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Office Hrs: by appointment

**Lecture Teaching Assistants:**

TA NAME EMAIL@gatech.edu

TA NAME EMAIL@gatech.edu

**Schedule and Classroom:**

|  |  |  |
| --- | --- | --- |
| Component | Location | Time |
| **Lecture** | CULC 144 | 9:05-9:55 am MWF |
| **Recitation/Help** | CULC 144 | 6:00–6:50 pm W (if no test) |
| **Midterm exams** | CULC 144 | 6:00–6:50 pm W |
| **Final Exam Day/Time** | CULC 144 | Fri 4/27 8:00-10:30 am |

**Prerequisites:** Good background in high school biology and chemistry.

**Co-requisites:** BIOS 1208L

**Description and Learning Objectives:** This is an **active-learning** class that introduces students to basic principles of modern biology, including biomacromolecules, bioenergetics, cell structure, genetics, evolution, and ecological relationships. This course will help you develop critical scientific skills including hypothesis testing, experimental design, data analysis and interpretation, and scientific communication. 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. By the end of this course, you will be able to:

1. Explain biological principles of modern biology, including biomacromolecules, bioenergetics, cell structure, genetics, evolution, and ecological relationships.
2. Use scientific skills to test hypotheses, design experiments, analyze and interpret data, and communicate scientifically

**Course Readings:** Biological Principles is taught on the flipped classroom model, meaning that *you will need to complete your assigned readings before each lecture*. Biological Principles will be taught without a textbook this semester. All course readings and videos are on the course website [bio1510.biology.gatech.edu](http://bio1510.biology.gatech.edu/). We have used this model in the past, and your peers have told us they like the website as the “go to” for all course readings and videos. The day-by-day schedule below contains links to each required reading. Some students prefer to have access to additional readings to support learning around certain topics, so we have also provided links to *optional* readings [Biology by OpenStax College](https://openstaxcollege.org/textbooks/biology), an online textbook available for free.

**Learning Catalytics for Participation and Homework:** To complete your pre-class incoming knowledge evaluation (IKEs), team in-class activities (TICAs), and your weekly homework assignments, students are required to have a [Learning Catalytics](https://learningcatalytics.com/users/sign_up) account. Points earned in Learning Catalytics will contribute to the "participation" portion of your course grade. Learning Catalytics can be purchased directly at <https://learningcatalytics.com/users/sign_up> or from the Georgia Tech Bookstore in Tech Square. To participate in class, you will need to bring an internet-ready smartphone, tablet, or laptop to class to earn participation points. Phone and computer use is restricted to class-related material, and off-task use may result in loss of participation points for that day. Your entire Learning Catalytics contribution of IKEs, TICAs, and Homeworks tallies to 10% of the course grade.

**Incoming Knowledge Evaluation (IKEs):** Before each class, we’ll expect you to complete the pre-class readings on the website. Once you’ve reviewed the material, log in to Learning Catalytics to complete that day’s Incoming Knowledge Evaluation (IKE). IKE sessions close at the start of class and will not be reopened for credit, but you can review closed sessions for study purposes. We’ll use your responses to guide what we do in class. IKE questions are not often at the same level as you can expect to see on an exam; instead, they ensure that you come to class with effective baseline knowledge to work up to exam-level questions in class.

**Lectures and Team In-class Activities (TICAs):** Attendance in lecture correlates strongly with performance in Biological Principles. We will make our lecture materials available and urge you to download and print them for use in active note-taking during class. Much of the material and application of ideas needed for success in this course will be presented only in lecture and assessed via Learning Catalytics. Questions presented in class are usually at the same level as exam questions. TICA sessions in Learning Catalytics close at the end of class, with a few exceptions, and will not be reopened for credit, but you can review closed sessions for study purposes.

**Homework:** Homework assignments will be made available each week in Learning Catalytics and are always *due on Sundays at midnight.* Homeworks close on Sunday at midnight, with few exceptions, and will not be reopened for credit, but you can review closed sessions for study purposes.

**Exams and Quizzes:** This course has four midterm exams and the cumulative final exam. The midterm exams will typically be held in the evening, are “closed-book,” and will be made up of multiple-choice questions based on topics, materials, and discussions presented in class, assigned readings, TICAs, and Homeworks. Quizzes may be administered in lecture, lab, and online.

**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 (by e-mail) and must include documentation of a legitimate reason for missing the exam. You are encouraged to 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 either administer a makeup exam or remove the missed exam from your grade calculation by using the weighted average of your other exam scores as your grade for the missed exam, making it completely neutral in your final point total.

**Recitations:** Lecture recitations occur weekly on Wednesdays from 6:00–6:50 pm and are led by the lecture Teaching Assistants. Attendance is optional but strongly encouraged, as it is designed to improve your understanding of the lecture material. Bring your wifi-enabled device to access Learning Catalytics during recitation to receive participation credit for your recitation attendance, which can add points to the Participation portion of your grade. Recitation attendance adds bonus points to your participation grade with a weight equivalent to an IKE (see Grading below).

**Tutoring:** Georgia Tech offers a variety of free learning and communications support options. Learn about free tutoring resources at www.success.gatech.edu or at the Center for Academic Success’s tutoring desk in Clough Commons 273. For assistance with revising lab reports or building and polishing a group project presentation, consult the Communications Center (Clough Commons 447 or [commlab.gatech.edu](http://commlab.gatech.edu/)).

**Honor Code:** All students are expected to abide by the [Academic Honor Code](http://www.policylibrary.gatech.edu/student-affairs/academic-honor-code), which can be viewed online. Plagiarism is the unattributed use of the words, works or ideas of others; plagiarism on any assignment, including laboratory reports and the group project, will be referred to the Office of Student Integrity for adjudication. If you have any questions regarding your assignments and plagiarism, we encourage you to consult with any of us before you submit the assignment.

**Learning Accommodations:** We will gladly make classroom accommodations for students with disabilities. These accommodations must be arranged in advance and in accordance with the Office of Disability Services ([disabilityservices.gatech.edu](http://disabilityservices.gatech.edu/)).

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

In-class exams (approximately 15% each, see below) 60%

Final exam (cumulative) 25%

Participation (equally weighted between HWs, IKEs, and TICAs) 15%

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

1. We will weight your 4 midterms 10%, 15%, 15%, and 20%, where your lowest midterm score will count 10% and your highest midterm score will count 20% of your final grade.
2. We will score all participation credit (IKEs, TICAs, and HWs) based on participation rather than accuracy.
3. We will combine your exam, lab, and group activity, and other scores into a final score using the weightings shown above to calculate a final course score of 0%-100%.
4. 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%

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| **Spring 2018** | **Lecture** | **Who** | **Lecture Topics** | **Website Reading (required)** | **OpenStax Biology (optional)** |
| 1/08 |  | JC  CH | Course overview Intro to Instructors  What is Life? | [What is Life](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/what-is-life/) | [Ch1.2 Themes and Concepts of Biology](http://cnx.org/contents/185cbf87-c72e-48f5-b51e-f14f21b5eabd:4/Themes-and-Concepts-of-Biology) |
| 1/10 |  | JC | Scientific Thinking: What is science?  What is the scientific method?  What is data? | [Strong Inference](http://bio1510.biology.gatech.edu/module-1-evolution/strong-inference/) | [Ch1.1 Science of Biology](http://cnx.org/contents/185cbf87-c72e-48f5-b51e-f14f21b5eabd:3/The-Science-of-Biology) |
|  | **M 1** |  | **Start Module 1: Evolution** |  |  |
| 1/12 | 1.1 |  | What is evolution? An evolutionary framework for biology  Define evolution  Evidence for common ancestry | [What is evolution?](http://bio1510.biology.gatech.edu/module-1-evolution/what-is-life/) | [Ch18.1 Understanding Evolution](http://cnx.org/contents/GFy_h8cu@10.8:noBcfThl@7/Understanding-Evolution) |
| 1/15 |  |  | MLK Holiday |  |  |
| 1/17 | 1.2 |  | Evolution of evolutionary thought Evolution by natural selection Common misconceptions | [Evolution by Natural Selection](http://bio1510.biology.gatech.edu/module-1-evolution/evolution-by-natural-selection/) | [Ch18.1 Understanding Evolution](http://cnx.org/contents/GFy_h8cu@10.8:gNLp76vu@13/Themes-and-Concepts-of-Biology)  [Ch19.3 Adaptive Evolution](http://cnx.org/contents/GFy_h8cu@10.8:-lKChQhL@5/Adaptive-Evolution) |
| 1/19 | 1.3 |  | Other mechanisms of evolution  Gene flow, drift, mutation | O[ther mechanisms of evolution](http://bio1510.biology.gatech.edu/module-1-evolution/neutral-mechanisms-of-evolution/) | [Ch19.2 Population Genetics](http://cnx.org/contents/GFy_h8cu@10.53:yNlSxj0E@6/Population-Genetics) |
| 1/22 | 1.4 |  | Population genetics Hardy-Weinberg equilibrium | [Population genetics: the Hardy-Weinberg Principle](http://bio1510.biology.gatech.edu/module-1-evolution/population-genetics-the-hardy-weinberg-principle/) | [Ch19.1 Population Evolution](http://cnx.org/contents/GFy_h8cu@10.53:Iid3mMv1@5/Population-Evolution) |
| 1/24 | 1.5 |  | Species and speciation What is a species Mechanisms of speciation | [Speciation](http://bio1510.biology.gatech.edu/module-1-evolution/speciation/) | [Ch18.2 Formation of New Species](http://cnx.org/contents/GFy_h8cu@10.8:l3kXtCxu@5/Formation-of-New-Species) |
| 1/26 | 1.6 |  | Phylogenies and the history of life  Misconceptions in reading phylogenetic trees | [Phylogenetic Trees](http://bio1510.biology.gatech.edu/module-1-evolution/phylogenetic-trees/) | [Ch20.1 Organizing Life on Earth](http://cnx.org/contents/GFy_h8cu@10.8:ZzIv3qRH@7/Organizing-Life-on-Earth)  [Ch20.2 Determining Evolutionary Relationships](http://cnx.org/contents/GFy_h8cu@10.8:tOc5w74I@5/Determining-Evolutionary-Relat) |
| 1/29 | 1.7 | CH | Earth history Fossil record & radiometric dating Key events in the history of life | [Earth History](http://bio1510.biology.gatech.edu/module-1-evolution/earth-history/) | OpenStax: Radioactive Decay; Radiometric dating section  [Ch22.1 Prokyarotic Diversity (sections within “Prokaryotes, the First Inhabitants of Earth”)](http://cnx.org/contents/GFy_h8cu@10.8:uUuWuMX6@5/Prokaryotic-Diversity)  [Ch23.1 Eukaryotic Origins](http://cnx.org/contents/GFy_h8cu@10.8:oHRu5dUS@5/Eukaryotic-Origins)  [Ch27.4 The Evolutionary History of the Animal Kingdom](http://cnx.org/contents/GFy_h8cu@10.8:CgswGrCE@5/The-Evolutionary-History-of-th) |
| 1/31 | 1.8 |  | Origin of life RNA world Miller-Urey experiment | [Origin of Life](http://bio1510.biology.gatech.edu/module-1-evolution/origin-of-life/) | No relevant material in OpenStax |
|  | **M 2** |  | **Start Module 2: Molecules and Metabolism** | [Chemistry Review](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/chemical-context-for-biology-origin-of-life-and-chemical-evolution/) | [Ch2 The Chemical Foundation of Life](http://cnx.org/contents/GFy_h8cu@10.53:djajv-uA@2/Introduction) |
| 2/2 | 2.1 | JC | Biomolecules Small molecules Major classes of macromolecule | [Biomolecules](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/biological-molecules-2/) | [Ch.3 Biological Macromolecules](http://cnx.org/contents/185cbf87-c72e-48f5-b51e-f14f21b5eabd:9/Introduction) |
| 2/5 | 2.2 | JC | Protein structure  Lipid bilayer membranes Membrane composition | [Membranes](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/02-membranes/) | [Ch.5 Structure and Function of Plasma Membranes](http://cnx.org/contents/GFy_h8cu@10.8:oaLwOnAf@2/Introduction) |
| 2/7 | 2.3 | JC | Transport: osmosis,  passive diffusion, facilitated diffusion, active transport |  |  |
| 2/7 | 6-7 pm |  | Module 1 Exam | Clough 144 | Bring pencil, buzzcard |
| 2/9 | 2.4 | JC | Cellular Structure  Evolution of mitochondria and eukaryotes Endomembrane system  Organelles | [Cells](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/03-cells/) | [Ch4 Cell Structure](http://cnx.org/contents/GFy_h8cu@10.8:6Yva7EBg@2/Introduction) |
| 2/12 | 2.5 | JC | Energetics and enzymes Thermodynamics and free energy Catalysis and kinetics, and enzymes feedback regulation Redox reactions Membrane potential | [Energy and Enzymes](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/04-energy-and-enzymes/) | [Ch6 Metabolism](http://cnx.org/contents/185cbf87-c72e-48f5-b51e-f14f21b5eabd@9.85:27/Biology) |
| 2/14 | 2.6 | JC | Cellular respiration Oxidation of food and reduction of an e- acceptor Electron transport chain Chemiosmotic generation of ATP by ATP synthase Aerobic vs anaerobic respiration | [Respiration](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/05-respiration-chemiosmosis-and-oxidative-phosphorylation-2/) | [Ch7 Cellular Respiration](http://cnx.org/contents/GFy_h8cu@10.8:5c-ZscNX@4/Introduction) |
| 2/16 | 2.7 | JC | oxidative pathways glycolysis, substrate-level phosphorylation pyruvate oxidation citric acid cycle regeneration of NADH, fermentation  Amino acid and lipid breakdown Consequences of defects in metabolism | [Oxidative pathways](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/06-oxidative-pathways-electrons-from-food-to-electron-carriers/)  [Fermentation](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/07-fermentation-mitochondria-and-regulation/)  (2 pages) | [Ch7 Cellular Respiration](http://cnx.org/contents/GFy_h8cu@10.8:5c-ZscNX@4/Introduction) |
| 2/19 | 2.8 | JC | Photosynthesis Overview: reduce CO2 to organic C Pigments and light absorption anoxygenic photosynthesis with single photosystem  oxygenic photosynthesis with 2 photosystems | [Photosynthesis](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/08-converting-light-energy-into-chemical-energy/) | [Ch8 Photosynthesis](http://cnx.org/contents/GFy_h8cu@10.8:SCQoV1nR@2/Introduction) |
| 2/21 | 2.9 | JC | Carbon fixation  Photosynthetic strategies | [Carbon fixation](http://bio1510.biology.gatech.edu/module-3-molecules-membranes-and-metabolism/09-carbon-fixation/) | [Ch8 Photosynthesis](http://cnx.org/contents/GFy_h8cu@10.8:SCQoV1nR@2/Introduction) |
| 2/23 | 2.10 | JC | Respiration and Photosynthesis Recap: compare and contrast respiration & photosynthesis, mitochondria & chloroplasts |  |  |
|  | **M3** |  | **Start Module 3: Genetics** |  |  |
| 2/26 | 3.1 | CH | Chromosomes and Cell Division  Mitosis  Meiosis | [Mitosis and Meiosis](http://bio1510.biology.gatech.edu/module-4-genes-and-genomes/4-1-cell-division-mitosis-and-meiosis/) | [Ch10.1 Cell Division](http://cnx.org/contents/GFy_h8cu@10.8:TK9ID2hI@8/Cell-Division)  [Ch10.2 The Cell Cycle](http://cnx.org/contents/GFy_h8cu@10.8:1tJ55Ot6@7/The-Cell-Cycle)  [Ch11.1 The Process of Meiosis](http://cnx.org/contents/GFy_h8cu@10.8:GYZS3DDP@8/The-Process-of-Meiosis) |
| 2/28 | 3.2 | CH | Mendelian genetics  Monohybrid and dihybrid crosses | [Mendelian genetics](http://bio1510.biology.gatech.edu/module-4-genes-and-genomes/4-2-4-mendelian-genetics/) | [Ch12 Mendel's Experiments and Heredity](http://cnx.org/contents/GFy_h8cu@10.8:O2lXSTlf@2/Introduction) |
| 2/28 | 6-7 pm |  | Module 2 Exam | Clough 144 | Bring pencil, buzzcard |
| 3/2 | 3.3 | CH | Chromosome Theory  Law of segregation Law of independent assortment  Sex-linkage and pedigree analysis | [Chromosome theory of inheritance](http://bio1510.biology.gatech.edu/module-4-genes-and-genomes/4-4-linkage-sex-linkage-and-pedigree-analysis/) | [Ch13 Modern Understanding of Inheritance](http://cnx.org/contents/GFy_h8cu@10.8:hvOThcGc@2/Introduction) |
| 3/5 |  |  | Group Video Project Workday |  |  |
| 3/7 | 3.4 | CH | Patterns of Inheritance  Beyond dominant/recessive traits | [Patterns of Inheritance](http://bio1510.biology.gatech.edu/module-4-genes-and-genomes/4-3-patterns-of-inheritance/) |  |
| 3/9 | 3.5 | CH | DNA as the basis of inheritance DNA structure Semi-conservative replication of DNA | [DNA](http://bio1510.biology.gatech.edu/module-4-genes-and-genomes/05-dna/) | [Ch14 DNA Structure and Function](http://cnx.org/contents/GFy_h8cu@10.8:Q01G1mzh@2/Introduction) |
| 3/12 | 3.6 | CH | Gene expression: DNA to protein Basics of transcription and translation Basics of gene expression regulation | [Gene expression](http://bio1510.biology.gatech.edu/module-4-genes-and-genomes/06-gene-expression/) | [Ch15 Genes and Proteins](http://cnx.org/contents/GFy_h8cu@10.8:7MmMR-pY@3/Introduction) |
| 3/14 | 3.7 | CH | Regulation of gene expression Prokaryotic gene regulation Eukaryotic gene regulation | [Gene regulation](http://bio1510.biology.gatech.edu/module-4-genes-and-genomes/4-7-gene-regulation/) | [Ch16 Gene Expression](http://cnx.org/contents/GFy_h8cu@10.8:mg3jT_xX@3/Introduction) |
| 3/16 | 3.8 | CH | Genomes Genome size, organization, and evolution | [Genomes](http://bio1510.biology.gatech.edu/module-4-genes-and-genomes/4-8-genomes/) | [Ch17.2 Mapping Genomes](http://cnx.org/contents/GFy_h8cu@10.8:Qq6Y1A16@5/Mapping-Genomes)  [Ch17.3 Whole-Genome Sequencing](http://cnx.org/contents/GFy_h8cu@10.8:5l844Z38@7/Whole-Genome-Sequencing)  [Ch17.4 Applying Genomics](http://cnx.org/contents/GFy_h8cu@10.8:Kc1B5yH7@5/Applying-Genomics) |
| *3/19-3/23* |  |  | *Spring Break* |  |  |
| 3/26 |  | CH | Module 3 recap and group project |  |  |
|  | **M4** |  | **Start Module 4: Ecology** |  |  |
| 3/28 | 4.1 | CS | Intro to Ecology Physical Environment | [Intro to Ecology](http://bio1510.biology.gatech.edu/module-2-ecology/introduction-to-ecology-major-patterns-in-earths-climate/) | [Ch44.1 The Scope of Ecology](http://cnx.org/contents/GFy_h8cu@10.8:ENnEbpkP@3/The-Scope-of-Ecology)  [Ch44.2 Biogeography](http://cnx.org/contents/GFy_h8cu@10.8:QF44BFyM@4/Biogeography) |
| 3/28 | 6-7 pm |  | Module 3 Exam | Clough 144 | Bring pencil, buzzcard |
| 3/30 | 4.2 | CS | Behavioral Ecology Foraging and defense against predation Mate choice and sexual selection Kin selection and altruism | [Behavioral Ecology](http://bio1510.biology.gatech.edu/module-2-ecology/behavioral-ecology/) | [Ch45.7 Behavioral Biology](http://cnx.org/contents/GFy_h8cu@10.8:mNyatk93@3/Behavioral-Biology-Proximate-a) |
| 4/2 | 4.3 | CS | Population Ecology | Population Ecology | Ch45.1 Population Demography |
| 4/4 | 4.4 | CS | Structure, dynamics, & regulation of populations Life histories Human populations through history Population management |  | [45.2 Life Histories and Natural Selection](http://cnx.org/contents/GFy_h8cu@10.8:BARv-3P2@3/Life-Histories-and-Natural-Sel)  45.3 Environmental Limits to Population Growth  [45.4 Population Dynamics and Regulation](http://cnx.org/contents/GFy_h8cu@10.8:eeuvGg4a@4/Environmental-Limits-to-Popula)  [45.5 Human Population Growth](http://cnx.org/contents/GFy_h8cu@10.8:m_VfXG9L@4/Human-Population-Growth) |
| 4/6 | 4.5 | CS | Community Ecology  Competition, Predation, parasitism, mutualism | Community Ecology | [Ch45.6 Community Ecology](http://cnx.org/contents/GFy_h8cu@10.8:d0xglyLD@4/Community-Ecology) |
| 4/9 | 4.6 | CS | Keystone species Island Biogeography |  |  |
| 4/11 | 4.7 | CS | Ecosystems  Energy and material flow through ecosystems | [Ecosystems](http://bio1510.biology.gatech.edu/module-2-ecology/ecosystems-and-biogeochemical-cycling/) | Ch46 Ecosystems |
| 4/12 |  |  | Group video project due | Upload by midnight Sunday night | |
| 4/13 | 4.8 | CS | Biogeochemical cycles Human impact on ecosystems |  |  |
|  | **M5** |  | **Start Module 5: Integrative human health** | |  |
| 4/16 | 5.1 | CH | Recombinant DNA | [Recombinant DNA](http://bio1510.biology.gatech.edu/01-recombinant-dna/) | [Ch.17.1 Biotechnology (through “Recombinant DNA Molecules”)](http://cnx.org/contents/GFy_h8cu@10.53:exg4e4AU@7/Biotechnology) |
| 4/18 | 5.2 | CH | Cloning and Stem Cells | [Cloning and Stem Cells](http://bio1510.biology.gatech.edu/02-cloning-and-stem-cells/) | [Ch.17.1 Biotechnology (“Cellular Cloning” and “Reproductive Cloning”)](http://cnx.org/contents/GFy_h8cu@10.53:exg4e4AU@7/Biotechnology) |
| 4/18 | 6-7 pm |  | Module 4 Exam | Clough 144 | Bring pencil, buzzcard |
| 4/20 | 5.3 | CH | Adaptive Immunity | [Adaptive Immunity](http://bio1510.biology.gatech.edu/03-adaptive-immunity/) | [7-10 The Immune System](http://cnx.org/contents/185cbf87-c72e-48f5-b51e-f14f21b5eabd@9.85:219/Biology) |
| 4/23 | 5.4 | CH | Human evolution and adaptation | [Human evolution and adaptation](http://bio1510.biology.gatech.edu/04-human-evolution-and-adaptation/) |  |
| **4/27** | **Final Exam** | | **Fri 8:00am-10:30am. The Final Exam is cumulative, with an emphasis on Module 5 content.** | | |