in your assignment (which is to be done independently, unless otherwise stated) by the beginning of the class period on the date it is due, and it will only be accepted **typed and stapled** (otherwise points will be lost). Assignments will lose one full letter grade for every day of delay (**any time after 5 p.m. counts as the next day**). You should hold onto all graded assignments and quizzes until the final grade has been turned in.

Students are required to adhere to the guidelines outlined by the Honor Board in the Student Handbook (please see <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>, sec. 9, p. 10 and 11 specifically). **This includes lying, which 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**, and have not been used, partially or totally, to fulfill requirements for other classes. 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 the Division of 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 or exam and may result in a final overall grade of F or XXF (failure due to academic dishonesty) for the course.**

Quizzes

Several short, surprise quizzes will be given throughout the semester. They are intended to encourage students to keep up with the large amount of information in this course by studying a little each and every day. **No make-up quizzes are given, but your lowest non-zero quiz score will be dropped.** A missed quiz will result in a 0 for that quiz, unless the student provides a valid and documented absence memo (through the Absence Memo Office – see below). Acceptable excuses include serious illness, personal tragedy or extreme circumstances beyond the student's control. **If you have a quiz excused, all of your remaining quiz scores will count toward your final grade (none will be dropped).** **No more than 2 quizzes may be excused.** All cell phones, pagers, iPods, iPads, tablets, laptops, etc. are to be **turned off and put away** during each quiz.

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. **You will need to bring a #2 pencil**

with you to exams, as they will be Scantron (please see me ASAP if you are not familiar with this testing procedure!). **There will be no make-up exams.** Anyone who misses an exam will receive a 0, unless the student provides a valid and documented absence memo (through the Absence Memo Office, 67 George St., 953-3390, <http://studentaffairs.cofc.edu/about/absence-memo/index.php>, absencememo@cofc.edu) for missing a scheduled exam. Acceptable excuses include serious illness, personal tragedy or extreme circumstances beyond the student's control. If you have any conflicts with the scheduled exams, you must see me ahead of time, well before the exam date. After receiving one excused exam, a student will be in danger of receiving a grade of Incomplete for the course if any more exams are missed. **All cell phones, pagers, iPods, iPads, tablets, laptops, etc. are to be turned off and put away during each exam.**

Grading

The quizzes will count for a total of 15% of your final grade. The assignment will count for 10% of your final grade. The 4 regular exams will count for a total of 55% of your final grade. The cumulative final exam will count for 20% of your final grade. Grade calculation formula (try for yourself in an Excel spreadsheet):

$$[(\text{Quiz avg.}) * 0.15] + [(\text{Assign.}) * 0.10] + [(\text{Exam avg.}) * 0.55] + [(\text{Final exam score}) * 0.20] = \text{Final grade}$$

Letter grades will be determined by the following breakdown:

$\geq 93\% = \mathbf{A}$ 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-** $\leq 59 = \mathbf{F}$ 0 due to acad. dishonesty = **XXF**

My Expectations of students in my class:

1. **TURN OFF** all cell phones, pagers, iPods, iPads, tablets, laptops and anything with alarms before coming into my class **AND PUT THEM AWAY**. If you forget to do so you may be asked to leave and not to return that class period. If you have a legitimate need to use a laptop, please see me to discuss.
2. **DO NOT TALK OR TEXT** (your phone should be off and put away anyway) WHEN I AM LECTURING. I am trying to do my job and others are trying to learn – please be courteous and pay attention! If you have a question, please ask me – I love questions from students!
3. It may take me some time to learn your names. However, I have an excellent memory and I can see everyone, so please stay awake, participate and be attentive. **Start behaving now like the student you will want me to write that stellar recommendation letter about!**

COURSE CALENDAR (lecture schedule is tentative – I will notify class of any changes – but exam dates are firm!)

Date	LECTURE TOPIC	Chapter
August		
T 23	Welcome, Introduction to Cell, start Prokaryotes	1.1, 1.2, 1.4, 7.1
R 25	Prokaryotic and Eukaryotic Cell Structure	7.1, 7.2, p. 221 Chap. 12, 7.5
T 30	Eukaryotic Cell Structure & Microscopes	7.2, 7.5, p. 143 Chap. 8, Bioskill 11 on p. B18-B20, 7.3, 7.6
September		
R 1	Start Cell Membranes & Transport, Diffusion & Osmosis	7.6, 6.3, 6.4
T 6	Finish Channels, Carriers & Pumps, Cell to Cell, Atoms	6.4, 11.1, 11.2, 2.1

R 8	Bonding, Properties of Water, pH	2.1, 2.2
T 13	**EXAM 1**	
R 15	Organic molecules and Functional Groups, some Energy	2.4, 2.5, 2.3 (part)
T 20	Macromolecules: Proteins	3.1, 3.2, 3.3, prions p. 53
R 22	No Class	4.1, 4.2
T 27	Macromolecules: finish Nucleic Acids	4.2, 4.3, 4.4
R 29	Macromolecules: Carbohydrates & start Lipids	5.1, 5.2, 5.3, 6.1
October		
T 4	Finish Lipids, Distant Cell Signaling	6.1, 6.2, 2.3, 11.3
R 6	**EXAM 2**	
T 11	Redox & ATP, begin Cellular Respiration	2.3 (some), 8, Chap. 5 p. 80-81, start 9
R 13	More Cellular Respiration	9.1, 9.2, 8.5, 9.3, 9.4
T 18	Finish Cell. Respiration & Fermentation, start Photosynthesis	
R 20	More Photosynthesis/ Bio. Assign. Due	9.5, 9.6, 10
T 25	Finish Photosynthesis, start Cell Cycle	10
R 27	Finish Cell Cycle, Mitosis and Cancer	10, 12
November		
T 1	**EXAM 3**	12, Ch. 13 p. 240, Ch. 19 p. 350 & 353
R 3	DNA Replication	
T 8	Fall Break	15
R 10	Finish DNA Replication and Meiosis	15, 13, Ch. 14 p. 258
T 15	Start Mendel, Chromosomes, Linked Genes and Inheritance	14
R 17	More on Inheritance	14
T 22	More on Inheritance/ <i>Course Instructor Evaluations are open!</i>	14
R 24	OFF – Happy Thanksgiving Break!	
T 29	**EXAM 4**	
December		
R 1	Revision of key concepts Q & A	TBA
T6	Reading day	
Sat Dec 10	**FINAL CUMULATIVE EXAM, 8 – 11 a.m., This Room!	

**** Please note: as stated in the Undergraduate Catalog.**

Examinations **must** be taken at the time scheduled, **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)

Note: Forms for permission to reschedule one exam may be obtained from the Office of the Registrar Forms on the Academic Services tab on MyCharleston. Written permission of the instructor and all relevant signatures must be obtained at least 24 hours prior to the scheduled time for the final examination.

Make it a habit to always check out your final exam schedules on your own as well:

<http://registrar.cofc.edu/pdf/exam-schedule-fall2016.pdf>

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

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**

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.*

- 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.

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.*

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