

BIOLOGY 141 (INQ, WR) – CELL BIOLOGY AND GENETICS
COURSE SYLLABUS, DR. AMANDA PENDLETON
SPRING 2013

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

Office hours: M, 2:30 - 3:30 & T, 10 - 11; or feel free to make an appointment with me for another time

Course Meeting Times:

Lecture - M, W, F	9:30 - 10:35	Pierce Hall Room 102
Lab - W	2:30 - 5:30	Pierce Hall Room 123

Required Texts:

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

Required Lab Text:

- (1) *Investigating Biology*, 7th 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, 3rd 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), 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 2013

Date	Topic	Assigned Reading
W Jan 16	Science as a Way of Knowing	1
F Jan 18	Major themes in Biology	1
M Jan 21	<i>Martin Luther King Day, no classes</i>	
W Jan 23	Hierarchies: beginning with living chemistry and water	2,3
F Jan 25	Building biological macromolecules: carbohydrates & lipids	4,5
M Jan 28	Proteins and nucleic acids	5
W Jan 30	Structure and function revealed in cells	6
F Feb 1	Cellular Case Studies	
M Feb 4	Membrane structure and cellular transport	7
W Feb 6	Transport problems	
Th Feb 7	<i>Scientific Literature and Research, 8 - 8:45 am or 9 - 9:45 am, Library (required)</i>	
F Feb 8	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M Feb 11	Cellular respiration I - Glycolysis	9
T Feb 12	EXAM I; 8:00 - 9:30 a.m. (through membrane transport)	
W Feb 13	Cellular respiration II - Transition and the Krebs Cycle	9
F Feb 15	<i>Presentation of Scientific Data - bring your lab data to class; Pierce 101</i>	
M Feb 18	Cellular respiration III - Chemiosmosis and the Electron Transport System	9
W Feb 20	Review and recapitulation: Accounting Day	
F Feb 22	Homage to photosynthesis	10
M Feb 25	Photosynthesis I: the light dependent reactions	10
M Feb 25	Ms. Jessica Wyndham; Lyceum/Oxford Studies Lecture; 7:30 p.m.	
W Feb 27	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10
F Mar 1	Cell reproduction: cell cycle, mitosis	12
M Mar 4	Sexual life cycles and meiosis	13
T Mar 5	EXAM II; 8:00 - 9:30 a.m. (through photosynthesis)	
W Mar 6	Chromosomal mutations, translocation & nondisjunction	15 pp. 297-300
F Mar 8	Mendelian principles; genes and chromosomes	14, 15 pp. 286-288
M, W, F	Mar 11 - 15 *** Spring Break ***	
M Mar 18	Patterns of inheritance	14, pp. 271-281
W Mar 20	Chromosomal theory and linkage	15
F Mar 22	Genetics problems and review	14, 15
M Mar 25	DNA structure	16
W Mar 27	DNA replication	16
Th Mar 28	<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>	
F Mar 29	Gene to Protein I: transcription and the genetic code	17

BIOLOGY 141; LECTURE SCHEDULE SPRING 2013

Date	Topic	Assigned Reading
M Apr 1	Gene to Protein II: translation and genetic mutations	17
W Apr 3	Modeling: Beyond Watson & Crick	
F Apr 5	Molecular genetics workshop	
F Apr 5	<i>Scientific Papers - "Ask the Editor"- 2 - 3 p.m. (optional)</i>	
M Apr 8	Charles Darwin and development of evolutionary concepts	22
T Apr 9	EXAM III; 8:00 - 9:30 a.m. (through genetics)	
W Apr 10	Evolutionary evidence	22,25, pp. 510 - 512; 519 - 530
F Apr 12	Genetic Variation, Population Genetics and Hardy Weinberg	23
M Apr 15	Microevolution: genetic drift, gene flow and mutation	23
W Apr 17	Selection & Speciation	23
	<i>Research papers due in class</i>	
F Apr 19	Evolution of land plants	29
M Apr 22	Sexual Encounters of the Floral Kind	38, pp. 801 - 807
W Apr 24	Bryophytes and seedless vascular plants	29
F Apr 26	Seed plants: gymnosperms and angiosperms	30
M Apr 29	Evolutionary trends in land plants & The Big Themes Revisited	
FINAL EXAMINATION: Friday, May 3; 2:00 - 5:00 pm		

BIOLOGY 141, LABORATORY SCHEDULE, SPRING 2013

<u>Date</u>	<u>Lab Topic</u>	<u>Writing Assignment*</u>
Jan. 23	Scientific Investigation	Materials & Methods; Title page
30	Microscopes and Cells	Review table+
Feb. 6	Diffusion and Osmosis	Introduction; References
13	Enzymes	Results; Table; Figure
15	<i>Respiration/Fermentation Proposal posted to Blackboard by 2 p.m.</i>	
20	Cellular Respiration & Fermentation	Title page; Discussion (Table, Figure), References
Feb. 21 st (Thurs.)	LAB EXAM (thru enzymes) begins at 6:00 p.m. or 6:30 p.m.	
27	Mitosis & Meiosis	Comparison table+
Mar. 6	Research Teams: Proposal Development <i>Proposals submitted to Blackboard Discussion Board by 2:00 p.m. on Friday 3/8</i>	
13	*** Spring Break; No labs ***	
20	Field Research: Ecology and Evolution on the Outcrops	
Mar. 21 nd (Thurs.)	LAB EXAM (Mitosis & Meiosis); 6:00 p.m. or 7:00 p.m.	
27	Microbial Diversity (Bacteriology)	
Apr. 3	Research Symposium <i>(Technology Rehearsal - beginning of lab)</i>	Research papers due in class Apr. 17th
10	Molecular Biology	Map+
17	Plant Diversity I & II	
24	Molecular Phylogeny of Plants	Report completed in lab
Apr. 25 th (Thurs.)	LAB EXAM (Molecular Biology, Bacteriology, Plant Diversity); 6:00 p.m. or 6:30 p.m.	

*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.

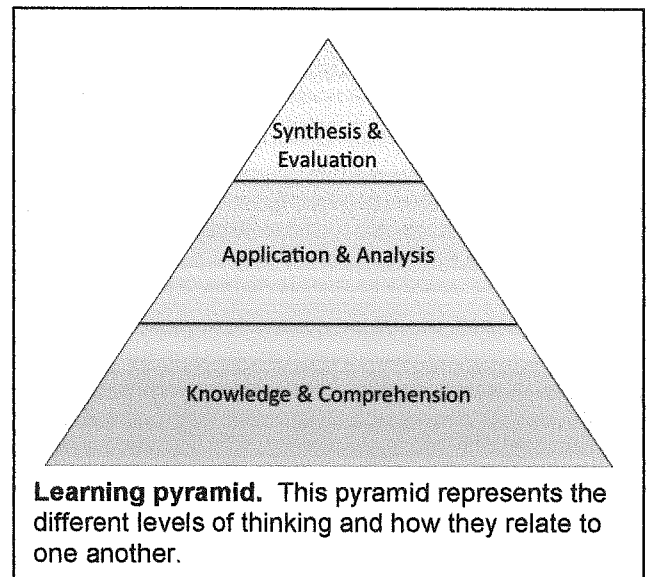
EXPECTATIONS, EVALUATION AND TIPS FOR SUCCESS IN BIOLOGY 141

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). 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
130 points	3 laboratory exams	80 - 89%	B
175 points	final examination	70 - 79%	C
35 points	scientific writing	60 - 69%	D
75 points	lab project	< 60%	F
-----		plus and minus grades are given	
720 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 not appropriate or respectful classroom behavior.
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. **Exam Protocols:** Do not come to any exam with notecards in your pockets or on your person. All cell phones are to be turned off and either in your bag in the front of the room or on the instructor's bench. Do not write notes or study material, or anything that could be construed as these, on your body. Check for such notations and remove before the exam time. These are considered to be a breach of the Honor Code.
8. **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.

ABSENCE POLICY – Biology Department

All students are expected to attend all lecture and laboratory sessions. However, emergencies may arise which will necessitate absences from class. Students are allowed 4 cuts in lecture and **NO CUTS** in lab. Students may only miss lab without penalty in cases of illness, family emergency or a school sponsored event which is cleared with the professor in advance. Students are responsible for all material which is covered in laboratory and lecture. When possible, students will be allowed to "make-up" laboratory material missed due to an excused absence; however, because of the nature of laboratory material, actual "make-up" of missed activities is usually impossible.

PENALTIES

Students who exceed the 4 cut limit in lecture for whatever reasons of have an unacceptable absence from laboratory will have their FINAL grade reduced 5 points per absence. Students who miss 2 labs without acceptable reasons will fail the course (see below).

LECTURE ABSENCES:

THERE ARE NO EXCUSED ABSENCES FOR LECTURE. Each student may be absent four times without penalty. These four cuts may be used for any reason: illness, studying, travel, family emergency, etc. However, ANY additional cuts will result in grade reduction. **USE YOUR CUTS JUDICIOUSLY**, e.g., for sick leave only.

ACCEPTABLE LABORATORY ABSENCES

Although no discretionary absences, i.e., "cuts", are allowed regarding laboratory, on rare occasions, illness, family emergencies, or certain school sponsored events may make it necessary for a student to miss a laboratory session. The instructor **MUST** be notified prior to the day of the absence in all but the most extreme emergencies.

In all cases, the final decision regarding whether or not an absence is acceptable will be made by the instructor.

AN UNACCEPTABLE ABSENCE FROM LABORATORY RESULTS IN A FIVE POINT REDUCTION IN THE FINAL GRADE. TWO UNACCEPTABLE LABORATORY ABSENCES RESULT IN FAILURE OF THE COURSE.

MISSED TESTS

Ordinarily, tests cannot be made up, however, this is up to the instructor. If a student misses a test, and the absence is acceptable the missed test will not count either for or against the student. If the absence is not excused the grade will be a zero. Students are cautioned that any excuse for missing an exam will come under severe scrutiny by the instructor. **THE INSTRUCTOR MUST BE NOTIFIED PRIOR TO THE TIME OF THE EXAM, AND THE INSTRUCTOR MAKES THE FINAL DECISION REGARDING WHETHER OR NOT AN ABSENCE IS ACCEPTABLE.**

Laboratory tests which are missed for a reason that is excused **MUST** be made up. **The instructor must be notified prior to the time of the test.**

RELIGIOUS HOLIDAYS:

Students must notify the instructor one week in advance if they intend to be absent for a religious holiday.

TARDINESS

Being late to class is rude and distracting. Continued tardiness by any student will result in the assignment or absences and ultimately a reduction in the student's grade. **Three tardies equal an absence.** The tardy student is responsible for notifying the instructor that she/he entered the classroom late and, therefore was not absent. The instructor reserves the option of excluding a person from further classroom or laboratory participation if the student is continuously tardy.

Falsification of information regarding absences from class or laboratory will be considered as a breach of academic integrity.

CLASSROOM AND LABORATORY GUIDELINES

Department of Biology

1. Eating and drinking are not allowed in either classrooms or laboratories. Therefore, do not bring food items and beverages to class or laboratory. The use of tobacco in any form is forbidden in Pierce Hall.
2. Students are expected to wear appropriate attire in classrooms and laboratories. Students must wear closed toed shoes in the laboratory.
3. Students should thoroughly wash their hands before leaving the laboratory.
4. Students must be safety conscious at all times but especially in the laboratories. Special procedures will be reviewed during laboratory sessions as needed.
5. All students are requested to help with housekeeping in the classroom and laboratory.
6. Materials may not be taken out of the laboratories. This includes microscopes, microscopic slides, demonstration notes and materials, charts, and all other items which are to be found in the laboratory.
7. Students may not photograph laboratory materials.
8. Violation of any regulation notes in Sections 6 and 7 above will be treated as a breach of academic integrity. Therefore, such violations will be immediately reported to the Honor Council.

STUDENT INFORMATION SHEET

NAME: _____ (Print) _____ [Freshman or Sophomore] SEMESTER: _____
(circle one)

NAME: _____ (Signature) _____ COURSE: _____

PHONE NUMBERS: Dorm: _____ Cell: _____

CAMPUS ADDRESS: _____

HOME ADDRESS: _____

HIGH SCHOOL: _____

TENTATIVE MAJOR/INTERESTS: _____

ACADEMIC ADVISOR: _____

PREVIOUS SCIENCE COURSES: HIGH SCHOOL: _____

COLLEGE: _____

List any health information that might be important for participation in the laboratory and on field trips. (For example: pregnancy, allergies, handicaps) _____

_____ This information will be kept confidential if requested.