

**BIOLOGY 141 – CELL BIOLOGY AND GENETICS**  
**COURSE SYLLABUS, DR. AMANDA PENDLETON**  
**FALL 2010**

**Faculty Information:** Pierce 105, (770) 784 – 4506, arpendl@emory.edu

**Office hours:** T, 10 – 12; Th, 1:30 – 3:30; or feel free to make an appointment with me for another time

**Course Meeting Times:**

Lecture – M, W, F	10:40 – 11:30	Pierce Hall Room 101
Lab – T	2:30 – 5:30	Pierce Hall Room 125

**OR**

Lecture – M, W, F	11:45 – 12:35	Pierce Hall Room 101
Lab – W	2:00 – 5:00	Pierce Hall Room 125

**Required Texts:**

- (1) *Biology*, N.A. Campbell and J.B. Reece, 2008, 8th edition, Benjamin/Cummings Publishing Co., Inc. The optional Study Guide is available on reserve in the library.
- (2) *Practicing Biology*, Heitz, Jean and C. Griffen. Benjamin/Cummings Publishing Co., Inc. 2008. A terrific workbook that is useful alone or in study groups.

**Required Lab Text:**

- (1) *Investigating Biology*, 6<sup>th</sup> ed. Morgan, J. G. and M. E. B. Carter. Benjamin/Cummings Publishing Company, Inc. 2008. A customized edition published for BIO 141 is available in the bookstore. *Used lab manuals are not permitted.*

**Optional Writing Book:**

- (1) *A Student Handbook for Writing in Biology*, Karen Knisely, 2008, 3<sup>rd</sup> edition, W.H. Freeman and Co. This is a great resource for writing, and is also on reserve in the library.

**Web Site:**

- (1) *MasteringBiology* provides online study materials ([www.masteringbio.com](http://www.masteringbio.com)), practice exams, learning activities, and strategies for success. Your text has instructions for accessing the site.

**Course Objectives:** The purpose of this course is to give you, the student, a firm foundation in the underlying themes of biology, so that you can answer the following **essential questions**:

- \* What common structures are found in almost all living things?
- \* What common principles and mechanisms govern almost all living things?
- \* How did life on Earth become so diverse?
- \* What principles and techniques do biologists use to study life and communicate their findings?

These questions may appear simple, but their answers are quite complex, and involve understanding a great deal of detailed information that encompasses multiple themes in biology. Therefore, this course will guide you through understanding and using the following **content**:

- \* The biochemical molecules that form a cell and how these molecules govern cell function.
- \* The crucial tasks conducted by cells, including the transportation of components across cell membranes and how cells generate energy.
- \* The basic mechanisms of cell duplication, and how these are related to the inheritance of biological traits and the processing of genetic information.
- \* The study of gene transmission within a population and how this contributes to the evolution of a species.
- \* Evolution and diversity in the biological world, as well as the cellular mechanisms that contribute to these processes.

Finally, this course (both lecture and laboratory portions) is designed to teach you to “think, work, and communicate like a scientist” through methods of scientific inquiry and the practice of deductive reasoning. My hope is that upon grasping the fundamental themes of biology in this course, and using them to ask questions and solve problems, you will be well prepared to delve deeper, into more specialized areas of biology.

Date	Topic	Assigned Reading
W Aug 25	Science as a Way of Knowing	1
F Aug 27	Major themes in Biology	1
M Aug 30	Hierarchies: beginning with living chemistry and water	2,3
W Sep 1	Building biological macromolecules: carbohydrates & lipids	4
F Sep 3	Proteins and nucleic acids	5
F Sep 3	<i>Scientific Literature and Research, 1 – 2 pm or 2 – 3 pm, Library (required)</i>	
M Sep 6	<b>** Labor Day **</b>	
W Sep 8	Structure and function revealed in cells	6
F Sep 10	Cellular Case Studies	
M Sep 13	Membrane structure and cellular transport	7
W Sep 15	Transport problems	
F Sep 17	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M Sep 20	Presentation of Scientific Data – Pierce 125 or 206	
<b>Tues, Sep 21</b>	<b>EXAM I 8:00 – 9:30 a.m. (through membrane transport)</b>	
W Sep 22	Cellular respiration I - Glycolysis	9
F Sep 24	Cellular respiration II - Transition and the Krebs Cycle	9
M Sep 27	Cellular respiration III – Chemiosmosis and the Electron Transport System	9
W Sep 29	Review and recapitulation: Accounting Day	
F Oct 1	Photosynthesis I: the light dependent reactions	10
M Oct 4	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10
W Oct 6	Cell reproduction: cell cycle, mitosis	12
F Oct 8	Sexual life cycles and meiosis	13
M Oct 11	<b>*** Fall Break***</b>	
W Oct 13	Chromosomal mutations	15 pp. 297-300
<b>Thurs, Oct 14</b>	<b>EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)</b>	
F Oct 15	Mendelian principles; genes and chromosomes	14, 15 pp. 286-288
M Oct 18	Patterns of inheritance	14, pp. 271-280
W Oct 20	Chromosomal theory and linkage	15
F Oct 22	Genetics problems and review	14, 15
F Oct 22	<i>Effective Presentations Workshop, 1 – 2 pm or 2 – 3 pm, Pierce 206 (optional – but sat least one group member must attend)</i>	
M Oct 25	DNA structure	16
W Oct 27	DNA replication	16
F Oct 29	Gene to Protein I: transcription and the genetic code	17
M Nov 1	Gene to Protein II: translation and genetic mutations	17
W Nov 3	Molecular genetics workshop	
F Nov 5	Charles Darwin and development of evolutionary concepts	22
F Nov 5	<i>Scientific Papers – “Ask the Experts”- 2:00 p.m. (optional)</i>	

M Nov 8	Evolutionary evidence	22,25, pp. 481-495
	<b>Research papers due in class</b>	
W Nov 10	Evolutionary processes	
F Nov 12	Population Genetics and Hardy Weinberg	23
M Nov 15	Microevolution: genetic drift, gene flow and mutation	23
<b>Tues, Nov 16</b>	<b>EXAM III - 8:00 – 9:30 a.m. (through genetics)</b>	
W Nov 17	Genetic variation and selection	23
F Nov 19	Evolution and population genetics	
M Nov 22	Evolution of land plants:	29
W, F Nov 24-26	** Thanksgiving Break **	
M Nov 29	Bryophytes and seedless vascular plants	29
W Dec 1	Seed plants: gymnosperms and angiosperms	30
F Dec 3	Evolutionary trends in land plants	
M Dec 6	The Big Themes Revisited	

**FINAL EXAMINATION: Friday, December 10;**      **Section 10A, 2:00 pm – 5:00 pm**  
**Section 11A, 9:00 am – 12:00 pm**

**BIOLOGY 141, LABORATORY SCHEDULE, FALL 2010**  
**DR. ELOISE CARTER, DR. NITYA JACOB, DR. AMANDA PENDLETON**

<u>Date</u>	<u>Lab Topic</u>	<u>Writing Assignment*</u>
Aug. 31 / Sep. 1	Scientific Investigation	Title page; Introduction; References
Sep. 7 / 8	Microscopes and Cells	Review table+
14 / 15	Diffusion and Osmosis	Results; Table; Figure
21 / 22	Enzymes	(Table, Figure) Discussion, References
28 / 29	Cellular Respiration; Introduction to Research	Materials & Methods Proposal completed in lab
<b>Sept. 30<sup>th</sup> (Thurs.)</b>	<b>LAB EXAM (thru enzymes) begins at 6:00 p.m.</b>	
Oct. 5 / 6	Mitosis; Independent Research Projects	Scientific Paper (due 11/8)
12 / 13	<i>***Fall Break***; No labs</i>	
19 / 20	Molecular Biology	Map+
26 / 27	Research Symposium (Technology Rehearsal – 9 a.m. – Pierce 101; one team member must attend)	<b>Research papers due in class Nov. 8<sup>th</sup></b>
Nov. 2 / 3	Ecology and Evolution on the Outcrops	
<b>Nov. 4<sup>th</sup> (Thurs.)</b>	<b>LAB EXAM (Respiration, Mitosis, and Molecular Biology) begins at 6:00 p.m.</b>	
9 / 10	Microbial Diversity (Bacteriology)	
16 / 17	Plant Diversity I & II	
23 / 24	<i>***Thanksgiving Break***; No labs</i>	
Nov. 30 / Dec. 1	Molecular Phylogeny of Plants	Report completed in lab
<b>Dec. 2<sup>nd</sup> (Thurs.)</b>	<b>LAB EXAM (Outcrops, Microbial Diversity, Plant Diversity) begins at 6:00 p.m.</b>	

**\*Writing assignments are due one week later at the beginning of the lab period, unless otherwise noted.**

+These assignments are **not** turned in for a grade.

**The instructor reserves the right to make changes to this syllabus as necessary.**

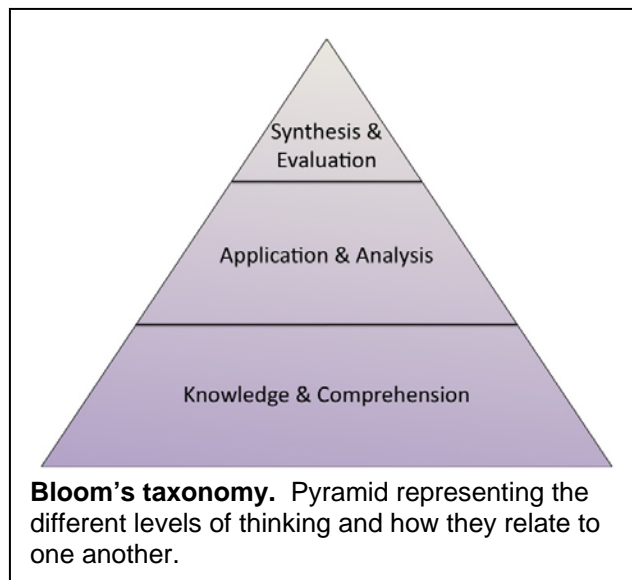
## EXPECTATIONS, EVALUATION AND TIPS FOR SUCCESS IN BIOLOGY 141

Welcome to Biology 141! The information in this handout and accompanying materials should be read and followed by all students in Cell Biology and Genetics. Please do not hesitate to ask for clarification.

Biology 141 is designed for students who **plan to major in biology or neuroscience and behavioral biology, attend professional school in a health related field, or have a strong background in biology** and have chosen biology to fulfill their distribution requirements. The knowledge from this course will be essential to your success in other biology courses, where your competence in basic biology will be assumed. Many of you will be taking examinations to enter graduate or professional schools, and the knowledge you gain here will be required for these tests.

**Tips for Success:** Biology 141 is an *intensive course* and requires *time and commitment*. In fact, this course may be one of the more difficult courses you will take. To perform well in this course, you must manage your time appropriately. You must have a proper study plan, beginning from the **first day** of class. If you are an average reader, you should spend about 8 hours a week outside class working on this course. The following are some study habits that will help you succeed:

- **Keep up with assigned readings.** The readings should be done **before class**. The best overall reading approach is to (1) read assignments quickly at first for an overview, (2) read again more carefully, jotting down questions or areas of confusion, (3) read a third time **after class** (the same day as class is best), using a different color of highlighter and paying careful attention to topics discussed during class. This third reading is critical because it will help you to connect class discussions to the textbook assignments.
- **Take good notes.** During class, we will discuss the most significant concepts from your readings. At times, I will present examples that may not be given in your textbook. You are responsible for all of this information. Good note-taking will help you to remember which concepts were most important and why. Additionally, the act of note-taking is itself a learning exercise that helps you to stay actively engaged in the topic and better remember class discussions.
- **Ask questions.** Biology 141 is a collaborative course. Therefore, if you don't understand something discussed in class, ask questions in class, ask questions of your peers, form productive study groups, or arrange to meet with me. I welcome your questions, and if you're struggling, it's important to get help early. Additionally, by asking questions, you take charge of your own learning.
- **Build a foundation of knowledge, but aim high in your thinking** (adapted from [www.cas.lsu.edu](http://www.cas.lsu.edu)). While studying, keep in mind that you will need to do more than simply learn facts; you will need to think. We will use Bloom's taxonomy as a guide for our thinking this semester. Bloom's taxonomy describes different levels of thinking:
  - **Level 1 = Knowledge & Comprehension:** Memorizing and understanding information, restating in your own words, paraphrasing, or summarizing.
  - **Level 2 = Application & Analysis:** Identifying parts, patterns, and connections in new information and comparing, contrasting, or arranging these parts and patterns in a logical order or in categories. Using information to solve new problems; transferring abstract or theoretical ideas to a practical, new situation.
  - **Level 3 = Synthesis & Evaluation:** Evaluating the relative effectiveness, value, or worth of a set of different solutions, ideas, or results. Predicting consequences. Taking a position on an issue and defending that position. Combining information to form a unique product; requires creativity and originality.



Notice how each level of the pyramid builds on the foundation that precedes it. We must learn the lower levels before we can effectively perform at higher levels. In general, students who earn lower grades have not gone past the 'Knowledge & Comprehension' level. Students who earn higher grades generally know the course material well enough to perform higher level thinking tasks.

- **Review, review, review and practice.** Any biology course these days will have **a lot** of information. So, mastering the course material at the 'Knowledge' and 'Comprehension' levels first is key. To do this, I suggest that you study the diagrams in your text and lecture handouts; practice writing out pathways and linking concepts **by memory**; prepare your own tables and diagrams as a study aid; create lists of questions that help you remember the material, and then practice answering those questions **by memory**. You should do at least one or two of these activities (in addition to your reading) each day. To move up to the higher learning levels, complete all worksheets and problems given during class, complete assignments in *Practicing Biology*, and attend SI sessions (where you will be given additional practice with higher-level thinking tasks).
- **Lab is equally important.** The laboratory component of this course is intensive and requires time as well. Please read your lab manual **before lab** and pay attention to the details. Take good notes during the lab and take time to make detailed observations during experiments. Answer questions in the lab manual either during lab or immediately following lab. After lab, review the objectives and prepare a study guide for the lab materials and activities. Make use of open lab times and prepare in advance for the lab writing assignments, because these assignments are important.  
Additionally, the lab topics and activities are designed to reinforce concepts discussed in lecture. So, by preparing well for labs and by participating fully in labs, you're likely to also do better in the lecture portion of the course.
- **Supplemental Instruction (SI)** is provided for all students in Biology 141. I will explain this important program that provides assistance for all students who wish to improve their performance in biology. Your Biology 141 SI leader is Sean Amegadzie.

#### Evaluation Criteria:

- **Examinations** – There will be three lecture exams, each worth 100 points, including multiple choice, short answer and short essay questions. Exams will cover all material in lecture in addition to assigned textbook readings and other supplemental materials. The final examination, worth 175 points, is comprehensive. Three laboratory exams, each worth 50 points, will be given in this course. Each lab exam will cover the material from the lab exercises. The lab exams will include a practical and a written portion.
- **Scientific Writing and Laboratory Project** – You will write individual sections of a scientific paper for specific laboratory exercises. Students will propose and implement an independent investigation as a team research project. For this laboratory, you will prepare a group symposium presentation and write an individual complete scientific paper. Specific instructions will be provided in lab.
- **Grade Distribution** –

300 points	3 lecture exams	90 – 100%	A
150 points	3 laboratory exams	80 – 89%	B
175 points	final examination	70 – 79%	C
40 points	scientific writing	60 – 69%	D
60 points	lab project	< 60%	F
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725 points	total		

**Class Policies:**

1. **Attendance:** See the attached sheet for the attendance policy. Unexcused absences in lecture, lab, examinations or a failure to follow the procedures outlined in that handout will result in a reduction in your grade. Any questions about absences should be asked immediately. It is your responsibility to be aware of the policy.
2. **Exams:** A student should place all book bags, purses, and other belongings at the front of the room while sitting for any type of exam or graded assignment. Cell phones should be turned off and should be placed in bags or on a bench at the front of the room. (Desktops should be clear except for the materials needed and authorized for testing). Students should feel free to ask for clarification about any question during the exams
3. **Late work:** My due dates are fixed, unless you provide documentation of a serious life event.
4. **Missed exams:** In general, missed exams may not be made up (see the attached sheet for the absence policy) except for serious reasons (such as death or illness) with proper documentation. However, if you already know you have a conflict, please inform me by Sept. 6, and I will determine if make-up arrangements will be possible.
5. **Electronic devices:** Please turn off all cell phones and other electronic devices prior to entering the classroom.
6. **Academic dishonesty:** Honesty and ethical behaviors are imperatives in any career. Therefore, academic dishonesty will not be tolerated. See [http://oxford.emory.edu/audiences/faculty\\_and\\_staff/resource\\_policies/faculty\\_handbook/honor\\_code.dot](http://oxford.emory.edu/audiences/faculty_and_staff/resource_policies/faculty_handbook/honor_code.dot) for descriptions of what constitutes academic dishonesty. Regulations of the Honor Code apply to all work in this course, including lecture and lab examinations and assignments. Please pledge all of your work with your signature to indicate that you have followed the rules of the Honor Code. Anyone caught violating this policy will be reported to the Honor Council, as detailed in the Honor Code. If you have any questions about what constitutes your own work, definitely ask!