BIOL 1521 Course Essentials:

Lecture meets MWF 9:05-9:55 am and Thurs 6:05-6:55 pm in Klaus 1447
Lab meets 12-3 or 3-6 pm in CULC 475 on Mon or Tues

Instructors:

Dr. Linda Green, CULC 474C, 404-385-6517, linda.green@biology.gatech.edu
Office hours: Wed & Thurs 1-3
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: TBD

Required Textbooks:

Freeman, Quillin, & Allison 2013. Biological Science, 5th edition. Pearson Benjamin Cummings.
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 and Learning Catalytics are included in the bookstore text bundle, or can be purchased directly from the website. Our class ID is MB1521S16. Weekly homework assignments in Mastering Biology will be due each Friday at 5pm.

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 section of Intro to Organismal Biology is intended for Biology majors and will explore the curriculum more deeply due to the smaller class size (compared to Biol 1520). This course will also foster the development of your 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 group-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 your 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 combines the benefit 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 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, *including logging into Learning Catalytics class sessions when you are not in the classroom*, and plagiarism in written work, *including copy-paste submissions in Mastering Biology homework*. **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 475. Lab attendance is mandatory and each unexcused absence will lower your final grade by 5%. Labs will begin the week of Jan 11. For the first lab, you will need a 100% cotton lab coat, long pants, and closed toe shoes that cover the entire foot. Communication regarding lab should be directed to your lab TAs or Dr. Bardill. 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 Klaus 1447. 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 a makeup exam, I will administer the makeup exam before the end of the term, and typically within one week of the scheduled exam. If I approve your petition but circumstances prevent a makeup exam, 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.

Video Project: Every student will take part in one video project during the semester. You may organize yourselves into groups of five students, and students not belonging to such a group will be assigned at random. Your project involves the production of an 8-min video presentation on a scientific topic. Additional details will be provided on Tsquare. You will also be required to view and rate peer videos, and complete a peer evaluation of your group members' efforts in the production of your video.

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. Extra credit opportunities may be presented during the semester to add to your points earned.

Recitation will be led by the TA on Thursday 6:05-6:55 pm in the week preceding each 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.

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).

Spring 2016	Lecture Topics	Reading Assignment
11-Jan	Course overview	Review Bioskills 1-4,7; p 506-510
=> M1	Start Module 1: Biodiversity	
13 Jan & 15 Jan	Beginnings of Life on Earth	Ch 28: 511-520
	Milestones in biological history	Ch 29: 529-533
	Biological and geological interactions	Ch 30: 552-557, 559-562
20-Jan	Plant and Fungal Colonization of Land	Ch 31
	Evolution of early land plants, fungi	32: 613-621
	Ancestry & diversification of seed plants	
22 Jan and 25 Jan	Animal Evolution	33: 636-645, 652-653
	Evolutionary innovations in fishes	34: 657-660, 660-664, 670-673
	Ancestry of tetrapods	35: 681-703
	Rise of reptiles, mammals	22: 410-416
27-Jan	Mass Extinctions and Climate Variability	28: 520-523
	Causes and evidence for mass extinctions	
	Climate variability	
29-Jan	Modern Bacteria & Archaea	29: 529-544
	Breadth of morphology, metabolism, habitats, roles in medicine & bioremediation	
	Lineage diversity	
1-Feb	Modern Eukarya	30: 557-566
	Animal phylogeny	31: 597-599
	Morphological and metabolic innov.	33: 646-651
	Ecosystem services by plants & fungi	
	Modern Tree of Life	
	Major lineages	
	Technological insights to evolutionary processes	
3-Feb	Case Study	
4-Feb	**Exam 1**	
=> M2	Start Module 2: Growth and Reproduction	
5-Feb	Intro to form, function, and Adaptation	Ch 42
	Intro to reproduction and development	22:405-409
	Diversity in life cycles	566-568, 624-627
	Differentiation, colony formation, growth	
8-Feb	Plant Reproduction	Ch 41
	Double fertilization, seeds, fruits	24: 438-440
	Flowering cues	40: 800-803

10 Feb & 12 Feb	Plant Development Alternation of generations Tissue development, differentiation and function Role of meristems, secondary growth	24: 432-438 Ch 37
15 Feb & 17 Feb	Animal Reproduction Asexual reproduction Sexual reproductive strategies Gametogenesis, hermaphroditism	50: 1013-1020 13: 251-253
19-Feb	Human Reproduction Spermatogenesis, oogenesis Ovarian and uterine cycles	50: 1021-1026
22 Feb & 24 Feb	Animal Development Cleavage patterns, polarity, differentiation	Ch 23
25-Feb	**Exam 2**	

=> M3	Start Module 3: Chemical and Electrical Signals	
26 Feb & 29 Feb	Intro to chem signaling and signal transduction Quorum sensing, biofilms in microbes	11: 204-216 40: 793-795 49: 991-997
2-Mar	Plant Hormones Hormones controlling growth, dormancy, germination	40: 794-800, 806-814
4 Mar & 7 Mar	Animal Hormones Hormone effects, production, distribution 5 case study systems	49: 997-1010 44: 897-899 50: 1025-1030
9 Mar & 11 Mar	Neurons and Nervous System Ion channels, synapses, neurotransmitters, integration Memory and learning	Ch 46
14 Mar & 16 Mar	Sensory Systems Sensory cells & organs, specificity Mechano- and photoreception	Ch 47
17-Mar	**Exam 3**	
18-Mar	Case Study	

=> M4	Start Module 4: Nutrition and Transport	
28-Mar	Movement Cilia, flagella, muscles, skeletons	7: 127-132 48: 972-983
30 Mar & 1 Apr	Nutrition - Adaptations & needs Microbial role in nutrition	39: 775-782, 789-790 44: 882-885

4 Apr & 6 Apr	Nutrition - Acquisition of nutrients	39: 782-788
	Soil processes, N2-fixation	44: 886-896
	Plant defenses to the environment	40: 815-819
	Digestive organs: structure and function	
8 Apr & 11 Apr	Plant transport processes	Ch 38
	Uptake of water and minerals	
	Xylem and evapotranspiration	
	Phloem, sieve tubes, and translocation	
	Photosynthetic strategies and water conservation	10: 190-195
13-Apr	Animal circulation I	provided on Tsq
	Evolution of circulatory systems	
14-Apr	**Exam 4**	

=> M5	Start Module 5: Materials Balance	
15-Apr	Animal circulation II	45: 916-924
	Human cardiovascular system	
18-Apr	Gas Exchange and Transport	45: 902-915
	Lungs and gills	
	Mechanisms for transporting O_2 and CO_2	
20 Apr & 22 Apr	Ion and water balance in animals	Ch 43
	Excretory mechanisms and systems	
	Adaptations to different environments	
25-Apr	Case Study	
29-Apr	**Final Exam, 11:30 - 2:20 pm**	