BIOLOGY 1520 ORGANISMAL BIOLOGY SPRING 2015

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Prerequisites: Good background in high school biology and chemistry.

Description: An introduction to biology at the organ and organismal levels, with an emphasis on physiological processes and integration of growth and development. This course will foster the development of critical scientific skills including hypothesis testing, experimental design, data analysis and interpretation, and scientific communication. Class meets MWF 11:05 to 11:55 in ES&T L1205.

Textbook, Freeman, S. *Biological Science*. 2011. 5th edition. Pearson.

Mastering Biology: The bookstore sells hardcover and looseleaf-bound texts, each bundled with *Mastering Biology* (MB) and *Learning Catalytics* (LC) codes. If you plan to work solely with the on-line e-book within MB (not downloadable), then you can simply purchase MB access with eText at the bookstore or at the *MB* website, pearsonmylabandmastering.com/northamerica/masteringbiology/. *Mastering Biology* consists of **required** course homework assignments. We will make "Adaptive Followup" exercises available for each homework assignment. These will provide you with the opportunity to reinforce your understanding of topics you missed on the homework assignment and to make up some or all of the missed credit. Although MB describes these as "extra credit" exercises, we combine the points earned on each Adaptive Followup with your score on the parent homework assignment, potentially raising your score for that assignment to a maximum of 100%. **MB Course ID: GTBIOL1520S15**

Learning Catalytics: We will use *Learning Catalytics* (learningcatalytics.com) for interactive lecture sessions, which along with MB, contributes to your "participation" grade. You may use any internet-enabled device (laptop, tablet, "smartphone") to access LC in class and respond to questions. An LC subscription is included if you purchase the eText and MB through the bookstore, otherwise you must purchase access separately (~$12 for a semester subscription).

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Honor Code: All students are expected to abide by the Academic Honor Code, which can be viewed online at http://www.honor.gatech.edu. We take the Honor Code very seriously and are required to report any potential violations. Some specific examples of Honor Code violations that we've encountered include: copying during exams, accessing in-class activities while not in class, and plagiarism.

Learning Accommodations: If needed, we will make classroom accommodations for students with disabilities. These accommodations must be arranged in advance and in accordance with the ADAPTS office (http://www.adapts.gatech.edu).

Lectures: Lectures are held in ES&T L1205. Attendance in lecture correlates strongly with performance in Biology 1520, and is the only permissible method for earning points from in-class activities. **Accessing Learning Catalytics during an active session from a location outside of the classroom is a violation of the Honor Code!** Lecture slides will be available via T-Square and you are urged to download and print them for use in studying for exams. The lectures and readings are complementary and some material will be presented only in lecture. Lecture exams will be based on topics, materials, and discussions presented in class and in the assigned readings. **Consumption of food or drink (other than water) during class is not permitted.** You are expected to arrive in class prepared to learn.

Labs: **Labs will begin the week of January 12.** That week, you'll need the combined lab manual/notebook (ISBN 978-073806554-0), a 100% cotton lab coat, and you must wear closed toe shoes that cover the entire foot. Note that while no labs meet during the first week of classes, you will have a pre-lab assignment due before you meet for lab: part 1 is due on January 8th, part 2 is due before your lab section meets (see lab T-square announcements for details). Labs are held in Clough Commons and taught by Teaching Assistants (TAs): your TA contact information is available on the BIOL 1520 Lab T-square site. All communications regarding lab should be directed to your lab TAs. Most FAQ about labs are answered on the lab T-square site and lab syllabus. Laboratory attendance is mandatory and each unexcused absence will lower your final course grade (not just your lab grade) by 5%. Details of the absence policy are in the BIOL 1520 Lab syllabus.

Homework: *Mastering Biology* offers animations, videos, interactive tutorials and simulations, as well as practice quizzes and an on-line version of the textbook. Individual access codes for *Mastering Biology* are included with each new textbook, or may be purchased separately from the publisher. Assignments will be due each throughout the semester, including the last week of class. **Check *Mastering Biology* frequently for new assignments!**

Group Projects: Groups of 4-5 students will work together to research a current issue of interest related to content covered in BIOL 1520. This topic will be assigned based on ranked preferences of each group, selected from a list provided by the instructors. Each group will produce one creative video exploring and explaining the assigned topic. Students may choose their groups no later than **March 13th**; students not in groups by this date will be assigned to groups by the instructors. Completed videos will be due **April 17th**.

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Lecture Exams: Midterm exams will be Thursday evenings at 6:00 pm in CULC 152 (see detailed syllabus schedule). Exams will be multiple choice or a mix of multiple choice and short answer.

Missed Exams: If you miss an exam for any reason, you will receive a grade of 0 (zero) on that exam unless you petition for a makeup exam within 24 h of the start of the missed exam, *and* your petition is approved. Your petition must be submitted in writing and must include documentation of a legitimate reason for missing the exam. You may submit your petition before the exam if you know of your scheduling conflict in advance. Examples of legitimate reasons to miss an exam include illness, illness or death in your immediate family, and participation in official university activities. If we approve your petition, we will remove the missed exam from your grade calculation by using the weighted mean of your other exam scores as your grade for the missed exam.

Recitation: The TA will lead a recitation each Thursday 6:05-6:55pm (CULC 152) when we do not have an exam scheduled that day. This is an opportunity for you to discuss lecture material and text readings with the TA. Recitation attendance is strongly correlated with exam performance.

Grading: Your final grade will depend on the following combination of grades:

In-class exams (10% each):	40%
Final exam (Module 5 and cumulative):	20%
Group project:	10%
Participation (*Mastering Biology* + *Learning Catalytics*):	10%
Laboratory:	25%

Note that these components total 105%. The maximum overall score we will allow in this course is 100%, so this scheme includes 5% of extra credit.
We will use the following procedure in calculating your final grade:

1. We will combine your exam, lab, participation, and group activity scores into a raw composite score (0 – 100%) using the weights shown above.
2. We will use the mean score earned by the top 5% of the class as a gauge of real student performance in the class.
3. We will scale your score to actual student performance by dividing your raw composite score by the mean score earned by the top 5% of the class. If you're in the top 2.5% of the class, your score will be 100%.
4. We will assign final letter grades based on scaled scores as follows:

A:	$\geq 90\%$
B:	$\geq 80\%$ and $< 90\%$
C:	$\geq 70\%$ and $< 80\%$
D:	$\geq 60\%$ and $< 70\%$
F:	$< 60\%$

Biology 1520 Module Themes and Teaching Goals

Module	Major theme	Teaching Goals
1	• Biodiversity	• Evolutionary history of life on Earth • Metabolic diversity • Biological diversity
2	• Growth and Reproduction	• Differentiation • Sexual and asexual reproduction • Reproductive strategies
3	• Chemical and Electrical Signals	• Hormones • Neurons and integration • Sensory systems • Motility
4	• Nutrition and Transport	• Metabolic diversity • Nutrient acquisition • Circulatory systems (plant and animal)
5	• Materials Balance	• Gas exchange • Water, ion, and mass exchange • Homeostasis

Spring15	Lecture Topics	Instructor	Freeman 5th Reading
=> M1	**Start Module 1: Biodiversity**		
5 Jan	Course overview	MB	
7 Jan	Phylogenetic Trees	SK	28.1: 506-511 and *Bioskills 7* (Appendix B)
9 Jan	Beginnings of Life on Earth Earliest signs of life Prokaryotes as ancient architects Evolution of early animals	MB	28: 506-519 29:529-533, 538-549
12 Jan	Early Paleozoic (Cambrian - Silurian) Cambrian explosion Evolutionary innovations in fishes Evolution of early land plants End-Ordovician extinction	MB	28: 513-514 30: 552-559 31: 577-590 35: 686-693
14 Jan	Late Paleozoic (Devonian - Permian) Ancestry of tetrapods Ascomycetes, & Basidiomycetes End-Permian extinction	MB	28: 514-520 31: 591-592 32: 612-628 34: 657-673
16 Jan	Mesozoic Era Life on land: reptiles, early mammals Ancestry of angiosperms End-Triassic and End-Cretaceous extinctions	MB	28: 520-523 31: 592-597 35: 693-703

19 Jan	**MLK Day (no class)**		**19 Jan**
21 Jan	Cenozoic Era Grasslands appear Mammals diversify	MB	28: 523-525 35: 704-710 pdf: Grass-Herbivore Coevolution
23 Jan	Modern Prokaryotes Breadth of morphology, metabolism, habitats Roles in medicine & bioremediation Modern techniques in studying prokaryotes Lineage diversity	MB	29: 536-549
26 Jan	Modern Eukaryotes: Multicellularity Lineage Diversity; Major lineages Diversity in life cycles Metabolic diversity and ecosystem services Structural diversity of protists Structural diversity in plants, fungi, animals	MB	30: 557-569 31:597-609 32: 615-633 33: 646-651 34: 664-669 34: 672-679 35: 696-703
=> M2	**Start Module 2: Growth and Reproduction**		
28 Jan	Intro to reproduction and development Differentiation, colony formation, growth	SK	22: 405-416 30.3: How to protists reproduce, life cycles- haploid vs diploid 566-569
29 Jan	**Module Exam 1**		
30 Jan	Plant Development Alternation of generations	MB	24: 432-443
2 Feb	Tissue development, differentiation, function Role of meristems, secondary growth	MB	37:731-751
4 Feb	Animal Development	SK	23: 419-429
6 Feb	Cleavage patterns, polarity, differentiation Coelom formation and body plans	SK	42.2: 845-850 33:1-2 636-646
9 Feb	Plant Reproduction Double fertilization, seeds, fruits Vegetative growth	MB	31.3: Transition to land II 586-596 41:822-839
11 Feb	Animal Reproduction Asexual reproduction (budding & parthenogenesis) Gametogenesis, hermaphroditism	SK	33.3: Reproduction, Life cycles 650-651 50.1-50.2: 1013-1021
13 Feb	Human Reproduction Spermatogenesis, oogenesis Ovarian and uterine cycles	SK	50.3-50.5: 1021-1034
16 Feb	TBD	TBD	
=> M3	**Start Module 3: Chemical and Electrical Signals**		
18 Feb	Intro to chem signaling and signal transduction Quorum sensing, biofilm formation in microbes	SK	11: 204-214 40: 793-815
19 Feb	**Module Exam 2**		
20 Feb	Plant Hormones and Defenses	SK	40: 793-815
23 Feb	Hormones controlling growth, dormancy, germination Responses to injury, chemical defenses.	SK	
25 Feb	Animal Hormones	SK	49: 991-1012
27 Feb	Hormone effects, production, distribution Insect development Vertebrate endocrine system	SK	44.4: 897-899

2 Mar	Neurons and Nervous System	SK	46: 928-949
4 Mar	Anatomy and function Ion channels, synapses, neurotransmitters, and integration	SK	
6 Mar	Sensory Systems	SK	47: 952-969
9 Mar	Sensory cells & organs, specificity Mechano- and photoreception Information processing	SK	
11 Mar	Effectors Role of cilia, flagella, muscles, skeletons	SK	7: 131-133 48: 972-983
12 Mar	**Exam 3**		**Module 3**
13 Mar	**TBD** **DEADLINE: Groups for video project must be formed!**	TBD	
16 Mar- 20 Mar	**Spring Break (no class)**		
=> M4	**Start Module 4: Nutrition and Transport**		
23 Mar	Nutrition - Adaptations & needs Autotrophy, heterotrophy, mixotrophy Microbial role in nutrition	SK	29: 538-541 39: 775-781, 787-790 44: 882-885
25 Mar	Nutrition - Acquisition of nutrients	MB	39: 775-791
	Soil processes, N2-fixation	MB	
27 Mar	Digestive organs: structure and function		44:882-889
30 Mar	Plant transport processes	MB	38: 754-772
1 Apr	Uptake of water and minerals Xylem and evapotranspiration Phloem, sieve tubes, and translocation	MB	
3 Apr	Animal circulation	SK	45: 916-925
6 Apr	Evolution of circulatory systems Human vascular system, hormonal regulation	SK	
8 Apr	TBD	TBD	
9 Apr	**Exam 4**		**Module 4**
=> M5	**Start Module 5: Materials Balance**		
10 Apr	Gas Exchange and Transport	MB	45: 902-916
13 Apr	Principles of diffusion Lungs and gills Mechanisms for transporting O_2 and CO_2	MB	
15 Apr	Ion and water balance in animals	MB	43: 861-879
17 Apr	Excretory mechanisms and systems Adaptations to different environments **Group video projects due**	MB	
20 Apr	Plant homeostasis and responses to the environs	MB	40: 815-819
22 Apr	Photosynthetic strategies Light, water, temperature, wounds, pathogens	MB	10: 190-195 40: 793-814
24 Apr	Animal homeostasis and responses to the environment	SK	42: 853-859
29 Apr	**Final Exam, 8 am - 10:50 am**		**Comprehensive**