BIOLOGY 1520 INTRO TO ORGANISMAL BIOLOGY SPRING 2016

Essential Course Details:

Lecture meets MWF 11:05 to 11:55 am and Thurs 6:05 to 6:55 pm in IC 105
Lab meets 12:05 to 2:55 pm or 3:05 to 5:55 pm MTW or R in CULC 473

Course Instructors:

Lecture Instructor: Dr. Shana Kerr, Cherry Emerson A114, 404.385.0065, shana.kerr@biology.gatech.edu,
Office Hours: Monday 2-4pm& by appointment
Recitation TAs: Cara Lin, clin353@gatech.edu
Office Hours: Wed and Fri 1-2pm, Cherry Emerson second floor student lounge
Christine Simon, csimon303@gatech.edu
Office Hours Thurs 1:30 to 3:30, CULC undergrad TA lounge, room 365
Laboratory Instructor: Dr. Patrick Bardill, CULC 385A, 404.385.1713, patrick.bardill@gatech.edu
Office Hours: By appointment

Note: This Syllabus and Schedule are subject to change.

Required Texts and Websites:

Freeman, S. Biological Science. 2011. 5th edition. Pearson. We recommend that you purchase the text as a bundle with Mastering Biology and Learning Catalytics from the GT bookstore.

Bardill, P. Biology 1520 Lab Manual. Available at the Bookstore (ISBN 978-073006554-0)

Mastering Biology with Learning Catalytics, www.masteringbiology.com. Mastering Biology offers animations, videos, interactive tutorials, weekly homework assignments, and an online version of the textbook. Learning Catalytics will be utilized in class for participation credit. Access codes for Mastering Biology with Learning Catalytics are included in the bookstore text bundle, or can be purchased directly from the website. Our class ID is: **GTBIOL1520S16**

Piazza (piazza.com), a free online forum, will be used for for online discussions and Q&A outside of class.

Course Description & Goals:

This course provides 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 scientific skills including hypothesis testing, experimental design, data analysis and interpretation, and scientific communication. By the end of this course, you will be able to

(a) Explain principles of organismal biology and apply knowledge of mathematics to biological principles
(b) Design and conduct biological experiments, and analyze and interpret biological data
(c) Make connections and identify patterns in biological problems
(d) Communicate effectively using appropriate scientific language in class settings

This course will foster your learning by using reflective practice, accentuating your critical thinking skills, and develop your confidence in soliciting guidance when problem-solving.

Course Structure & Expectations

Class time will consist of a variety of team-based activities designed to discuss, clarify, and apply new ideas by answering questions, drawing diagrams, analyzing primary literature, and explaining medical or ecological phenomena in the context of biological principles. We will spend class time on building your comprehension on the material you find the most difficult, based on pre-class assessments. You will play a prominent role in determining what is the focus of each day's effort.

What is our role as instructors? Our goal is to increase your engagement and comprehension of course material during the class period. We will encourage you to be fearless in attempting class activities, and we will help you exploit class as an opportunity for you to make mistakes and be corrected in real-time.

This is not a lecture course! Mini-lecture tutorials will be offered when you can articulate what you want to know and why. We will strive to balance your desire to hear from us as "experts" with our goal for you to become an expert yourself.

What is your role as a student? Before class, read/watch/listen to the assigned preparatory material, attempt each pre-lecture assessment (incoming knowledge evaluation, or IKE), and formulate any questions you want to ask. During class, you can expect to build your understanding through team activities (team in-class activity, or TICA) and periodically contribute to class discussions and display your notes on the projection screen. Following class, there will be short homework assignments in Mastering Biology to give you an additional opportunity to practice mastery of the material.

This course format will ask you to develop skills in identifying what information you need, and learning how to break down a problem into achievable parts. Key attributes of A-level class participation include (based on rubric by Filipe and Pritchett 2013):

- Actively looking for and recognizing inadequacies of existing knowledge,
- Consistently seeking and asking probing questions,
- Using advanced and persistent search strategies,
- Evaluating solutions by assessing reliability and appropriateness of sources.

We expect you to demonstrate persistent learning by attending every class period, reading ahead, bringing appropriate notes that support quality participation during class, and taking personal responsibility for the success of both yourself and your team. Team-based learning promotes the benefits of combining the effect of individually mastering a concept and reinforcing that understanding by sharing and teaching to peers. Learning Catalytics questions and large-group discussions during class will be used to identify problem areas and establish areas of content mastery.

All students are expected to abide by the Academic Honor Code, which can be viewed online at 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 include: copying during exams, falsifying attendance in class, and plagiarism in written work. Phone and computer use is restricted to class-related material during class, and off-task use may result in dismissal from class for that day.

Laboratory Information

Labs will begin the week of January 11. You'll need the combined lab manual/notebook (ISBN 978-0-7380-8153-3), a 100% cotton lab coat, and you must wear closed-toe shoes that cover your entire foot as well as long pants. Note that while no labs meet during the second week of classes, you will have a Pre-lab assignment due before you meet for lab: part 1 is due on January 21st, part 2 is due before your lab section meets (see lab T-square announcement 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 FAQs 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.

Learning Accommodations:

If needed, we will make classroom accommodations for students with disabilities. These accommodations should be arranged in advance and in accordance with the Office of Disability Services (http://www.disabilityservices.gatech.edu).

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Course Components:

Exams: Midterm exams will be Thursday evenings in IC 105. If you miss an exam for any reason, you will receive a grade of 0 (zero) on that exam unless you petition the instructor for a makeup exam within 24 h of the start of the missed exam, 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 your petition is approved, your makeup exam will be administered before the end of the term, and typically within one week of the scheduled exam. If your petition is approved but circumstances prevent a makeup exam, the missed exam will be removed from your grade calculation by using the mean of your other exam scores as your grade for the missed exam, weighted by the class average on the missed exam

Video Project: Every student will take part in one video project during the semester. You may organize yourselves into groups of four to five students, and students not belonging to such a group will be assigned. Your project involves the production of a 4-5-min video presentation on a scientific topic. Additional details will be provided on Tsquare.

Participation: Your participation grade has multiple components. I will collect all points earned and divide by the total points possible. You can earn points by completing the pre-class assessments, earning points during class activities, and completing the Mastering Biology homework assignments. In general, Mastering Biology homeworks will be due on Saturdays, with extra credit "Adaptive Followups" due one week following. Adaptive Followups count as extra credit to allow you to make up missed points on the original homework assignment, but you cannot exceed the value of the points on the original homework assignment. During exam weeks, there may be Mastering Biology homeworks due mid-week in preparation for material covered on the exam.

Recitation will be led by the TAs each Thursday 6:05-6:55 pm in IC 105 when we do not have an exam. This is an opportunity for you to discuss class material in further detail. Recitation attendance is not mandatory, but it is correlated with exam performance and should be a regular component of your study habits should you desire an A in this course. The TAs may choose to award extra credit participation points for recitation activities.

Grading

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

In-class exams (approximately 10% each, see below):	40%
Final exam (Module 5 and cumulative):	15%
Video project:	10%
Participation (pre- & in-class activities, Mastering Bio):	15%
Laboratory:	25%

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

1. We will weigh your 4 midterms 6%, 10%, 10%, and 14%, where your lowest midterm score will count 6% and your highest midterm score will count 14% of your final grade.
2. We will combine your exam, lab, and group activity and other scores into a raw composite score (0 – 100%) using the weightings shown above.
3. We will assign final letter grades using the following scale:
   A: ≥ 90.0%
   B: ≥ 80.0% and < 90.0%
   C: ≥ 70.0% and < 80.0%
   D: ≥ 60.0% and < 70.0%
   F: < 60.0%

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Spring15	Lecture Topics	Freeman 5th Reading
11 Jan	Course Overview	Bioskills 1-4, 7 (Appendix B)
=> M1	**Start Module 1: Biodiversity**	
13 Jan	Phylogenetic Trees Recognizing relationships between life on Earth	28.1: 506-511 Bioskills *7* (Appendix B)
15 Jan	Beginnings of Life on Earth Milestones in biological history Biological and geological interactions	28.2-3: 506-520 (*some review*) History of Life on Earth (Bio 1520 Website) 29.0: 528-529 (incl. Table 29.2) 29.3: The oxygen revolution 541-542 30.0: 552-553 30.3: 559-565 (stop at How do protists move?)
18 Jan	**MLK day: Official School Holiday**	
20 Jan	Plant and Fungal Colonization of Land Evolution of early land plants, fungi Ancestry & diversification of seed plants	31: 577-599 32.0-2: 612-619
22 Jan 25 Jan	Animal Evolution Evolution of fishes Ancestry of tetrapods Rise of reptiles & mammals	33.0-33.2: 636-646 34.0-2: 657-664 34.3: 670-673 35.0-1: 681-684 35.2-3: 686-697
27 Jan	Mass Extinctions & Climate Variability Causes and evidence for mass extinctions Climate variability	28.4: 520-523 56.3: 1163-1169
29 Jan	Modern Tree of Life: Bacteria & Archaea Diversity in morphology, metabolism, habitats Roles in medicine & bioremediation Evolutionary diversity	29: 528-544 *(some review)*
1 Feb	Modern Tree of Life: Eukaryotes Major lineages Diversity in life cycles, morphology, and metabolism Ecosystem services by plants and fungi	30.0-2: 552-570 (*some review*) 31.0: 577-599 (*review*) 32.04-: 612-628 (*some review)* 33.3-4: 646-653 34.0-2: 657-664 (*review*) 34.3: 670-673 (*review*) 35.0-1: 681-684 (*review*) 35.2-3: 686-697 (*review*)
3 Feb	Module Synthesis: Reconstructing the Evolutionary Past Insights to evolutionary processes	
4 Feb	**Module 1 Exam**	
=> M2	**Start Module 2: Growth and Reproduction**	
5 Feb	Intro to reproduction and development Differentiation, colony formation, growth	13.4: 251-253 22: 405-416 30.3: How do protists reproduce, life cycles- haploid vs diploid 566-569
8 Feb	Plant Reproduction Double fertilization, seeds, fruit	24.3: 438-441 41:822-837

	Vegetative growth	31.3: Transition to Land II 586-596 (*review*)
10 Feb 12 Feb	Plant Development Alternation of generations Tissue development, differentiation, and function Role of meristems, secondary growth	24.0-2: 432-438 37: 731-751
15 Feb 17 Feb	Animal & Human Reproduction Mating patterns Gametogenesis, hermaphroditism Ovarian and uterine cycles	50: 1013-1034 33.3: Reproduction, Life cycles 650-651 (*review*)
19 Feb 22 Feb	Animal Development Fertilization, polarity, cleavage, gastrulation, differentiation	23: 419-429 33:2 (Start at Origin of Multicellularity) 638-646 (*review)* 42.2: 845-850
24 Feb	Module Synthesis: Evolutionary Tradeoffs in Sexual Reproduction	
25 Feb	**Module 2 Exam**	
=> M3	**Start Module 3: Chemical and Electrical Signals**	
26 Feb	Intro to chemical signaling and signal transduction Quorum sensing, biofilm formation in microbes	11.2-4: 204-216
29 Feb	Plant Hormones Growth, dormancy, germination Responses to injury, chemical defenses	40: 793-819
2 Mar	Animal Hormones Hormone effects, production, distribution Case study systems	49: 991-1010 44.4: 897-899 50: 1025-1030 (*review*)
3 Mar	**Deadline to form groups for video project**	
4 Mar 7 Mar	Neurons and Nervous Systems Ion channels, synapses, neurotransmitters, & integration Learning and memory	46: 928-949
9 Mar 11Mar	Sensory Systems Sensory cells & organs, specificity Case study systems	47: 952-969
14 Mar	Effectors & Movement Cilia, flagella, muscles, skeletons	7.6: 127-133 48: 972-988
16 Mar	Module Synthesis: Interactions between hormones and the brain	
17 Mar	**Module 3 Exam**	
18 Mar	Group Project Workday	Bring a copy of your assigned research article
21-25 Mar	**Spring Break: Official School Holiday**	

=> M4	**Start Module 4: Nutrition, Transport & Materials Balance**	
28 Mar	Nutritional Adaptations & Needs Autotrophy, heterotrophy, mixotrophy	29.3: Metabolic Diversity 538-541 (*review*) 39.0-2: 775-782 39.4-5: 787-790 44.0-2: 882-886
30 Mar 1 Apr	Acquisition of Nutrients Soil processes, N2-fixation Structure and function of digestive organs Microbial roles in nutrition	39.3-5: 782-790 (*some review*) 30.3 How do protists obtain food 563-564 (*review*) 32.3: 619-624 (stop at Variation in reproduction) (*review)* 44.2-4: 884-899 (*some review)*
4 Apr 6 Apr	Plant Transport Processes Uptake of water and minerals Xylem and evapotranspiration Phloem, sieve tubes, and translocation	38: 754-772
8 Apr	Animal Gas Exchange and Transport Principles of diffusion Lungs and gills Mechanisms for transporting O_2 and CO_2	45.0-4: 902-916
11 Apr 13 Apr	Animal circulation Evolution of circulatory systems Human cardiac cycle, hormonal regulation	45.5: 916-925
15 Apr 18 Apr	Ion and water balance in animals Excretory mechanisms and systems Adaptations in different environments	43.0-5: 861-879
20 Apr	Module Synthesis: Circulation, nutrition, and ion balance	
21 Apr	**Module 4 Exam**	
=> M5	**Start Course Synthesis: Homeostasis & Environmental Challenges**	
22 Apr	Plant and Animal Responses to the environment Photosynthetic strategies & water conservation Thermoregulation	40.6: ABA closes guard cells in stomata 810-812 (*review*) 40.7: 815-819 (*review*) 10.4: 190-195 42.4-5: 853-859
25 Apr	Course synthesis:	
26 Apr	**Video projects due**	
4 May	**Video comments & ratings due before start of Final Exam**	
4 May	**Final Exam, 8:00am – 10:50 am**	**Comprehensive**