

## BIOL 1520: ORGANISMAL BIOLOGY

- Faculty:** Dr. David Garton, Lecturer  
333 Biology Building  
Tel: 404-385-1039 email: david.garton@biology.gatech.edu  
Dr. Rupal Thazhath, Laboratory Coordinator  
A106 Biology Building  
Tel: 404-385-7230 email: rupal.thazhath@biology.gatech.edu
- Prerequisites:** None.
- Description:** An introduction to biology at the organ and organismal levels, with emphasis on physiological processes and integration of growth and development.
- Textbook:** Campbell, N.A. and Reece, J.B., *Biology*, 8<sup>th</sup> Edition, Pearson/Benjamin Cummings, San Francisco, CA.
- Lab Manual:** Vincent, K. and Thazhath, R., *Biology: An Introduction to Organismal Biology*, Kendall/Hunt Publishing, Dubuque, IA.
- Organization:** The course is organized into five modules, each of which deals with a major area of modern biology. Each module ends with an exam over material included in that module.
- Honor Code:** All students are expected to abide by the Academic Honor Code, which can be viewed online at <http://www.registrar.gatech.edu/rules/18.php>.
- Lectures:** Attending lectures correlates strongly with performance in Biology 1520. The lectures and readings are complementary and some material not in the text will be presented only in lecture. Lecture exams will be based on topics and material presented in class and in the assigned readings. As a courtesy to your fellow students, **please turn your cell phones and laptop computers off while in lecture.**
- Readings:** Please complete each reading assignment as specified in the syllabus before coming to class.
- Labs:** Laboratory attendance is mandatory, and only one unexcused absence will be allowed. Each additional unexcused absence will lower the final lab grade 5%. Make-up labs cannot be accommodated, and arrangements to make-up work for excused absences will be considered on a case-by-case basis. Excused absences include illness, illness or death in the immediate family, and participation in official university activities. Requests for excused absences must be submitted in writing and include appropriate documentation (e.g. letter from a physician/university health center, letter from Dean of Students Office, letter from Athletic Department). Written notification must be received before the absence or immediately following the missed lab (next day, or as soon as practicable).
- Lecture Exams:** Four midterm exams and the final exam. All lecture exams will be held in the evening, are closed-book and will be based on multiple-choice questions. Exams and quizzes will be given in the laboratory as well. Practice quizzes and end-of-chapter practice tests can be found at the web site for the textbook at [www.campbellbiology.com](http://www.campbellbiology.com). We strongly recommend students use these web-based tools to help prepare for the lecture-based exams.

<b>Grading:</b>	Midterm exams:	40% (four @ 10% each)
	Group presentation:	5%
	Final exam:	20% (comprehensive!)
	Laboratory:	25%
	In-class quizzes:	10% (using PRS system)

Final grades for the course will be normalized according to student performance:

1. Your lab and lecture scores will be combined into a raw score (based on 100 points) using the weights shown above.
2. The average score of students in the top 5% of the class will be used to provide a benchmark, that is, 100%.
3. All student scores will be normalized by dividing their score by the benchmark set by the top 5% (students in the top ~2.5% will therefore have an adjusted score of 100%).
4. Final letter grades will be assigned based on the adjusted scores using the scale where 90% or greater, A; between 80 and 89%, B; between 70 and 79%, C; between 60 and 69%, D; and less than 60%, F.

**Group Presentations:** One group project will be assigned for the semester. On their own initiative students will form groups of no more than eight (8) and no less than six (6) members. Students not belonging to a group will be assigned at random by the course TAs. Dr. Garton must be notified of each group's membership no later than September 10. Each group will be assigned a specific topic for each presentation. Specific topics for each group for the first presentation, *Paleoclimatology: Living and Non-living Records of a Changing Climate*, will be issued on September 12. Groups will be allowed two weeks to complete the project, which involve creating a powerpoint presentation. All members of the group will be given the same score. Anonymous peer assessments will be made within each group, and any group member not participating nor contributing fully to the group project will have points deducted from their score.

Each group will be allowed 8 minutes for their presentation, allowing time in class for 4 presentations on the first day and 3 presentations plus quiz on the second day. A quiz covering the material presented in the group presentations will be administered in class on the second day of group presentations. The "Group Presentation" portion of your grade in this course will be weighted equally between the group score on the written report and the individual score on the in-class quiz.

Detailed instructions for preparing the powerpoint presentation and how groups will be selected for in-class presentations will be posted to the class web site on T-Square.

## BIOL 1520 Syllabus-Fall 2008

### Module 1: Biodiversity

<i>Date</i>	<i>Topic</i>	<i>Chapter</i>	<i>Reading</i>
Aug 18	<b>The Diversity of Life on Earth</b> The story of life begins 3.8 billion years ago. How could complex life arise from simple chemicals?	25 26	505-525 548-553
Aug 20	<b>The Precambrian</b> Life gets going. Prokaryotes, endosymbionts, eukaryotes. The enigma of Ediacaran fauna.	27 28	557-573 575-576
Aug 22	<b>The Cambrian Explosion: The Ordovician and Silurian Periods</b> The diversity of marine life. Coral reefs, bony fish, vascular plants, and fungi appear.	32	654-664
Aug 25	<b>The Devonian</b> The Age of Fishes. Plants, arthropods, and apsid colonize land. Apsids diversify. Plants make seeds. Fish diversify. The Devonian extinctions.	29 34	600-615 698-713
Aug 27 Aug 29	<b>The Carboniferous</b> The Age of Amphibians. Pangea coalesces; foraminifera proliferate in the seas. Gymnosperms appear. Amniotic eggs open new niches for animals.	32	654-664
Sep 1	<b>Labor Day Holiday-No Class</b>		
Sep 3	<b>The Permian</b> Conifers, beetles, and flies appear. Cynodonts and archosaurs. The Permian extinction.	33	684-692
Sep 5	<b>The Mesozoic</b> The Age of Reptiles. Mammals and angiosperms appear. The Triassic and Cretaceous extinctions.	34 30	687-693 621-632
Sep 8	<b>The Cenozoic</b> The Age of Mammals. Climate change, angiosperms become dominant, grasses appear. Mammals diversify; the order Primates.	34	720-727
Sep 10	<b>Putting the Pieces Together</b> In-class activity: reconstructing the major events in the diversification of life.	-	-
Sep 11	<b>Module Exam 1</b>	-	-

### Module 2: Growth & Reproduction

<i>Date</i>	<i>Topic</i>	<i>Chapter</i>	<i>Reading</i>
Sep 12 Sep 15	<b>Plant development</b> Plant tissue development, differentiation and function: role of meristems, differences in plant vs animal development, secondary growth. Function of leaf.	35	738-757
Sep 17 Sep 19	<b>Reproduction in Flowering Plants</b> Double fertilization, mate selection, seeds, fruits, asexual reproduction	38	801-811
Sep 22	<b>Animal development</b> Development in animal systems: sea urchin, frog, chick,	47	1021-1044

	mammal (including some human embryonic development): Fertilization (sperm-egg recognition), cleavage.		
Sep 24	<b>Animal and Human Reproduction</b> Asexual reproduction – budding and parthenogenesis, sex – gametogenesis, hermaphroditism, estrus, copulation, fertilization, ovipary and vivipary	46	997-1016
Sep 26	<b>Human Reproduction</b> Male spermatogenesis, female oogenesis, ovarian and uterine cycles, hormonal control	46	997-1016
Sep 29	<b>Group Presentations: Session 1</b>		
Oct 1	<b>Group Presentations: Session 2 and Quiz</b>		
Oct 2	<b>Module Exam 2</b>		

### Module 3: Chemical Messengers & Electrical Signals

<i>Date</i>	<i>Topic</i>	<i>Chapter</i>	<i>Reading</i>
Oct 3 Oct 6	<b>Plant Hormones</b> Hormones regulating plant growth, dormancy, germination, flowering, fruit growth, senescence	39	821-835
Oct 8 Oct 10	<b>Animal Hormones</b> Hormone effects, production, distribution, insect development, vertebrate endocrine systems, anterior and posterior pituitary  Thyroxine, calcitonin, parathyroid glands, insulin and glucagon, adrenal glands, sex steroids, mechanisms of hormone action	45	975-994
Oct 13	<b>Fall Break-No Class</b>		
Oct 15 Oct 17	<b>Neurons and Nervous Systems</b> Cells and functions, anatomy, nerve impulses, ion channels, synapses, neurotransmitters, neuromuscular junctions, integration	48	1047-1061
Oct 20 Oct 22	<b>Sensory Systems</b> Sensory cells, organs, transduction, specificity, mechanoreception, photoreception, retina, information processing	50	1087-1105
Oct 24	<b>Mammalian Nervous Systems</b> Information flow, medulla, midbrain, cerebrum, Neural networks, sleep, consciousness, learning, memory	49	1064-1084
Oct 27	<b>Effectors-1</b> Responding to environment via movement: role of cilia, flagella, muscles.	50	1105-1111
Oct 29	<b>Effectors-2</b> Responding to environment via movement: role of skeletons.	50	1112-1117
Oct 30	<b>Module Exam 3</b>	-	-

**Module 4: Nutrition & Transport**

<i>Date</i>	<i>Topic</i>	<i>Chapter</i>	<i>Reading</i>
Oct 31	<b>Microbial Nutrition</b> Nitrogen fixation, denitrification, sulfate metabolism, carnivory, interactions with environment	27	564-565
Nov 2 Nov 3	<b>Plant transport</b> Uptake and transport of water and minerals: role of xylem, stomata, and role of processes of osmosis, facilitated diffusion, active transport, transpiration. Transport of products of photosynthesis: role of phloem, sieve tubes and role of processes of translocation and pressure flow.	36	764-782
Nov 5	<b>Plant nutrition</b> Nutrient acquisition and metabolism in plants: autotrophy, chemotrophy, heterotrophy. Photosynthesis,	37	785-798
Nov 7	<b>Animal nutrition</b> Energy acquisition (carbohydrates, fats, proteins), processing, and utilization: needed nutrients, feeding, digestion	41	875-896
Nov 10	<b>Animal nutrition</b> Gut function. Control of digestion and metabolism: reflexes, hormones, bioaccumulation.	41	875-896
Nov 12	<b>Animal circulation</b> Evolution of circulatory system (open system with tubular hearts to closed system with 4-chambered heart; fish->amphibians->reptiles->birds, mammals), function of human heart.	42	898-915
Nov 14	<b>Animal circulation</b> Function of human vascular system, components of blood, hormone regulation of human circulatory system.	42	898-915
Nov 20	<b>Module Exam 4</b>	-	-

**Module 5: Materials Balance**

<i>Date</i>	<i>Topic</i>	<i>Chapter</i>	<i>Reading</i>
Nov 17	<b>Gas Exchange</b> Principles of gas diffusion; Animal adaptations for extracting oxygen from the surrounding environment; lungs vs gills	42	915-927
Nov 19	<b>Gas Transport</b> Mammalian lungs and transport mechanisms of oxygen and carbon dioxide	42	915-927
Nov 21	<b>Ion and Water Balance in Animals</b> Adaptations and excretory mechanisms for homeostasis of salts and water in different environments	44	954-972

Nov 24	<b>Dynamics of Vertebrate Osmoregulation</b> Anatomy and physiology of vertebrate excretory system (kidney structure and function).	44	954-972
Nov 26	<b>Plant Homeostasis and Responses to Environmental Challenges</b> Water, temperature, wounding, pathogens	39	835-847
Nov 28	<b>THANKSGIVING HOLIDAY-NO CLASS</b>		
Dec 1	<b>Photosynthesis and Gas Exchange in Plants</b> Intro, leaf anatomy, control of stomatal opening, photorespiration and CAM	10 36	201-203 776-778
Dec 3	<b>Alternate Forms of Primary Production: How to Run Ecosystems in Extreme Environments</b> <i>And Offering Important Lessons to Human Systems</i>		
Dec 5	<b>Last day of class, review session, final exam format</b>		

**FINAL EXAM: Friday, Dec. 12, 2:50-5:40 pm**

Note: Yes, this is the last exam period for the week of final exams. Alternate times for taking the final exam are not allowed unless you have a direct exam conflict or can provide written documentation that you have more than two final exams scheduled on this date.