

**Instructor:** Tyson Edwards, PhD

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**Office Hours:** By appointment – in person (on campus) or online (via Canvas)

**Communication:** Messaging via Canvas is preferred and will typically be answered the same day; however, responses during standard workday hours (9am-5pm) will be limited

**Textbook:**

- *Campbell Biology Concepts and Connections*, 3<sup>rd</sup> Custom Edition for University of Utah, by Reece, Taylor, Simon, Dickey, and Hogan.
- A valid access code for the associated online *Mastering Biology* program will be necessary for required homework assignments.

**Course Description**

Principles of Biology introduces the workings of life from the molecular to the ecosystem level. Topics include genetics, development, ecological interrelationships, evolution, physiology and behavior. A preparatory course intended for all life and health science students.

**Teaching and Learning Methods**

*"The correct analogy for the mind is not a vessel that needs filling, but wood that needs igniting."* ~Plutarch

I believe that one of the most important responsibilities as an educator is to inspire curiosity. Once a student becomes truly invested in a topic, they take responsibility for their own education. I will facilitate your learning process by providing excellent resources and materials, clarifying difficult concepts and answering questions, and engaging everyone in high-level learning activities in class.

Class time will be split between a review of the material and activities that enhance the biological principles. I expect each student to come to class prepared by completing the MasteringBiology homework and reading assignments. This will enable an in-depth review of the material, and will facilitate class activities and assignments that integrate the associated principles.

Overall, our class will be focused on answering three main questions about biology:

1. **What do we know?** The answer to this question will come mainly in the form of the course material found in the textbook, homework questions, and lecture reviews. The majority of the content should be learned primarily *outside of class time*. Because the course is expansive in scope, I will try to be specific in the core principles that you need to master.
2. **How do we know it?** Understanding the process of scientific inquiry is essential in order for us to appreciate biological principles and to critique experimental findings. We will learn about the methods and experiments that have illuminated the workings of cells, organisms, and ecosystems, and we will practice analyzing the data and verifying conclusions. The bulk of this work will be done during class sessions in the form of assignments and group activities.
3. **Why do we care?** In addition to knowing content and the processes that generated it, we will also strive to develop an appreciation for biology in the larger-world view. We will investigate how specific biological principles impact daily life and how they connect to you. The answer to this question will come from in-class assignments, guest speakers, and individual research that you will conduct on a specific biological question.

## Course Outcomes

By the end of this course, the goal is that each of you will:

1. Appreciate how biological knowledge is obtained through the scientific method
2. Learn to analyze primary scientific data
3. Apply biological concepts towards real-life scenarios
4. Be a more informed and responsible citizen
5. Describe the inner workings of living organisms, including:
  - DNA replication, cell division, and transmission genetics
  - gene regulation and protein synthesis
  - cellular metabolism including respiration and photosynthesis
  - movement of molecules and signaling mechanisms
6. Explain how biological processes are regulated by information flow and feedback loops
7. Appreciate how evolution has shaped the ability of organisms to adapt and diversify
8. Describe the levels of life including viruses, bacteria, fungi, plants, and animals
9. Describe how complex organisms function at molecular, cellular, tissue, organ, and system levels
10. Explain how function depends upon structure at all levels

## Course Policies

***Attendance & Punctuality:*** I believe that learning is facilitated through the interactions that come during a well-structured and active class session. Therefore, attendance is highly recommended (but not mandatory). However, topics discussed in class may be included on assignments and examinations, and in-class assignments cannot be completed outside of class time. It is possible, but difficult, to pass the class without these assignments (see Grading Policy below).

***Participation:*** Active learning requires the engagement of each student. I expect everyone to come to class prepared, and to participate when appropriate. I expect mutual respect for others' ideas, questions, and comments. Asking questions, investigating solutions, and analyzing the material is crucial to any scientific endeavor.

***Electronic Devices in Class:*** Cell phones, tablets, and computers can be valuable learning tools when used appropriately. In fact, many of the in-class assignments will require electronic access to scientific articles or websites. Because you are responsible for your own education, I will not restrict usage of electronics in class **other than during exams**. However, if you are being a distraction to others your device will be confiscated until the end of class.

## Assignments and Exams

A summary of assignments and exams is provided here. Additional information may be given in class or on Canvas.

### MasteringBiology Homework

A set of questions for each lecture topic will be available via the MasteringBiology website. The homework assignment includes dynamic tutorials, video clips and a range of question types to help you preview the chapter material that will be covered in class the day the homework is due. Most questions allow at least one retake, thereby increasing the ability to gain full credit. In order to facilitate an active learning environment during class, **each homework assignment is due by 6 pm on the day of the topic lecture**. No accommodations will be made for late MasteringBiology assignments.

### In-class Assignments

Most class periods will include an activity, worksheet, or case study, that will be completed during class. These activities are meant to connect the basic biological principles to the real world, and to teach you the process of doing and analyzing science – not just learning it.

### Semester Project

During the semester you will keep a list of questions that interest you from your reading, assignments, or exams. These questions should stem from the course content, but should allow for deeper investigation beyond the scope of our standard class material. You will select one question from the list to explore in greater detail. You will submit your question for initial review, develop an annotated bibliography with at least 5 scientific sources, and present a 3-5 minute summary of your findings to the class, including a proposal for possible future experiments.

### Examinations

Four exams will be administered over the course of the semester. Each exam will consist of multiple choice/matching, short answer, long answer, and problem-solving questions. The first three exams will be non-cumulative, while the final exam will be cumulative. The material covered in class discussions, assigned reading chapters, in-class assignments, and MasteringBiology assignments, may be included on these examinations. Taking an exam early may be pre-arranged within 7 days and will incur a small cost to use the Sandy site proctoring service. Make-up exams for unplanned missed classes will only be given if the reason for missing class is severe and documented. Exam rules include:

- Students remain in the class during the exam unless given permission by the instructor. **No restroom breaks will be permitted.**
- Cell phones will be turned off and out of sight. **Use of a cell phone or other electronic device during an exam will result in a 0.**
- **No talking** or interacting with other students, including looking at others' work.
- The allowed time will be sufficiently generous to enable you to complete the exam if you know the material. If you finish early please leave the room or be quiet.

### **Grading Policy (Evaluation Methods & Criteria)**

The course grade will be determined by a percentage of total points earned in the assignments and exams. The anticipated point breakdown and grade distributions are detailed in the following tables.

Assignment/Exam	Number	Points Each	Total Points
MasteringBiology Homework	~20	15	300
In-class Assignments	~20	15	300
Semester Project	1	100	100
Examinations	3	80	240
Comprehensive Final	1	60	60

Grade	A	A-	B+	B	B-	C+	C	C-	D	E
% of Total Points ( $\geq$ )	93	90	87	83	80	77	73	70	60	<60

Final grades will be re-examined only if there is sufficient evidence of an error in grading or recording. No special extra credit assignments will be considered for individual students, though some extra credit may be made available to everyone throughout the course.

**Note:** Any student found cheating on an assignment or exam will receive a failing grade for the course and if warranted, the matter will be turned over to the appropriate student disciplinary committee.

For a detailed description of the university policy on cheating, please see the University of Utah Student Code: <http://regulations.utah.edu/academics/6-400.php>

### **University Policies**

- 1. *The Americans with Disabilities Act.*** The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.
- 2. *Addressing Sexual Misconduct.*** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

*Note: This syllabus is meant to serve as an outline and guide for the course, and it may be modified with reasonable notice to you. The Course Schedule may also be revised to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas under Announcements.*

### Course Schedule

Date	Topic	MasteringBiology Assignment Due	In-Class Assignment	Lens
Jan 7	Introduction and Overview	N/A	Class Survey/Introductions	Neurons – Extreme Cells
Jan 9	The Chemical Basis of Life (2) and Molecules of Cells (3)	Chapter 2/3	Alzheimer’s Disease	
Jan 14	A Tour of the Cell (4)	Chapter 4	Axonal Transport	
Jan 16	The Working Cell (5)	Chapter 5	The Action Potential	
Jan 21	<b>No Class – Martin Luther King Jr. Day</b>			
Jan 23	How Cells Harvest Chemical Energy (6)	Chapter 6	Brain Metabolism	
Jan 28	Nervous Systems (28)	Chapter 28	The Connectome	
	Review Day	N/A		
Jan 30	<b>Exam 1</b>			
Feb 1	<b>Question for Semester Project Due</b>			
Feb 4	The Cellular Basis of Reproduction and Inheritance (8)	Chapter 8	Early Embryo	Building Animals
Feb 6	Molecular Biology of the Gene (10)	Chapter 10	Developmental Mutations	
Feb 11	How Genes Are Controlled (11)	Chapter 11	Hox Genes	
Feb 13	Reproduction and Embryonic Development (27)	Chapter 27	Building Limbs Experiment	
Feb 18	<b>No class – Presidents’ Day</b>			
Feb 20	DNA Technology and Genomics (12)	Chapter 12	Guest Speaker (TBD)	
Feb 25	Review Day	N/A		
Feb 27	<b>Exam 2</b>			
Mar 1	<b>Annotated Bibliography for Semester Project Due</b>			
Mar 4	Patterns of Inheritance (9)	Chapter 9	Pigeonetics	Genius of Birds
Mar 6	How Populations Evolve (13)	Chapter 13	Darwin’s Finches	
Mar 11	<b>No Class – Spring Break</b>			
Mar 13				
Mar 18	The Origin of Species (14)	Chapter 14	New Birds	
Mar 20	Unifying Concepts of Animal Structure and Function (20)	Chapter 20	Anatomy of Flight	
Mar 25	Review Day	N/A		
Mar 27	<b>Exam 3</b>			
Apr 1	Communities and Ecosystems (37)	Chapter 37	Wolves in Yellowstone	
Apr 3	Photosynthesis: Using Light to Make Food (7)	Chapter 7	New Discoveries	
Apr 8	Nutrition and Digestion (21)	Chapter 21	<i>H. pylori</i> and Ulcers	
Apr 10	<b>Semester Project Presentations</b>			
Apr 15	<b>Semester Project Presentations (cont.)</b>			
Apr 17	Final Review			
Apr 22	<b>Comprehensive Final</b>			