Concepts in Biology

BIOL120 Fall 2018

Instructor: Dr. Emily McLean
Email: emily.mclean@emory.edu
Phone: 770-784-4745
Office: OSB 310
Office Hours: By appointment or 3-4pm Fridays

Lecture Hours: T/Th 11:30-12:15 **Room:** OSB 101
Lab Hours: Thursday 2:30-5:30 **Room:** OSB 201

Textbook: Campbell Biology Concepts and Connections. 9th Edition. ISBN: 013429601X – Required

Lab Manual: Biology 120 Oxford College Lab Manual. ISBN: 9781323872925
Available at the Campus bookstore, new copy required.

Course Overview: This course will introduce students to the concepts that inform our understanding of biology. We will focus on basic biological concepts (including cell theory, the "central dogma" of molecular biology, cell division, genetics, ecology and evolution) while also learning and practicing the practical and philosophical methods that scientists use to investigate these concepts. This course focuses on equipping students to make informed decisions about scientific issues affecting their personal lives and the communities where they live.

Course Objectives:
By the end of this course students will be able to:

- Describe the major components of plant and animal cells and their primary functions within the cell
- Explain how cells transfer and store energy
- Apply your knowledge of the typical patterns of cell division and inheritance to evaluate the causes and consequences of abnormality in these processes
- Compare the different forces of evolution and discuss their potential impacts on microevolution and/or speciation
- Apply your understanding of biological concepts to evaluate decisions made by citizens and policy-makers surrounding scientific issues in society
- Create and evaluate strong hypotheses and predictions

Evaluation

- Lecture Exams (3 at 100 points each)
- Final (150 points)
- In class "Review and Apply" Problem Sets (3 at 20 points each)
- Public Service Announcement Project (50 points total)
- Decision making problem sets (3 at 7 points each)
- Hypotheses and Predictions exercises (3 at 3 points each)
- Pre-exam study plans (4 at 3 points each)
- Lab exams (3 at 50 points each)
- Lab exit tickets (10 at 5 points each)

Grading Scale:

A: 90-100% B: 80-89% C: 70-79% D: 60-69% F: <60%

Assignments:

Assignments will be described in detail in class throughout the semester at which time grading rubrics will be provided (see "Schedule"). See below for a brief description of coursework.

- Reading Reactions: A short reaction to the reading will be due before every class (for which a reading was assigned). These will be graded for completion.
- "Review and Apply" problem sets: In class problem sets will focus on both recalling and applying key concepts from class material. These problem sets will be completed first individually, and second in randomly assigned groups.
    - **Solo grade:** Each problem set will be worth 18 points. You will receive credit for answering questions correctly and demonstrating sound reasoning.
    - **Group grade:** 3-4 students will be assigned to each team and the composition of the teams will change with each problem set, assigned by a random generator. Your team grade for each problem set will be a participation score worth 2 points. To earn this, you need to attend class and participate in the team discussion about which answers are correct. You will either receive 2 points if you are present and participate on a team, or you will receive a 0.
- Hypotheses and Predictions Exercises: These exercises may be in class or take-home and will ask you to apply your understanding of hypotheses and predictions to course material.
- Practical Decision Making Assignments: These assignments may be in class or take-home. You will be provided with a set of scenarios where someone is facing a "real-life" decision. You will apply your understanding of course material to identify relevant biological concerns and provide decision-making advice.
- "Public Service Announcement" Group Project: Working in small groups you will choose a topic of societal and biological importance. As a group, you will 1) Research the scientific processes at work in and around your topic, 2) Explore the cultural and societal issues surrounding your topic, 3) Identify the informational/educational needs of the community as it pertains to this topic, and 4) Develop a strategy to inform the

community about your topic. As a group, you will turn in a product (meme, video, t-shirt, poster, infographic, etc.) designed to inform and advise the public about your issue. As an individual you will turn in a ~1500 word paper describing the scientific rationale for your advice to the public. More details about this assignment and a detailed grading rubric will be provided in class.

- Study plans: 2 weeks before each lecture exam, you will create a study plan, using on online form.

Laboratory expectations: You are expected to attend all the laboratory sessions for this class, missing lab has extreme consequences, as detailed in the attached attendance policy. Lab is a great time to try new things – you are not expected to be an expert at any laboratory skills, but you will be asked to understand the goal of each laboratory exercise and to be able to identify where things might have gone wrong. There will be no make-up labs and content from all the labs will be included on lab exams. If you miss a lab, you are still responsible for knowing the material from that lab. Some of the labs will include animal dissections (e.g., fish, fetal pigs). If this presents an ethical or religious problem for you, you must discuss it with me before the drop/add period is over. All students will be responsible for the material covered in every lab, whether they are present/participate or not.

Technology in the classroom: Cell phone use will not be tolerated during class. In nearly all cases, laptop/tablet use for note-taking is strongly discouraged and usage for anything else will not be tolerated. If you would rather work on assignments for other classes, check email/facebook, talk on the phone, text, or play games than be in class, please own that choice, stay home, and do those things.

Attendance Policy: This class is full of in class activities and assignments. Your attendance will be necessary to complete the assignments and participate in the activities; the penalty for missing class will be felt largely due to poor performance on in-class assignments and assessments. The attendance policy for the Oxford Biology Department is attached as a separate document and will be followed for this class. If you are unable to attend class and would like the opportunity to complete any *ungraded* activities we may have done that day, please attend office hours or schedule another time to meet with me.

Make-up assignments: Due to laboratory space constraints, there will be no make-up times available for any labs missed for any reason. If you must miss lab or lecture and you contact me at least one week ahead of time, accommodations for assignments or exams missed may be made, on a case-by-case basis. If an emergency or illness causes you to miss class at the last minute, you must provide documentation of the emergency or illness for accommodations to be considered.

Disability statement: Students with disabilities who believe that they may need accommodations in the class are encouraged to contact the Office of Accessibility Services at 770-784-4690 or oas_oxford@emory.edu as soon as possible to better ensure that such accommodations are implemented in a timely fashion. Students who have accommodations in place are encouraged to coordinate with me during the first week of the semester, to communicate your specific needs for the course as it relates to your approved accommodations. Accommodations cannot be implemented until I am provided an accommodation letter and discuss the accommodation plan for this course face to face with you. All discussions with OAS and faculty concerning the nature of your disability remain confidential.

Religious Holidays Arrangements: If you anticipate religious holidays that may affect your ability to complete the requirements of this course, please make every effort to discuss your religious holiday needs with me within the first two weeks of the semester; waiting longer may compromise my ability to extend satisfactory arrangements. If you need guidance negotiating your needs related to a religious holiday, the College Chaplain, Rev. Lyn Pace, ppace@emory.edu, Candler Hall 202, is willing and available to help. **Please be aware that Rev. Pace is not tasked with excusing students from classes or writing excuses for students to take to their professors. Emory's official list of religious holidays may be found at http://www.religiouslife.emory.edu/faith_traditions/holidays.html.

Title IX Reporting: Every Emory employee who is informed about an allegation of sexual misconduct involving any student is required to notify a Title IX Coordinator either directly or through their relevant reporting structure*. All members of the Emory community are encouraged to promptly report incidents of sexual harassment and discrimination. For more information, visit: http://sexualmisconductresources.emory.edu/policies/index.htm

**Employees who serve in a professional role in which communications are afforded confidential status under the law (e.g., medical providers, therapists, and professional and pastoral counselors) are not bound by this requirement but may, consistent with their ethical and legal obligations, be required to report limited information about incidents without revealing the identities of the individuals involved, to a Title IX Coordinator or Deputy Title IX Coordinator.*

Academic Integrity: In this, as in all classes at Oxford, you are expected to complete your assignments with due regard to academic integrity and to adhere to Oxford's Honor Code. In order to do so you should familiarize yourself with the honor code (http://oxford.emory.edu/catalog/regulations/honor-code.html). Failure to comply with these standards will be reported to the Honor Council.

The instructor reserves the right to modify this syllabus as she deems necessary.

Schedule:

Unit	Dates	Topics	Reading Assignment (subject to change, check Canvas for most up to date information)	Additional	Lab
Nature of Science and Intro to Biology 120	Th: Aug 30	Course introduction How does science answer questions?			
	T: Sep 4	Hypotheses and Predictions Meta-learning: how to succeed in this class/study plans	Scientific proof is a myth Forbes article Sections 1.4-1.8 (pg 6-9)	PSA rubric handed out	
	Th: Sep 6	Themes in Biology Chemistry in Biology Hierarchy of Organization	Sections 1.1-1.3 (pg 1-5) 1.9-1.14 (pg 10-16) 2.5-2.14 (pg 26-32)	Hypotheses and Predictions practice activity	I: Leaves of Steel/Scientific Inquiry
Ecosystems and Ecology	T: Sep 11	Energy and matter in Ecosystems Changes to Ecosystems/human disturbance	37.1-37.4 (pg 742-745) 37.8-37.9 (pg 748-749) 37.14-37.16 (pg 754-755) 37.22- 37.23 (pg 760-761)	Decision making problem set passed out **Study plan due for exam 1**	
Cell Biology	Th: Sep 13	Cells as the unit of life: what makes up a cell? What are key components of prokaryotic eukaryotic cells? Cellular structures and functions: what are functions executed by cells and what cellular structures carry out these functions?	Wacky History of Cell Theory Youtube Video 4.1-4.12 (pg 54-67)	**Hypotheses and Predictions in class** **Decision making problem set due**	II: Pond Ecosystem
	T: Sep 18	More cellular structure and function and Communication between cells and the environment – why are membranes important?	4.13-4.22 (pg 67-73) 5.1-5.9 (pg 76-83)		
	Th: Sep 20	Cell Biology catch-up/review and Transport –		**Cell biology review and application problem set in class**	III: Microscope and Cell

Unit	Dates	Topics	Reading Assignment	Additional	Lab
	T: Sep 25	EXAM I (Nature of Science, Ecology, Cells, themes in biology/chemistry in biology)			
Cell Transport and Energy	Th: Sep 27	Finish Transport and Intro to Energy	5.10-5.16 (pg 84-89)		LAB EXAM I
	T: Oct 2	Cellular respiration and fermentation	Chapter 6 (pg 92-107) – *This is a **hard** reading. Give yourself a lot of time to do it. Focus on understanding what your read and identifying specific things you don't understand. Don't just see the words.*	**Study plan due for exam II**	
	Th: Oct 4	Photosynthesis	Chapter 7 (pg 110-124). *Another hard reading*		IV: Osmosis and Diffusion
	T: Oct 9	FALL BREAK			
	Th: Oct 11	Cell energy review		**Cell energy application and review problem set in class**	V: Respiration/Wine-making
	T: Oct 16	EXAM II (Transport, Respiration, fermentation, photosynthesis)			
Central Dogma	Th: Oct 18	Central Dogma – transcription, translation	10.1-10.16 (pg 184-202)	**PSA topics due**	VI: Photosynthesis
	T: Oct 23	Central Dogma – gene regulation, Cell Division and Inheritance - mitosis	11.2 (pg 216-217) Epigenetics: The Evolution Revolution Book Review from NYT 8.1-8.5 (pg 128-135) Optional: 8.6-8.10 (pg 136-140)	Hypotheses and predictions take home assignment passed out	

Unit	Dates	Topics	Reading Assignment	Additional	Lab
Cell Division and Inheritance	Th: Oct 25	Cell division and Inheritance – sexual reproduction (meiosis)	8.11-8.17 (pg 140-147)	**Hypotheses and predictions assignment due**	LAB EXAM II
	T: Oct 30	Cell division and inheritance – mendelian genetics	9.1-9.7 (pg 156-165) 9.11-9.15 (pg 170-174)	**Revised PSA topic due, if necessary** **Study plan due for exam 3**	
	Th: Nov 1	TBD (gene mapping/mutations/cancer)		**Decision making assignment due** (probably done in class)	VII: Mitosis/Meiosis
Evolution	T: Nov 6	Evolution	13.1 (pg 260-261) 13.6-13.9 (pg 266-269) 13.12-13.14 (pg 272-274)		
	Th: Nov 8	Speciation/TBD	TBD – check Canvas	**Evolution application and review problem set in class**	VIII: Digestion (Pig)
	T: Nov 13	EXAM III (Central dogma, cell division and inheritance)			
Body Systems	Th: Nov 15	Circulatory	TBD – check Canvas		IX: Circulatory (Pig)
	T: Nov 20	Digestion	TBD – check Canvas	**Rough draft of PSA paper due**	
	Th: Nov 22	THANKSGIVING			Thanksgiving – NO LAB
	T: Nov 27	Immune	TBD – check Canvas		
Popular Topics	Th: Nov 29	GMOs	TBD – check Canvas	**Hypotheses and predictions exercise in class**	XI: Behavior
	T: Dec 4	Antibiotic resistance	TBD – check Canvas		
	Th: Dec 6	Vaccines	TBD – check Canvas	**Study plan due for the final**	LAB EXAM III
	T: Dec 11	PSA presentations/ Why Science?		**Decision making problem set in class;** **final PSA paper due**	

Cumulative final (EXAM IV – Evolution, Body Systems, Popular Topics) to be given during finals meeting period: Tuesday, December 18th at 9:00AM