

Biology 111: Introduction to Cell and Molecular Biology

Section 1 TR 1:40-2:55 PM RITA 101 and Zoom Fall 2020

Tentative Course Syllabus10089.202010

Instructor Deb Bidwell

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Due to the ongoing COVID-19 pandemic, please consider the following syllabus as valid on August 18th 2020. If the College issues changes to the calendar and/or in-person contact protocols due to COVID-19, weather related evacuations or other unforeseen reasons, I will provide you with a modified version of this syllabus as changes occur. My goal is to ensure the learning outcomes listed below, but how and when they are finally achieved may change multiple times over the Fall 2020 semester because of factors beyond my control.

Course Description

- Introduction to Cell and Molecular Biology is a foundation course for likely science majors emphasizing critical thinking skills, and the concepts 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, detailed at the end of this syllabus.

Pre-requisites

- None. Biology 111 Laboratory is a co-requisite, unless students already have credit for the laboratory portion of the course. BIOL111L is a separate 1 credit course taught by a graduate student Teaching Assistant. Students must purchase their lab manual through VitalSource or the CofC bookstore before labs start on August 31.

Student Learning Outcomes

This general education science sequence provides a background for understanding and evaluating contemporary topics in biology. Students develop a foundational understanding of core biology 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. See addendum for further details.

OAKS OAKS, including Gradebook, will be used for this course throughout the semester to provide the syllabus, class materials and grades, which will be regularly updated.

Contact/Communication

Private Student-To-Instructor Contact

- I do not know you yet, but I care about you. My intentions are to treat you fairly. Should you feel that you have experienced unfair treatment please let me know.
- Students should contact me about issues that are specific to the student **by email at bidwelld@cofc.edu**
- My response time with emails will normally be **24 hours on weekdays and 48 hours on weekends**. I am normally completely on top of my email obligations, so if I do not reply within 48 hours, please feel free to resend your email.

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

- Students should contact the Instructor and other students about issues that are not student-specific and may apply to the entire class using the OAKS **Discussion Board “Hallway Conversations” open 24 /7**.
- My response time on the hallway conversations discussion board will normally be **within 36 hours weekdays and within 48 hours on weekends**. Frequently students will answer each other’s questions before the Instructor is able to reply.

Office Hours

- **Zoom group drop in office hours Wednesdays 3:30 - 5:30 PM** or by appointment for confidential issues. The group zoom link will be located on our OAKS page. Email for a private Zoom meeting only if we’ll discuss confidential matters or if regular office hour meeting time conflicts with your schedule.
- Future face to face, in person office hours with masks and social distancing may be scheduled if COVID-19 pandemic health protocols allow.

Course Communication and Community Building

- **OAKS** will be utilized for **content, quizzes, news, updates, and online office hours**. *New to Oaks?* Tutorial here: <http://blogs.cofc.edu/oaks/students/getting-started/>
- **Email and OAKS news** will be used to communicate important or sudden changes in course information.
- Big class, small feel. We will **all work together to build our classroom 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 diverse community of learners.

Expectations

- Students must earn **100% on online OAKS syllabus quiz** to access course materials.
- Students should plan to **log into Oaks at least 3 times per week**.
- Students should dedicate **6+ hours per week** outside of class 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 often weekly obligations**. Quizzes are designed as active learning tools (formative assessment) and exams are designed as summative tools (formal assessment). Both will take place online through OAKS.
- **Collaborative learning** is strongly encouraged, but quizzes and exams are individual. Collaboration on quizzes and exams is prohibited.
- This class uses **higher order thinking**. What is covered in the lecture is the tip of the iceberg, and students are expected to augment and elaborate outside of class using the text, suggested homework, quizzes, and Supplemental Instruction.
- **Procrastination hurts** - the course builds and snowballs.
- **Ask for help early and often**. Don't wait until you feel overwhelmed.
- **Attendance is enthusiastically recommended, but cannot be required**.
- **If you miss a class, it is your responsibility to view recorded materials and contact a peer for class notes**.

Required Course Materials

- **Computer/technology** with access to strong **internet software/Apps**: (OAKS, Zoom, PowerPoint)
- **Textbook**: Free online open access text Open Stax Biology 2e
<https://openstax.org/details/books/biology-2e>
- Basic **scientific calculator** (logs, exponents, & square roots)
- A **physical notebook** with paper and pen are strongly encouraged. Science tells us that taking notes by hand and drawing to learn is the best way to actively engage with our course material. It is not recommended to use a keyboard to take notes. Electronic pens and tablets are acceptable.

Assessment

- Weekly quizzes will be multiple-choice, individual, timed, randomized, approximately 10 questions, and conducted through OAKS. They are open-book and open-notes but students must prepare ahead of time, as quizzes are challenging and there will not be time to look up individual answers. Students may take the quizzes as many times as they choose to during the quizzing period. Once students earn 85% or higher on tier 1

level quiz questions, they can move on to tier 2 level (higher order thinking) questions. The final quiz grade is the highest score an individual makes out of all of their attempts. Quizzes are held each week unless an exam is scheduled or classes are

- Exams (3) consisting of tier 2 level questions will be timed, randomized, synchronous and online through OAKS. Extra credit will be based on weekly readings. If a student is receiving urgent medical attention and is too injured or ill to take a regularly scheduled exam, they must notify the instructor as soon as possible (ideally prior to the exam) so that a make-up may be arranged. If a student needs to miss an exam due to an official CofC activity, arrangements should be made well ahead of time.
- The final exam is cumulative, multiple choice, and held synchronously online during the scheduled final exam time.

Tentative schedule

Classes start on August 25th and meet synchronously on Zoom through September 10th. In person classes are scheduled to begin on 9/15. Our Rita 101 classroom holds half of our class at a time. Starting on 9/15 students will be assigned to attend in person on either Tuesdays or Thursdays and will attend via synchronous Zoom on the other day. Students wishing to attend class virtually on both days can be accommodated.

Units of study:

Unit 1: molecules of life – biological molecules, cell form and function

Unit 2: biochemical pathways of life – photosynthesis and cellular respiration

Unit 3: replication of life – cell division and genetics

Weekly quizzes (asynchronously on OAKS) are currently scheduled with due dates on:

August 31

September 7, 14, 21

October 5, 12, 19

November 2, 9, 16

Exams (held synchronously on OAKS during class time) are currently scheduled for:

September 24

October 22

November 19

Cumulative final exam (on OAKS) is scheduled for:

December 8 from 1-3 PM

A detailed course calendar that includes weekly topics and readings will be made available at the start of classes and revised as needed.

Grades calculated as follows:

Component	Value (% of final course grade)
Quizzes - lowest score dropped (9)	30
Exams (3)	50
Cumulative Final Exam (1)	20
Total:	100%

Final course average:	Grade
100-93	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-
< 60	F

Special Agreements This College abides by Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. If you have a documented disability that may have some impact on your work in this class and for which you may require accommodations, please see an administrator at the Center of Disability Services/SNAP, (843) 953-1431) or me so that such accommodation may be arranged. Contacting the Instructor as early as possible in the semester is the best strategy.

Supplemental Instruction Our section has Supplemental Instruction with Makayla Cook. Supplemental Instruction is collaborative learning with a trained underclassman peer biology coach. It is for everyone and is not remedial. Attendance is strongly encouraged! <http://csl.cofc.edu/supplemental-instruction/>

Center for Student Learning I encourage you to utilize the Center for Student Learning's (CSL) academic support services for assistance in study strategies, speaking & writing strategies, and course content. They offer tutoring, Supplemental Instruction, study strategy appointments, and workshops. Students of all abilities have become more successful using these programs throughout their academic career and the services are available to you at no additional cost. For more information regarding these services please visit the CSL website at <http://csl.cofc.edu/> or call (843)953-5635.

College of Charleston Honor Code/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.

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.

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 and all related processes in the Student Handbook at <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>

Title IX The College of Charleston is committed to providing an environment free of all forms of prohibited discrimination, including sexual harassment and violence (i.e. sexual assault, domestic and dating violence, and gender or sex-based bullying and stalking). If you have experienced any form of discrimination or harassment, know that help and support are available.

Please be aware that College of Charleston employees, other than designated confidential resources, are expected to report information they receive about prohibited discrimination,

including sexual harassment and sexual violence. This means that if you tell me about a situation involving sexual harassment or violence, or other form of discrimination or harassment, I have to share the information with my supervisor and the College's Title IX Coordinator.

Students may speak to someone confidentially by contacting the Office of Victim Services at 843-953-2273, Counseling and Substance Abuse Services at 843-953-5640, or Student Health Services at 843-953-5520.

Please visit the Office of Equal Opportunity Programs website (<http://eop.cofc.edu/title-IX/index.php>) for more information.

Inclement Weather, Pandemic or Substantial

Interruption of Instruction If in-person classes are suspended, faculty will announce to their students a detailed plan for a change in modality to ensure the continuity of learning. All students must have access to a computer equipped with a web camera, microphone, and Internet access. Resources are available to provide students with these essential tools.

Addendum General Education information

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 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

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.*

- the use of performance enhancing drugs in sports
- the development of antibiotic resistance in disease organisms