BIOL 1520 Course Essentials:

Lecture meets MWF 9:05-9:55 am and Thurs 6:05-6:55 pm in MoSE G011
Lab meets 12-3 or 3-6 pm in CULC 473 on Mon, Tu, Wed, or Thursday

Instructors:

Dr. Linda Green, CULC 474C, 404-385-6517, linda.green@biology.gatech.edu
Office hours: Mon 1-3, Tu & Th 10-11
Dr. Patrick Bardill, CULC 385A, 404-385-1713, Patrick.bardill@gatech.edu
Office hours by appointment
Bonnie Shoai, bshoai922@gatech.edu, CULC 365, Office hours: Wed 2-4p
Christine Simon, csimon303@gatech.edu, CULC 365, Office hours: Thur 2-4

Required Textbooks:

Freeman, Quillin, & Allison 2013. Biological Science, 5th edition. Pearson Benjamin Cummings.
Bardill,P. Biology 1520 Lab Manual. Available at the bookstore. (ISBN 978-073806554-0).
Mastering Biology with Learning Catalytics, from www.masteringbiology.com. Mastering Biology offers animations, videos, interactive tutorials, as well as practice quizzes and an online version of the textbook. Access codes for Mastering Biology are included in the bookstore text bundle, or can be purchased directly from the website. Our class ID is MB1520F15. Weekly homework assignments in Mastering Biology will be due each Friday at 5pm including the last day 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, as well as to analyze and interpret biological data
(c) Make connections and identify patterns in biological problems
(d) Compose effective communication by using appropriate technical 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 Mechanics & 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.

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? 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 ensure you've mastered 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:

- 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.

(based on rubric by Filipe and Pritchett 2013)

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 ("clicker") 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 are held in CULC 473. Lab attendance is mandatory and each unexcused absence will lower your final grade by 5%. Labs will begin the week of Aug 24. For the first lab, you will need the lab manual, a 100% cotton lab coat, long pants, and closed toe shoes that cover the entire foot. Note that while labs do not meet during the first week of classes, you have a pre-lab assignment due before you meet for lab: part 1 is due Aug 20th, part 2 is due by the start of your first lab meeting (see lab Tsquare site for details). Communication regarding lab should be directed to your lab TAs. Most FAQ about labs are answered on the lab Tsquare site and lab syllabus.

Extra Credit Opportunities:

The Video Project involves watching and rating videos created by your peers, and there will be an opportunity to watch additional videos for extra participation points. For each of Modules 1-4, you may also attempt to earn up to 4 bonus points that will be added to your midterm exam grade by completing an activity described below. There may not bonus point opportunities for the final exam.

Podcasts: We will post several podcasts on Tsquare that are relevant to each module. You may select one (or more, if the relevant portion of the podcast is brief), listen to it, and write a one-page paper according to one of the following formats:

Opinion piece: describe and justify whether you agree with the podcast
Critical review: critique the podcast with factual support

Spelling, grammar, punctuation, and style all count toward the determination of points earned.

Grading:

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

In-class exams (approx 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%

Exams: Midterm exams will be Thursday evenings in MSE G011. Exams will be a mix of multiple choice and short answer. If you miss an exam for any reason, you will receive a grade of 0 (zero) on that exam unless you petition me for a makeup exam within 24 h of the start of the missed exam, and I approve your petition. 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 I approve your petition, I will remove the missed exam 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. You may also petition for a makeup exam. If I approve a makeup exam, I will administer the makeup exam before the end of the term, and typically within one week of the scheduled exam.

Video Project: Every student will take part in one video project during the semester. You may organize yourselves into groups of six students, and students not belonging to such a group will be assigned at random. Your project involves the production of a 10-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.

Recitation will be led by the TAs each Thursday 6:05-6:55 pm 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 component of your study habits should you desire an A in this course. The TAs may choose to award participation points for recitation activities.

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).

Fall 2014	Lecture Topics	Reading
17-Aug	Course overview	Review Bioskills 1-4,7
=> M1	Start Module 1: Biodiversity	
19-Aug	Beginnings of Life on Earth	Ch 28: 506-519
	Milestones in biological history	Ch 29: 529-533
	Biological and geological interactions	Ch 30: 554-557
21-Aug	Plant and Fungal Colonization of Land	Ch 31
	Evolution of early land plants, fungi	32: 613-614
	Ancestry & diversification of seed plants	
24-Aug	Animal Evolution	33: 636-645, 652-653
26-Aug	Evolutionary innovations in fishes	34: 657-669, 670-679
	Ancestry of tetrapods	35: 681-703
	Rise of reptiles, mammals	
28-Aug	Mass Extinctions and Climate Variability	28: 520-523
	Causes and evidence for mass extinctions	
	Climate variability	
31-Aug	Modern Bacteria & Archaea	29: 533-544
	Breadth of morphology, metabolism, habitats, roles in medicine & bioremediation	
	Lineage diversity	
2-Sep	Modern Eukarya	30: 557-569
	Animal phylogeny	31: 597-609
	Diversity in life cycles	32: 615-633
	Morphological and metabolic innov.	33: 646-651
	Ecosystem services by plants & fungi	
4-Sep	Modern Tree of Life	Extended from above
	Major lineages	
	Technological insights to evolutionary processes	
9-Sep	Case Study	
10-Sep	**Exam 1**	
=> M2	Start Module 2: Growth and Reproduction	
11-Sep	Intro to reproduction and development	Ch 22
	Differentiation, colony formation, growth	42: 845-850
14-Sep	Plant Reproduction	Ch 41
	Double fertilization, seeds, fruits	24: 438-440
	Vegetative growth	

16-Sep	Plant Development	24: 432-438
18-Sep	Alternation of generations	Ch 37
	Tissue development, differentiation and function	
	Role of meristems, secondary growth	
21-Sep	Animal Reproduction	50: 1013-1020
23-Sep	Asexual reproduction	13: 251-253
	Sexual reproductive strategies	
	Gametogenesis, hermaphroditism	
25-Sep	Human Reproduction	50: 1021-1034
	Spermatogenesis, oogenesis	
	Ovarian and uterine cycles	
28-Sep	Animal Development	Ch 23
30-Sep	Cleavage patterns, polarity, differentiation	
1-Oct	**Exam 2**	

=> M3	Start Module 3: Chemical and Electrical Signals	
2-Oct	Intro to chem signaling and signal transduction	11: 204-216
5-Oct	Quorum sensing, biofilms in microbes	40: 793-795
		49: 991-997
7-Oct	Plant Hormones	40: 795-803, 806-814
	Hormones controlling growth, dormancy, germination	
9-Oct	Animal Hormones	49: 997-1010
14-Oct	Hormone effects, production, distribution	44: 897-898
	5 case study systems	50: 1025-1030
16-Oct	Neurons and Nervous System	Ch 46
19-Oct	Ion channels, synapses, neurotransmitters, integration	
	Memory and learning	
21-Oct	Sensory Systems	Ch 47
23-Oct	Sensory cells & organs, specificity	
	Mechano- and photoreception	
26-Oct	Movement	7: 127-132
	Cilia, flagella, muscles, skeletons	Ch 48
28-Oct	Case Study	
29-Oct	**Exam 3**	

=> M4	Start Module 4: Nutrition and Transport	
30-Oct	Nutrition - Adaptations & needs	39: 775-781, 789-790
2-Nov	Autotrophy, heterotrophy, mixotrophy	44: 882-885
	Microbial role in nutrition	

4-Nov	Nutrition - Acquisition of nutrients	39: 782-788
6-Nov	Soil processes, N2-fixation	44: 886-896
	Digestive organs: structure and function	
9-Nov	Plant transport processes	Ch 38
11-Nov	Uptake of water and minerals	
	Xylem and evapotranspiration	
	Phloem, sieve tubes, and translocation	
13-Nov	Animal circulation	45: 916-924
16-Nov	Evolution of circulatory systems	
	Human vascular system, hormonal regulation	
19-Nov	**Exam 4**	
=> M5	Start Module 5: Materials Balance	
18-Nov	Gas Exchange and Transport	45: 902-915
	Lungs and gills	
	Mechanisms for transporting O_2 and CO_2	
20-Nov	Ion and water balance in animals	Ch 43
23-Nov	Excretory mechanisms and systems	
	Adaptations to different environments	
30-Nov	Plant homeostasis and defenses to the environment	40: 800-806, 815-819
	Photosynthetic strategies and water conservation	
2-Dec	Animal homeostasis and responses to the environment	42: 853-859
4-Dec	Case Study	
11-Dec	**Final Exam, 8 am - 10:50 am**	