

**BIOLOGY 141 (INQ, WR) – CELL BIOLOGY AND GENETICS**

**COURSE SYLLABUS, DR. AMANDA PENDLETON**

**SPRING 2012**

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

**Office hours:** M, T 2:30 – 3:30; or feel free to make an appointment with me for another time

**Course Meeting Times:**

Lecture – M, W, F	11:45 – 12:35	Pierce Hall Room 102
Lab – W	2:00 – 5:00	Pierce Hall Room 123

**Required Texts:**

- (1) *Biology*, N.A. Campbell and J.B. Reece, 2011, 9<sup>th</sup> edition, Benjamin/Cummings Publishing Co., Inc.
- (2) *Practicing Biology*, Heitz, Jean and C. Griffen. Benjamin/Cummings Publishing Co., Inc. 2011, 4<sup>th</sup> edition. A terrific workbook that is useful alone or in study groups.

**Required Lab Text:**

- (1) *Investigating Biology*, 7<sup>th</sup> ed. Morgan, J. G. and M. E. B. Carter. Benjamin/Cummings Publishing Company, Inc. 2011. 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 as a “Ways of Inquiry” or INQ course. Therefore, this course will teach you to “think, work, and communicate like a scientist” through “actively learning and practicing the discipline’s approaches to inquiry” (INQ Vision Statement). Throughout the course, you will have many opportunities to engage in biological inquiry by asking questions, designing experiments, reading and writing critically, and working independently to seek knowledge. 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, both in knowledge and in thinking abilities, to delve deeper, into more specialized areas of biology.

*BIOLOGY 141; LECTURE SCHEDULE SPRING 2012*

Date	Topic	Assigned Reading
W Jan 18	Science as a Way of Knowing	1
F Jan 20	Major themes in Biology	1
M Jan 23	Hierarchies: beginning with living chemistry and water	2,3
W Jan 25	Building biological macromolecules: carbohydrates & lipids	4,5
F Jan 27	Proteins and nucleic acids	5
M Jan 30	Structure and function revealed in cells	6
W Feb 1	Cellular Case Studies	
F Feb 3	Membrane structure and cellular transport	7
M Feb 6	Transport problems	
W Feb 8	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
Th Feb 9	<i>Scientific Literature and Research, 8 – 8:45 am or 9 – 9:45 am, Library (required)</i>	
F Feb 10	Cellular respiration I - Glycolysis	9
M Feb 13	Cellular respiration II - Transition and the Krebs Cycle	9
W Feb 15	Cellular respiration III – Chemiosmosis and the Electron Transport System	9
Th Feb 16	<b>EXAM I; 8:00 – 9:30 a.m. (through membrane transport)</b>	
F Feb 17	Presentation of Scientific Data – Pierce 101	
M Feb 20	Review and recapitulation: Accounting Day	
W Feb 22	Homage to photosynthesis	10
F Feb 24	Photosynthesis I: the light dependent reactions	10
M Feb 27	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10
W Feb 29	Cell reproduction: cell cycle, mitosis	12
F Mar 2	Sexual life cycles and meiosis	13
M Mar 5	Chromosomal mutations, translocation & nondisjunction	15 pp. 297-300
W Mar 7	Mendelian principles; genes and chromosomes	14, 15 pp. 286-288
Th Mar 8	<b>EXAM II; 8:00 – 9:30 a.m. (through photosynthesis)</b>	
F Mar 9	Patterns of inheritance	14, pp. 271-281
M, W, F	Mar 12 - 16	*** Spring Break ***
M Mar 19	Chromosomal theory and linkage	15
W Mar 21	Genetics problems and review	14, 15
F Mar 23	DNA structure	16

*BIOLOGY 141; LECTURE SCHEDULE SPRING 2012*

Date	Topic	Assigned Reading
M Mar 26	DNA replication	16
W Mar 28	Gene to Protein I: transcription and the genetic code	17
Th Mar 29	<i>Effective Presentations Workshop, 8 – 8:45 am or 9 – 9:45 am, Pierce 206 (optional – but at least one group member must attend)</i>	
Th Mar 29	<i>Dr. Mark Frankel; Lyceum/Oxford Studies Lecture; 7 p.m.</i>	
F Mar 30	Gene to Protein II: translation and genetic mutations	17
M Apr 2	Modeling: Beyond Watson & Crick	
W Apr 4	Molecular genetics workshop	
F Apr 6	Charles Darwin and development of evolutionary concepts	22
M Apr 9	Evolutionary evidence	22,25, pp. 510 – 512; 519 - 530
W Apr 11	Population Genetics and Hardy Weinberg	23
W Apr 11	<i>Dr. Alison Foster Lecture; Time and location to be announced</i>	
Th Apr 12	<b>EXAM III; 8:00 – 9:30 a.m. (through genetics)</b>	
F Apr 13	Microevolution: genetic drift, gene flow and mutation	23
F Apr 13	<i>Scientific Papers – “Ask the Editor”- 2 – 3 p.m. (optional)</i>	
M Apr 16	Genetic variation and selection	23
W Apr 18	Evolution of land plants	29
	<b><i>Research papers due in class</i></b>	
F Apr 20	Sexual Encounters of the Floral Kind	38, pp. 801 – 807
M Apr 23	Bryophytes and seedless vascular plants	29
W Apr 25	Seed plants: gymnosperms and angiosperms	30
F Apr 27	Evolutionary trends in land plants	
M Apr 30	The Big Themes Revisited	
<b>FINAL EXAMINATION: Monday, May 7; 2:00 – 5:00 pm</b>		

**BIOLOGY 141, LABORATORY SCHEDULE, SPRING 2012**  
**DR. ELOISE CARTER, MS. JENNIFER GAULDING, DR. AMANDA PENDLETON**

<u>Date</u>	<u>Lab Topic</u>	<u>Writing Assignment*</u>
Jan. 25	Scientific Investigation	Materials & Methods
Feb. 1	Microscopes and Cells	Review table+
8	Diffusion and Osmosis	Title page; Introduction; References
15	Enzymes	Results; Table; Figure
22	Cellular Respiration & Fermentation	Title page; Discussion (Table, Figure), References
<b>Feb. 23<sup>rd</sup> (Thurs.)</b>	<b>LAB EXAM (thru enzymes) begins at 6:00 p.m. or 6:30 p.m.</b>	
29	Mitosis & Meiosis	Comparison table+
Mar. 7	Research Teams: Proposal Development <i>Proposals submitted to Blackboard Discussion Board by 9:00 a.m. on Friday 3/9</i>	
14	*** Spring Break; No labs ***	
21	Field Research: Ecology and Evolution on the Outcrops	
<b>Mar. 22<sup>nd</sup> (Thurs.)</b>	<b>LAB EXAM (Respiration, Mitosis &amp; Meiosis, and Outcrops); 6:00 p.m. or 6:30 p.m.</b>	
28	Microbial Diversity (Bacteriology)	
Apr. 4	Research Symposium <i>(Technology Rehearsal – 9 a.m. – Pierce 101; one team member must attend)</i>	<b>Research papers due in class Apr. 18<sup>th</sup></b>
11	Molecular Biology	Map+
18	Plant Diversity I & II	
25	Molecular Phylogeny of Plants	Report completed in lab
<b>Apr. 26<sup>th</sup> (Thurs.)</b>	<b>LAB EXAM (Molecular Biology, Bacteriology, Plant Diversity); 6:00 p.m. or 6:30 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.**

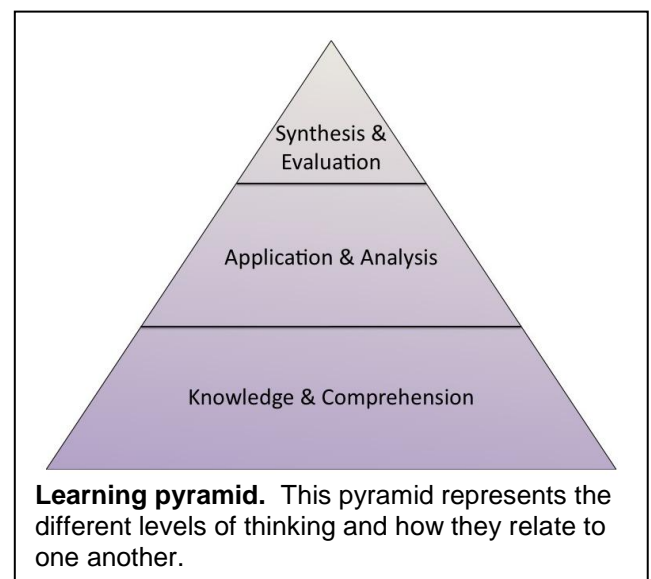
## EXPECTATIONS, EVALUATION AND TIPS FOR SUCCESS IN BIOLOGY 141

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:

- **Be prepared for class every day.** The readings should be done **before class**. The best overall reading approach is to read **before class** (or at least browse) assignments at first for an overview, jotting down questions or areas of confusion. Then, answer all of the questions associated with your reading assignment in the textbook to practice your knowledge. Bring your textbook to class and annotate the figures. Finally, read a second 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 second 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 a learning pyramid as a guide for our thinking this semester:
  - **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 that 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 & Comprehension' level first is key. To do this, I suggest that you study the diagrams in your text and lecture handouts; practice writing out 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 all assigned 'Practicing Biology' problems, 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 Ajay Mohinani.

#### **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 Team Research Project** – You will write individual sections of a scientific paper for specific laboratory exercises. You will also work in teams to design and perform an independent research investigation in the laboratory. You will write a proposal, organize your team and complete the research project. Together you will prepare a PowerPoint presentation and individually write a

complete scientific paper. Specific instructions will be provided in lab. You will be evaluated for individual and group performance.

- **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
-----		plus and minus grades are given	
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**. It is your responsibility to communicate with the instructor as much in advance as possible about medical or family emergencies or send a message through another student.
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. If you know you have a conflict with an exam, please inform me as soon as possible **before** the exam, and I will determine the potential for make-up arrangements.
5. **Electronic devices:** Please turn off all cell phones and other electronic devices prior to entering the classroom. Photography and using calculators on phones is also prohibited. If you would like to take notes on your personal laptop in class you must seek special permission from the instructor. Use of laptops for surfing the web, Facebook, Skype, or other networking/chat during class is **completely unacceptable**.
6. **Academic dishonesty:** Honesty and ethical behaviors are imperatives in any career. Therefore, academic dishonesty will not be tolerated. 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. Please also read the information on **plagiarism** on the Library web page and always ask if you have any questions about assignments. Note that writing assignments will be submitted to **SafeAssign on Blackboard**. Anyone caught violating Honor Code policies 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!
7. **College-wide Assessment:** Student work submitted as part of this course may be reviewed by Oxford and Emory faculty/staff for the purposes of improving instruction and enhancing Emory education.