

## *Syllabus part 2 of 2 – Fall 2017*

### *BIOLOGY 111 sec. 04: Intro. To Cell and Molecular Biology (CRN 13798)*

*(alongside the Chem/Bio Learning Community)*

TR 9:55-11:10 a.m., HWWE 213



#### **INSTRUCTOR:**

**Mrs. Kathleen E. Janech, M.S.**

[janechk@cofc.edu](mailto:janechk@cofc.edu)

**(843) 953-4970 (email is best; I may not get messages promptly)**

**OFFICE HOURS (drop-in):** T & R 12:35-1:35 at my Harbor Walk office (see location below). You are welcome to email me to schedule an alternate appt. time or location.

**OFFICE LOCATIONS:** 309/311 Harborwalk West; also 65 Coming St., room 214 on the main campus.

### *Course Description*

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.

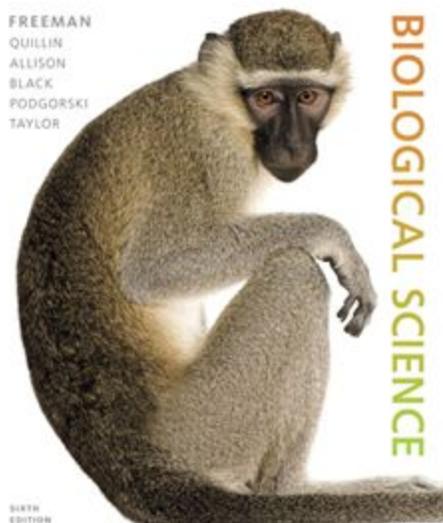
### *Supplemental Instruction (SI):*

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://csi.cofc.edu/?referrer=webcluster&> The SI instructor for this class is **Skylar McBride (mcbridesa@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 Materials



1. **Textbook:** *Biological Science* by Freeman, Quillin & Allison, Sixth Edition (Pearson Publishers). You can buy it (hardcover, loose-leaf version or etext), rent it, 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** 211 if you are a Bio. major, so it is a worthwhile investment. **Keep up with the reading!**

2. **Online:** Access to OAKS and Voice Thread (through MyCharleston), as well as your CofC email and the Remind app

## Suggested Course Material

**Study Guide** for *Biological Science* by Freeman, Sixth Edition (Pearson Publishers). Not required, but very helpful for many students.

**Center for Student Learning** – I encourage you to utilize the Center for Student Learning (CSL) and their academic support services for assistance with study strategies and course content. They offer tutoring, Supplemental Instruction, Study Skills appointments, and workshops that help students of all abilities become more successful throughout their academic career. Services are available to you at no additional cost. For more information, please visit the CSL website at <http://csl.cofc.edu>, or call (843) 953-5635, or drop by their location on the first floor of the Addlestone Library.

## 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.

## How to Take This Course

*(with credit & thanks to, and in memory of, Dr. Conseula Francis)*

Any course, in any given semester, is a journey, often to a place you haven't been before. You may be super excited about the trip, eager to get going and explore the sites. Or maybe you are here because you were told to take this course. Or maybe you are somewhere in-between. Imagine, if you

will, that we're all standing at the base of a mountain. We all have to decide how we're going to climb it, and you alone can decide the manner of your exploration.

|   |  |   |
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| <p><b><u>Day Hiker</u></b><br/>         You're sticking to the trail because you're certain of where it goes. You want the basics - lists, order of processes, details to memorize. There is nothing wrong with this approach, especially if the material is new to you. A successful day hiker will take notes during class, read all related pages in the book after class, and review their notes at least twice a week. A day hiker may do well on quizzes, but they will have to dig a little deeper for exams to really understand the connections between all aspects of the material.</p> | <p><b><u>Backpacker</u></b><br/>         You're ready to spend a few days on this mountain and you have supplies (already existing knowledge, interest, inclination) to help you. You have a grasp of the basics, and are ready to explore beyond them. Backpackers will hone their note-taking skills in class, read all related pages in the book both before and after class so they can ask questions about anything that is not clear, and really spend time digesting all of the information that is contained in the figures in the textbook. They might even drop in to the professor's office hours from time to time, or send an email, with a question.</p> | <p><b><u>Trailblazer</u></b><br/>         You are blazing your own way, finding new routes up the mountain and new connections between all aspects of the material, things others may not see. You are passionate about, and interested in, not only the <i>what</i> and the <i>why</i>, but also the <i>how does this connect to other things in the bigger picture?</i> Trailblazers often use different colors when taking notes, and read more in the book than is required, because they really want to understand the whole picture. They study the figures and try to draw them on their own for mastery. They ask questions and spend a lot of time with the material. For trailblazers, this course is part of the expedition to discover all that science has to offer.</p> |
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**No matter which path you choose, remember that all explorers need to do their best to limit outside distractions. Yes, life happens, and can divert us from the path, but by putting all of our devices away and really focusing while we are in class, we are giving our brains the gifts of time and focus.**

## *Course Policies and Requirements*

### *Accommodations*

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](mailto: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. This material is challenging and requires work on your part for success!**

## Assignment

One homework assignment will be assigned during the semester. 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. Due date is given on the course calendar below. **Because of the assignment and other REAL opportunities to earn credit in this course, I do not offer any extra credit projects.** All students are expected to turn in their assignment by the beginning of the class period on the date scheduled, and they will only be accepted **typed and stapled** (otherwise points will be lost). An assignment 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 until the final grade has been turned in.

## Honor Code

Students are required to adhere to the guidelines outlined by the Honor Board in the Student Handbook (please see [studentaffairs.cofc.edu/honor-system/studenthandbook/2016-2017-student-handbook.pdf](http://studentaffairs.cofc.edu/honor-system/studenthandbook/2016-2017-student-handbook.pdf), sec. 9, p. 11 and 12 specifically). **This includes lying, which will not be tolerated in this course.** All work that you turn in for this course (whether for an assignment, quiz, or exam) 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 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, quiz 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 quizzes will be given throughout the semester on OAKS. They are intended to assist students in keeping up with the large amount of information in this course. **It is the student's responsibility to keep up with due dates and times! No make-up quizzes are given, but your lowest quiz score will be dropped in the final grade calculation.** 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, and you are **expected to take them by yourself without other people, notes or books.**

## Exams

In this course, there are 3 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., (843) 953-3390, <http://victimservices.cofc.edu/absence-memo/index.php>, [absencememo@cofc.edu](mailto: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 3 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):

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

*"Hard work beats talent when talent doesn't work hard" - Tim Notke*

Letter grades will be determined by the following breakdown:

≥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 acad. dishonesty = XXF

**Please teach yourself how to check on your grade in this course on OAKS, and follow along during the semester. Any errors can be brought to my attention, and are much easier to fix the sooner they are detected!**

## 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. The only exception to this would be if you use your phone to make audio recordings of my lectures. In that case, you may have it face down on the desk only.

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. This is a large class, and it will take me some time to learn your names. However, I have an excellent memory and I can see everyone, even in such a large lecture hall, 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  |
|------------------|--|--|
| <b>August</b>    |  |  |
| T 22             | Welcome, Introduction to Cell, start Prokaryotes                                   | 1.1, 1.2, 1.4, 1.5, 7.1                                  |
| <b>R 24</b>      | Prokaryotic and Eukaryotic Cell Structure / <b>Last day for Drop/Add is Monday</b> | 7.1, 7.2, Ch. 12 p. 254, 7.5                             |
| T 29             | Eukaryotic Cell Structure & Microscopes  | 7.2, 7.5, Ch. 8 p. 177, Bioskill 9 on p. 33-35, 7.3, 7.6 |
| R 31             | Start Cell Membranes & Transport, Diffusion & Osmosis                              | 7.6, 6.3, 6.4  |
| <b>September</b> |  |  |
| T 5              | Finish Channels, Carriers & Pumps, Cell to Cell, Atoms                             | 6.4, 11.1, 11.2, 2.1                                     |
| R 7              | Bonding, Properties of Water, pH   | 2.1, 2.2   |
| T 12             | Organic molecules and Functional Groups, start Energy                              | 2.4, 2.5, 2.3 (part)                                     |
| R 14             | Macromolecules: Proteins   | 3.1, 3.2, 3.3, prions p. 89                              |
| <b>T 19</b>      | <b>**EXAM 1**</b>  |  |
| R 21             | Macromolecules: Proteins, start Nucleic Acids (VT)                                 | 4.1, 4.2   |
| T 26             | Macromolecules: finish Nucleic Acids   | 4.2, 4.3, 4.4  |

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|-----------------|--|--|
| R 28            | Macromolecules: Carbohydrates & start Lipids   | 5.1, 5.2, 5.3, 6.1                       |
| <b>October</b>  |  |  |
| T 3             | Finish Lipids, Distant Cell Signaling  | 6.1, 6.2, 2.3, 11.3                      |
| R 5             | Redox & ATP, begin Cellular Respiration  | 2.3 (some), 8, Ch. 5 p. 115-117, start 9 |
| T 10            | More Cellular Respiration  | 9.1, 9.2, 8.5, 9.3, 9.4                  |
| R 12            | Finish Cell. Respiration & Fermentation, start Photosynthesis  | 9.5, 9.6, 10                             |
| <b>T 17</b>     | <b>OFF - Happy Fall Break!!!</b>   |  |
| <b>R 19</b>     | More Photosynthesis / <b>Midterm grades avail. tom.</b>  | 10                                       |
| <b>T 24</b>     | <b>**EXAM 2**</b>  |  |
| <b>R 26</b>     | Finish Photosynthesis, start Cell Cycle / <b>Today is the last day to withdraw with a grade of W</b> | 10, 12                                   |
| T 31            | Finish Cell Cycle, Mitosis and Cancer / <b>HAPPY HALLOWEEN! / Bio. Assign. Due</b>                   | 12, Ch. 13 p. 274, Ch. 19 p. 381 & 384   |
| <b>November</b> |  |  |
| R 2             | DNA Replication  | 15                                       |
| T 7             | Finish DNA Replication and Meiosis   | 15, 13, Ch. 14 p. 291                    |
| R 9             | Start Mendel, Chromosomes, Linked Genes and Inheritance  | 14                                       |
| T 14            | More on Inheritance  | 14                                       |
| R 16            | More on Inheritance  | 14                                       |
| T 21            | Finish Inheritance   | 14                                       |
| <b>R 23</b>     | <b>OFF – Happy Thanksgiving!</b>   |  |

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| <b>T 28</b>     | <b>**EXAM 3**</b>   |                               |
| <b>R 30</b>     | <b>Last day of class for this course!</b>                 | <b>TBA – parts of Ch. 16?</b> |
| <b>December</b> |   |                               |
| <b>Mon. 4</b>   | <b>Official last day of classes for the fall semester</b> |                               |
| <b>Thurs. 7</b> | <b>**FINAL CUMULATIVE EXAM, 8 – 11 a.m., This Room!</b>   |                               |

**\*\* Please note: as stated in the 2017-2018 Undergraduate Catalog, under Academic Regulations, Final Examinations (<http://catalog.cofc.edu/content.php?catoid=7&navoid=282#final-examinations>)**

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 requesting permission to reschedule one exam may be found on the Student Academic Forms channel on the Academic Services tab in 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:

[registrar.cofc.edu/pdf/exam-schedule-fall2017.pdf](http://registrar.cofc.edu/pdf/exam-schedule-fall2017.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**

- <sup>[1]</sup> Understand 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 <sup>[2]</sup>impact 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
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[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.*