

BIOL 1520: ORGANISMAL BIOLOGY

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- 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*, 7th Edition, Pearson/Benjamin Cummings, San Francisco, CA.
- Lab Manual:** There is no assigned laboratory manual for this course. Detailed hand-outs describing each laboratory exercise will be provided.
- 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. We strongly recommend students use these web-based tools to help prepare for the lecture-based exams.

Grading:	Midterm exams:	40% (four @10% each)
	Group presentations:	10% (two @5% each)
	Final exam:	20% (comprehensive!)
	Laboratory:	25%
	In-class quizzes:	5% (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: Two group projects are 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. Drs. Pullman and Garton must be notified of each group's membership no later than September 8. Each group will be assigned a specific topic for each presentation. Specific topics for each group for the first presentation, *Plant Genetic Engineering*, will be issued on September 11, and for the second presentation, *Science and Ethics of Stem Cell Research*, on November 6. This allows all groups two weeks to complete the project, which involve creating a powerpoint presentation on the assigned topic. 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 5 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 can be found on WebCT.

BIOL 1520 Syllabus-Fall 2006

Module 1: Biodiversity

<i>Date</i>	<i>Topic</i>	<i>Chapt</i>	<i>Reading</i>	<i>Professor</i>
Aug 21	Phylogeny and the Breadth of Biodiversity How phylogenetic trees are reconstructed, ancestral & derived traits, convergent & parallel evolution, kingdoms & phyla evolutionary information in macromolecules, molecular clocks, molecular phylogenies	25	491-500 504-508	Garton
Aug 23	Bacteria and Archaea Why 3 domains, general features of prokaryotes, cellular organization, locomotion, reproduction, metabolism, nutrition, role in environment, prokaryote phylogeny	26 27	516-531 534-546	Garton
Aug 25	Protists and Animal Origins Origin of eukaryotes, major monophyletic protist groups, cellular organization. Origins of animals, body plans, body cavities, development patterns, radial symmetry	32 33	626-635 638-656	Garton
Aug 28	Fungi General biology of fungi, classification, reproduction, nutrition, phylogeny, role in the environment (important organisms, as this is the group that makes pizza and beer possible)	28 31	549-569 608-623	Pullman
Aug 30 Sep 1	A Multitude of Invertebrates Small critters, worms, Arthropods – crustaceans and insects, body plan, diversity, themes in invertebrate evolution	33	656-665	Garton
Sep 4	Labor Day Holiday-No Class			
Sep 6 Sep 8	Deuterostomes: Bigger Animals Phylogeny, Echinoderms, origin of vertebrates, body plan, jaws, swim bladders, colonization of land, amphibians, reptiles, birds, mammals	34	665-700	Garton
Sep 11 Sep 13	Plants Origins of plants, classification & phylogeny, colonization of land, non-tracheophytes, tracheophytes, roots & leaves, life cycle Evolution of seeds, gymnosperm phylogeny, characteristics, life cycle, angiosperms, life cycle, flowers, pollinator co evolution, fruits	29 30	573-588 591-605	Pullman
Sep 14	Midterm Exam 1	-	-	

Module 2: Growth & Reproduction

<i>Date</i>	<i>Topic</i>	<i>Chapt</i>	<i>Reading</i>	<i>Professor</i>
Sep 15 Sep 18	Plant development Plant tissue development, differentiation and function: role of meristems, differences in plant vs animal development, secondary growth. Function of leaf.	35	712-735	Pullman

Sep 20	Reproduction in Flowering Plants	38	771-782	Pullman
Sep 22	Double fertilization, mate selection, seeds, fruits, asexual reproduction			
Sep 25	Group presentations			Pullman
Sep 27	Group presentations			Pullman
Sep 29	Animal development Development in animal systems: sea urchin, frog, chick, mammal (including some human embryonic development): Fertilization (sperm-egg recognition), cleavage.	47	987-1008	Garton
Oct 2	Animal and Human Reproduction Asexual reproduction – budding and parthenogenesis, sex – gametogenesis, hermaphroditism, estrus, copulation, fertilization, ovipary and vivipary	46	964-978	Garton
Oct 4	Human Reproduction Male spermatogenesis, female oogenesis, ovarian and uterine cycles, hormonal control, sexual behavior, contraception, infertility, sexually transmitted disease	46	978-984	Garton
Oct 12	Midterm Exam 2			

Module 3: Chemical Messengers & Electrical Signals

<i>Date</i>	<i>Topic</i>	<i>Chapt</i>	<i>Reading</i>	<i>Professor</i>
Oct 6	Plant Hormones	39	788-808	Pullman
Oct 9	Hormones regulating plant growth, dormancy, germination, flowering, fruit growth, senescence			
Oct 11	Animal Hormones	45	943-961	Garton
Oct 13	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			
Oct 16	Fall Break-No Class			
Oct 18	Neurons and Nervous Systems Cells and functions, anatomy, nerve impulses, ion channels, synapses, neurotransmitters, neuromuscular junctions, integration	48	1011-1025	Garton
Oct 20	Sensory Systems	49	1045-1063	Garton
Oct 23	Sensory cells, organs, transduction, specificity, mechanoreception, photoreception, retina, information processing			
Oct 25	Mammalian Nervous Systems Information flow, medulla, midbrain, cerebrum, Neural networks, sleep, consciousness, learning, memory	48	1026-1037	Garton
Oct 27	Effectors Responding to environment via movement: role of cilia, flagella, muscles.	49	1063-1074	Garton

Oct 30	Effectors Responding to environment via movement: role of skeletons.	49	1063-1074	Garton
Nov 2	Midterm Exam 3	-	-	

Module 4: Nutrition & Transport

<i>Date</i>	<i>Topic</i>	<i>Chapt</i>	<i>Reading</i>	<i>Professor</i>
Nov 1	Microbial Nutrition Nitrogen fixation, denitrification, sulfate metabolism, carnivory, interactions with environment	27	538-540	Pullman
Nov 3 Nov 6	Plant transport 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	738-753	Pullman
Nov 8	Plant nutrition Nutrient acquisition and metabolism in plants: autotrophy, chemotrophy, heterotrophy. Photosynthesis,	37	756-768	Pullman
Nov 10	Animal nutrition Energy acquisition (carbohydrates, fats, proteins), processing, and utilization: needed nutrients, feeding, digestion	41	844-855	Pullman
Nov 13	Animal nutrition Gut function. Control of digestion and metabolism: reflexes, hormones, bioaccumulation.	41	855-864	Pullman
Nov 15	Animal circulation 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	867-874	Garton
Nov 17	Animal circulation Function of human vascular system, components of blood, hormone regulation of human circulatory system.	42	874-883	Garton
Nov 30	Midterm Exam 4	-	-	

Module 5: Materials Balance

<i>Date</i>	<i>Topic</i>	<i>Chapt</i>	<i>Reading</i>	<i>Professor</i>
Nov 20	Group presentations			Garton
Nov 22	Group presentations			Garton
Nov 24	THANKSGIVING HOLIDAY-NO CLASS			

Nov 27	Gas exchange Mammalian lungs and transport mechanisms of oxygen and carbon dioxide.	42	888-895	Garton
Nov 29	Excretion Adaptations and excretory mechanisms for homeostasis of salts and water in different environments.	44	922-934	Garton
Dec 1	Salt Balance Anatomy and physiology of vertebrate excretory system (kidney structure and function).	44	934-939	Garton
Dec 4	Plant Homeostasis and Responses to Environmental Challenges Water, temperature, wounding, pathogens	39	808-815	Pullman
Dec 6	Photosynthesis and Gas Exchange in Plants Intro, leaf anatomy, control of stomatal opening, photorespiration and CAM	10	181-183 195-198	Pullman
Dec 8	Last day of class, review session			Pullman Garton

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