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Prerequisites:	None.
Description:	An introduction to the basic principles of modern biology, including biomacromolecules, bioenergetics, cell structure, genetics, homeostasis, evolution, and ecological relationships. This course will foster the development of critical scientific skills including hypothesis testing, experimental design, data analysis and interpretation, and scientific communication
Textbook:	Campbell, N.A. et al. (2008). <i>Biology</i> , 8 th Edition. Benjamin Cummings, San Francisco. We have arranged special pricing through the bookstore for both hardcover and ebook versions of the textbook bundled with a PRS coupon and access to the publisher's web content.
Lab Manual:	Thazhath, R. (2007). <i>Biological Principles: Biology 1510 Lab Manual</i> . Kendall-Hunt, Atlanta. (available at the bookstore).
PRS:	A PRS is required and will be used for quizzes and interactive lecture sessions, which will contribute to the "participation" portion of your course grade.
Organization:	The course is organized into five modules, each of which deals with a major area of modern biology. Each module will end with an exam and a group activity.
Honor Code:	All students are expected to abide by the Academic Honor Code, which can be viewed online at http://www.honor.gatech.edu .
Lectures:	Attendance in lecture correlates strongly with performance in Biology 1510. Please complete each reading assignment before class. We will make our lectures available via T-Square and urge you to download and print them for use in taking notes during lecture. The lectures and readings are complementary and some materials will be presented only in lecture. Lecture exams will be based on topics, materials, and discussions presented in class and in the assigned readings.
Lecture Exams:	Four midterm exams and the final exam. All lecture exams will be held in the evening, are closed-book and will be made up of multiple-choice questions. Exams and quizzes will be given in the laboratory as well.
Missed Exams:	If you miss an exam for any reason, you will receive a grade of 0 (zero) on that exam unless you petition us for a makeup exam within 24 h of the start of the missed exam, and we approve your petition. Your petition must be submitted in

writing and must include documentation of a legitimate reason for missing the exam. You can, of course, submit your petition before the exam if you know of your scheduling conflict in advance. We will consider each petition individually. Examples of legitimate reasons to miss an exam include illness, illness or death in your immediate family, and participation in official university activities.

If we approve your petition, we will remove the missed exam from your grade calculation by using the weighted mean of your other exam scores as your grade for the missed exam, making it completely neutral in your final point total. You may also petition for a makeup exam. If we accept your petition, we will administer a makeup exam before the end of the term.

Quizzes:

Short quizzes may be administered in lecture, lab and on our T-Square site.

Group Activities:

For each module, 8-10 groups (5 students each) will each research an issue of current interest related to the topic of the module. Each group will prepare a formal scientific poster, 2 potential exam questions, and a brief (single slide) overview to be presented in class.

Labs:

Labs are held in ESM G1 and G2. Check your registration for the location of your lab. Note that labs start during the first week of classes.

Laboratory attendance is mandatory and each unexcused absence will lower your final grade by 5%. We cannot accommodate makeup labs and will consider requests for excused absences from lab on a case-by-case basis. Legitimate reasons to miss a lab include illness, illness or death in the immediate family, and participation in official university activities. All such requests must be submitted in writing with appropriate documentation (e.g., a letter from a physician or the athletic department) no later than the day after the missed lab.

Grading:

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

In-class exams:	40%
Final exam:	25%
Group activities:	10%
Participation:	5%
Laboratory:	25%

Note that these components total 105%, though the maximum overall score we will allow in this course is 100%. This means that participation is effectively a source of extra credit toward the final grade.

We will use the following procedure in calculating your final grade:

1. We will combine your exam, lab, and group activity scores into a raw composite score (0 – 100%) using the weights shown above.
2. We will use the mean score earned by the top 5% of the class as a gauge of real student performance in the class.
3. We will normalize your score to actual student performance by dividing your raw composite score by the mean score earned by the top 5% of the class. If you're in the top 2.5% of the class, your score will be 100%.
4. We will assign final letter grades based on normalized scores using the following scale:

A:	≥ 90%
B:	≥ 80% and < 90%
C:	≥ 70% and < 80%
D:	≥ 60% and < 70%
F:	< 60%

Biology 1510 Module Themes and Teaching Goals

Module	Major theme	Teaching Goals
Intro	<ul style="list-style-type: none">• Course intro	<ul style="list-style-type: none">• Scientific method
1	<ul style="list-style-type: none">• Evolution	<ul style="list-style-type: none">• Earth history• History of life on Earth• Mechanism of evolution
2	<ul style="list-style-type: none">• Ecology	<ul style="list-style-type: none">• Behavior and evolution• Simple population models• Community structure• Mass and energy flow through ecosystems
3	<ul style="list-style-type: none">• Bioenergetics	<ul style="list-style-type: none">• Overview of biomolecules• Introduction to bioenergetics: respiration and photosynthesis.• Chemiosmosis in respiration and photosynthesis• Diversity of metabolic pathways
4	<ul style="list-style-type: none">• Genetics	<ul style="list-style-type: none">• Mendelian genetics• DNA and genomics• Gene regulation in prokaryotes and eukaryotes
5	<ul style="list-style-type: none">• Biomedicine	<ul style="list-style-type: none">• Recombinant DNA technology & bioethics• CF as a model biological system• Cell signaling and immunology• Course synthesis

Date	Lecture Topics	Readings ¹	Lecturer
18 Aug	Course overview Introduction to instructors		All
=> M1	Start Module 1: Evolution		
20 Aug	What is science? What is the scientific method?	Platt (1964) 1.3: 18-24	JPM
22 Aug	What is life? What is evolution? An evolutionary framework for biology	1: 1-24	JPM
25 Aug	Earth history	25.2-25.3: 510-519	JPM
27 Aug	Origin of life RNA world, Miller & Urey experiment	25.1: 507-510	JPM
29 Aug	History of life on Earth Life in the remote past, Patterns of biological diversity over time Life and changes in the physical environment Biological classification	25.3-25.6: 514-531 24.1: 487-492	JPM
1 Sep	Holiday: Labor Day		
3 Sep	Evolution and life on Earth Gradualism Descent with modification Historical biogeography	22: 452-466	NS
5 Sep 8 Sep	Mechanisms of evolution Genetic variation Hardy-Weinberg equilibrium Mutation, drift, selection Case study: HIV drug resistance, human resistance to HIV	23: 468-484	NS
10 Sep	Species and speciation What is a species Mechanisms of speciation Adaptive radiation	24: 487-504	NS
11 Sep	Exam 1 (evening)	Module 1	
=> M2	Start Module 2: Ecology		
12 Sep	Intro to Ecology Physical Environment	52: 1148-1171	JPM
15 Sep	Behavioral ecology Foraging and defense against predation Mate choice and sexual selection Kin selection and altruism	51.1-2: 1120-1128 51.4-5: 1133-1142	NS
17 Sep	Group activity 1		JPM
19 Sep 22 Sep	Population ecology Structure, dynamics, & regulation of populations Life histories Human populations through history Population management	53: 1174-1195	NS

¹ Textbook readings given as Chapter #: page range in Campbell et al., 8th ed.

Date	Lecture Topics	Readings ¹	Lecturer
24 Sep 26 Sep	Community ecology Competition, Predation, parasitism, mutualism Keystone species Island Biogeography	54: 1198-1219	NS
29 Sep 1 Oct	Ecosystems Energy and material flow through ecosystems Biogeochemical cycles Human impact on ecosystems	55: 1222-1242	NS JPM
2 Oct	Exam #2 (evening)	Module 2	
3 Oct	Group activity 2		NS
=> M3	Start Module3: Bioenergetics		
6 Oct 8 Oct	Diversity of metabolic pathways Evolution of energy metabolism Thermodynamic principles Chemoautotrophy ATP, enzymes, catalysis	8: 142-159 27.3: 564-565 55.4: 1232-1233 5: 77-80	JPM
10 Oct	Cellular organization Cell structure Organelles Cytoskeleton	5: 68-77 (reference) 6: 94, 98-122	NS
13 Oct	Holiday: Fall break		
15 Oct	Cellular transport systems Membrane systems Transport	7: 125-139	JHC
17 Oct 20 Oct	Cellular respiration Glycolysis and pyruvate oxidation Citric acid cycle Respiration Chemiosmotic generation of ATP Fatty acid and amino acid metabolism	5: 68-77 9: 162-182	JHC
22 Oct 24 Oct	Photosynthesis Pigments and the photosynthetic spectrum Photosystems I and II C3 and C4 photosynthesis	10: 185-203	JPM
27 Oct	Group activity 3		JPM
=> M4	Start Module 4: Genetics		
29 Oct	Chromosomes Cell division	12: 228-238 13: 248-258	NS
30 Oct	Exam 3	Module 3	
31 Oct 3 Nov 5 Nov	Mendelian genetics Mendel's model genetic system Monohybrid and dihybrid crosses Sex-linkage and pedigree analysis Probabilities of genetic outcomes Genetics of human disease	14: 262-277 15: 286-300	JHC
7 Nov	DNA as the basis of inheritance Experimental evidence for role of DNA DNA structure Semi-conservative replication of DNA	16: 305-315 320-321	JHC
10 Nov	Gene expression: DNA to protein Basics of transcription and translation	17: 325-331 337-348	JHC

Date	Lecture Topics	Readings¹	Lecturer
12 Nov	Prokaryotic and eukaryotic genomics Genome size and organization Mammalian genomes Genome evolution	18: 351-356 21: 426-427 432-435	JHC
14 Nov	Group activity 4		JPM
=> M5	Start Module 5: Biomedicine		
17 Nov	Cystic fibrosis as a model disease Membrane biogenesis Membrane transport processes Testing for genetic diseases	Fig. 17.21: 343-344 Fig. 7.10: 130 7.3-7.4: 132-138 CF article	JHC
19 Nov	Recombinant DNA	20.1-20.2: 396-411	JHC
20 Nov	Exam 4	Module 4	
21 Nov	Genetic diagnosis and gene therapy	20.4: 417-422	JHC
24 Nov	Stem cells, cloning and bioethics	20.3: 412-416	JHC
26 Nov	Cell signaling and cancer	11: 206-214 12.3: 238-243	JHC
28 Nov	Thanksgiving Holiday		
1 Dec	Immunology and infectious diseases	43: 930-946	JHC
3 Dec	Group activity 5		JPM
5 Dec	Course wrap-up and review		All
8 Dec 12 Dec	Final Exams (see exam schedule for dates and times)	Comprehensive	

BIOL 1510: BIOLOGICAL PRINCIPLES I

Fall 2008

Tentative schedule for labs

The labs will be held in room ESM G1 & G2. Check your registration for location. Labs begin the first week of classes (August 18, 2008).

BIOL 1510 Laboratory Policies

1. The Biology 1510 lab manual will be available at the bookstore before labs begin. It is your responsibility to show up prepared. There will not be an elaborate introduction to each lab experiment, so you will need to read the protocols in advance of the labs.
2. **NO FOOD OR DRINK IN THE LAB!!!** This is not a request; it is against federal, state and institutional rules. Failure to comply will result in the submission of "F" as your lab grade for the semester.
3. **BE CONSIDERATE OF OTHER LAB SECTIONS.** Clean up your lab station after each lab and report any messes left behind previous lab sections to your TA.
4. **THERE ARE NO MAKE-UP LABS FOR UNEXCUSED ABSENCES!!!!** An unexcused lab will cost you 5% of your grade plus the lost 2% for a missed quiz, and since you have a quiz every time you are in lab it is to your advantage to (a) attend, (b) document your absence, (c) make arrangements in advance of any known absences for school or personal activities to make up the lab in another section. Documented absences can include: an illness of your own or within your family, schedule conflict with an obligation to an official organization, auto accident, etc. [FYI: Full-time students can be exempt from/rescheduled for jury duty with proof of full-time enrollment.]
In the event that you miss a lab, or will need to be excused from a lab in advance of it, Dr. Rupal Thazhath should be contacted at rupal.thazhath@biology.gatech.edu, Brande Jones should be contacted at brandejones@gatech.edu or you may leave a message at the Biology main office: (404)-894-3700; 201 Cherry Emerson Building. There is no penalty for an excused absence.
5. **THERE IS ONLY ONE MAKE-UP QUIZ!!!!** If you miss a quiz due to an excused absence, then you will take a comprehensive make-up quiz during the week prior to the lab final, irrespective of the quiz you missed. This may sound unfair, but it will be an option available to everyone to prepare for the final exam and is no more difficult than any other quiz. This is the only way to ensure uniformity of grading and testing.
6. Be on time for lab. **THERE WILL BE A QUIZ IN LAB EVERY TIME YOU ATTEND, BEGINNING WITH THE "Scientific Inquiry" LAB (LAB 1).** The quiz is handed out exactly when class begins (at 10 minutes past the hour), and ends 15 minutes later. Showing up 5 minutes late means you have only 10 minutes to take that quiz. Also, leaving lab early without the instructor's prior permission (the TA's) will result in a zero (0) grade for that lab's quiz.
7. Proper attire needs to be worn in lab. No open-toed shoes. **This is not a request. You will be sent home if you are wearing open toed shoes and will not be allowed to take the quiz.**
8. All injuries or accidents must be reported to the lab TA IMMEDIATELY.

9. The distribution of grades and the modes of assessment have been determined to provide you with a diverse set of opportunities to demonstrate your command of the course content and the scientific method.

- You will have 7 quizzes during the semester. Each is worth 8% of your lab grade. Your lowest quiz grade will be dropped, and the remaining quizzes will account for **48%** of your lab grade.
- The lab final is worth **20%** of your lab grade and is comprehensive.
- You will maintain a lab notebook, worth **32%** of your lab grade. You can use your lab notebook during the quizzes and the lab final exam.

10. Plagiarism will not be tolerated. Anything written in your lab report(s) that is not an original idea of yours must be referenced. Direct copying from the lab manual will result in a grade of "O" for that assignment. Your conduct in this class is expected to conform to the Georgia Tech Honor Code (<http://www.honor.gatech.edu>). Please familiarize yourself with its expectations and responsibilities.

QUIZZES

You will have a quiz each week in lab, and these are done to provide you with lots of feedback about your performance, and to minimize the length of introductory lectures during the lab period. These will require a significant amount of independent preparation before lab, but you will be given several examples of quizzes to guide you with your preparations. You will need to be conversant in the basic modes of experimental design since Biology is an experimental science. You may use your lab notebook during the quiz and during the lab final exam.

TENTATIVE SCHEDULE FOR LABS

Week	Lab
1 (August 18 - 22)	Introduction and Review
2 (August 25 - 29)	<i>Lab 1:</i> The process of scientific inquiry <i>Lab 2:</i> Data analysis and interpretation Practice Quiz
3 (September 1 - 5)	Official School Holiday- September 1st
4 (September 8 - 12)	<i>Lab 3:</i> A window to the microscopic world <i>Lab 4:</i> Functions and properties of cells Quiz 1
5 (September 15 - 19)	<i>Lab 5:</i> Predator-Prey Interactions OR <i>Lab 6:</i> Identification of organic molecules (Dependent upon weather) Quiz 2
6 (September 22 - 26)	<i>Lab 5:</i> Predator-Prey Interactions OR <i>Lab 6:</i> Identification of organic molecules (Dependent upon weather) Quiz 3 Turn in lab notebooks for lab notebook check
7 (September 29 – October 3)	<i>Lab 7:</i> Enzymes: function and factors that affect enzyme activity Quiz 4
8 (October 6 -10)	<i>Lab 8:</i> An introduction to biotechnology: Plasmids, molecular cloning and bacterial transformation Quiz 5
9 (October 13 -17)	Fall 2008 Student Recess

10 (October 20 -24)	Lab 9: An introduction to biotechnology: Plasmid isolation and the use of restriction enzymes Quiz 6
11 (October 27 – 31)	Lab 10: An introduction to biotechnology: Restriction enzymes (continued) and use of gel electrophoresis Lab 11: An introduction to biotechnology: DNA amplification using PCR Quiz 7
12 (November 3 -7)	Lab 11: An introduction to biotechnology: DNA amplification using PCR (continued) Lab 12: An introduction to biotechnology: PCR- continued/ Computer science and Biology: Bioinformatics Make-up quiz
13 (November 10 – 14)	No Scheduled Labs
14 (November 17 – 21)	Lab Final Exam; Lab notebook due at end of exam
15 (November 24 – 28)	School Holiday
16 (December 1 – 5)	No Scheduled Labs