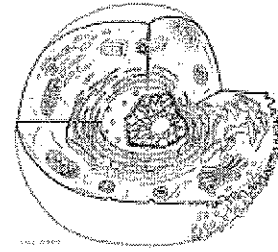


# **Biology 141 Cell Biology and Genetics**

## **Syllabus**

**Fall Semester 2011**



**Professor:** Dr. Steve Baker

**Office:** Pierce Hall #117A

**Lecture Hours:** 11A; 11:45-12:35, in Pierce 101

**Office Hours:** My office hours will be 9-10 TTh, 8:30-10:00 MWF or by appointment; see me after class or email to set up. You are welcome to talk to me anytime if I am in the office or lab.

**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, 4<sup>th</sup> edition. A terrific workbook that is useful alone or in study groups.

**Optional Writing Book:** A Student Handbook for Writing in Biology, Karen Knisely, 2005, 2<sup>nd</sup> edition, W.H. Freeman and Co. This is a great resource for writing, and is on reserve in the library.

**Required Lab Text:** *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.*

**Web Site:** [www.masteringbio.com](http://www.masteringbio.com). Mastering Biology provides online study materials. Your text has instructions for accessing the site.

**Course Objectives:** This course is designed to serve as an introduction to the basic themes of biology and to begin your training as a scientist by introducing you to the basics of investigative science and science writing. The topics covered by the course will expose you to the basics of biology at the molecular, cellular, and organismal levels. Initially, you will learn about biological molecules and how they lead to cell structure and function. Secondly, we will learn about vital cell functions such as transport and the production of energy. A third objective will include the basics of molecular biology and inheritance, and how genetics is responsible for evolution. Your work in the lab will involve investigations addressing these topics, in order to broaden your understanding and to help you begin to learn how to “think and act like a scientist.” These basic themes will prepare you well for more advanced study in biology.

## BIOLOGY 141 Fall 2011 LECTURE SCHEDULE

Date	Topic	Assigned Reading
W, Aug 24	Science as a Way of Knowing	1
F, Aug 25	Major themes in Biology	1
M, Aug 29	Hierarchies: beginning with living chemistry and water	2,3
W, Aug 31	Building biological macromolecules: carbohydrates and lipids	4,5
Th, Sep 1	<b>Scientific Literature and Research (Required)</b> <b>8-9 AM or 9-10 AM – in the Library. Sign up with the Instructor.</b> <b>Library Assignment due 9/9</b>	
F, Sep 2	Proteins and nucleic acids	5
<b>M, Sep 5</b>	<b>** Labor Day **</b>	
W, Sep 7	Structure and function revealed in cells	6
F, Sep 9	Cellular Case Studies	
M, Sep 12	Membrane structure and cellular transport	7
W, Sep 14	Transport problems	
Th, Sep 15	<b>Presentation of Scientific Data (Required) – Room TBA</b> <b>8:15-9AM or 9-9:45AM. Sign up with the Instructor.</b>	
F, Sep 16	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M, Sep 19	Overview of cellular respiration	9
<b>Tues, Sep 20</b>	<b>EXAM I 8:00 - 9:30 a.m. (through membrane transport)</b>	
W, Sep 21	Cellular respiration I - Glycolysis	9
F, Sep 23	Cellular respiration II - Transition and the Krebs Cycle	9
M, Sep 26	Cellular respiration III - Chemiosmosis and the Electron Transport System	9
W, Sep 28	Review and recapitulation: Accounting Day	
F, Sep 30	Photosynthesis I: the light dependent reactions	10
M, Oct 3	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10
W, Oct 5	Cell reproduction: cell cycle, mitosis	12
F, Oct 7	Sexual life cycles and meiosis	13
M, Oct 10	*** Fall Break***	
W, Oct 12	Chromosomal mutations	15 pp. 297-300
<b>Thur, Oct 13</b>	<b>EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)</b>	
F, Oct 14	Mendelian principles; genes and chromosomes	14, 15 pp. 286-289

M, Oct 17	Patterns of inheritance	14, pp. 271-281
W, Oct 19	Chromosomal theory and linkage	15
F, Oct 21	Genetics problems and review	14, 15
M, Oct 24	DNA structure	16
W, Oct 26	DNA replication	16
F, Oct 28	Gene to Protein I: transcription and the genetic code	17
<b>F, Oct 28</b>	<b>Effective Presentations Workshop - Pierce 206</b> <b>(1-2pm; 2-3 p.m in P206 – at least one group member must attend)</b>	
M, Oct 31	Gene to Protein II: translation and genetic mutations	17
W, Nov 2	Molecular genetics workshop	
F, Nov 4	Charles Darwin and development of evolutionary concepts	22
M, Nov 7	Evidence for evolution	22,25
W, Nov 9	Evidence for evolution	22,25
F, Nov 11	Population Genetics and Hardy Weinberg	23
M, Nov 14	Microevolution: genetic drift, gene flow and Mutation	23
<b>Tues, Nov 15</b>	<b>EXAM III - 8:00 – 9:30 a.m. (through genetics)</b>	
W, Nov 16	Genetic variation and selection	23
F, Nov 18	Evolution of land plants	29
<b>F, Nov 18</b>	<b>Scientific Papers – “Ask the Experts”- 2:00 p.m. Room TBA</b>	
M, Nov 21	Bryophytes and seedless vascular plants	29
<b>Research papers due in instructors office – Nov. 22<sup>nd</sup> no later than 3:00 PM</b>		
<b>W, F 23-26</b>	<b>** Thanksgiving Break **</b>	
M, Nov 28	Seed plants: gymnosperms and angiosperms	30
W, Nov 30	Flowering plants	30
F, Dec 2	Evolutionary trends in land plants - review	
M, Dec 5	The Big Themes Revisited	

\*\*\*\*\* **FINAL EXAMINATION ----Monday, Dec. 12, 9 AM**\*\*\*\*\*

# BIOLOGY 141 - LABORATORY SCHEDULE

## Fall 2011/ Dr. Steve Baker, Dr. Nitya Jacob

**Lab: 2:00-5:00 PM, Wednesday Lab meets in Pierce 125**

<u>Date</u> <u>Assignment*</u>	<u>Lab Topic (#)</u>	<u>Writing</u>
Aug 29, 30, 31 <i>Introduction,</i>	Scientific Investigation	<i>Title page,</i>  <i>References; (due 9/9)</i>
Sept 5**	Labor Day	
6, 7, 9	Microscopes and Cells	Review table+
12, 13, 14	Diffusion and Osmosis	<i>Results, Table, Figure</i> <i>(due 9/23)</i>
19, 20, 21	Enzymes	<i>(Table, Figure),</i> <i>Discussion, References</i> <i>(due 10/3)</i>
26, 27, 28	Cellular Respiration	<i>Materials and Methods</i> <i>(due 10/7)</i>
	Introduction to Research Project	<i>Research Proposal</i> <i>(due 10/17)</i>

**Sept. 29<sup>th</sup> (Thurs.) LAB EXAM I (through enzymes) begins at 6:00 pm.**

Oct. 3, 4, 5	Mitosis and Meiosis	
<b>10, 11</b>	<b>***Fall Break*** No Lab This Week</b>	
17, 18, 19	Molecular Biology	Map+
24, 25, 26	Ecology and Evolution on the Outcrops	
Oct. 30, Nov. 1, 2	Microbial Diversity (Bacteriology)	

**Nov. 3<sup>rd</sup> (Thurs.) LAB EXAM II (respiration, mitosis, molecular biology) begins at 6:00 pm.**

7, 8, 9	Research Symposium	<i>Research papers (due</i> <i>11/22 by 3pm)</i>
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*(Technology Rehearsal – 9:00 a.m., Nov. 9 – Pierce 101 – one team member must be present)*

14, 15, 16                      Plant Diversity I & II

**21, 22, 23                      \*\*\*Thanksgiving Break\*\*\* No Lab This Week**

Nov. 28, 29, 30              Molecular Phylogeny of Plants                      *Report completed in lab*

**Dec. 1<sup>st</sup> (Thurs.) LAB EXAM III (outcrops, microbial diversity, plant diversity) begins at 6:00 pm.**

**\*Writing assignments are due on the specified date in class (at the beginning).**

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

**The instructor reserves the right to adjust dates and topics on lecture and lab syllabi if he determines it is necessary.**

## STUDENT'S GUIDE TO BIOLOGY 141

Welcome to Biology 141! The information in this handout and accompanying materials should be read and followed by all students in Introductory Biology. If you do not understand everything in this handout, you should ask for clarification.

Biology 141 is designed for students who **plan to major in 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. This may be one of the more difficult courses you will take, demanding that you not only learn and apply complex information, but that you also organize this information within the major concepts of biology. This information will be essential to your success in other biology courses, where your competence in basic biology will be assumed. In addition many of you will be taking examinations to enter graduate or professional schools, and the knowledge you gain here will be required later.

In Biology 141 students are introduced to basic concepts in biology following the hierarchy of life from basic biological molecules, to cell structure and function, fundamentals of genetics, evolution and organismal diversity (specifically plants). Students master detailed information within the broad themes of unity and diversity, structure and function, and evolution.

The laboratory component of the course emphasizes student use of scientific methods of inquiry, fundamental concepts and techniques in biology, and communicating scientific results through laboratory presentations and scientific writing. Students participate in an independent team research project: proposal, research, symposium and scientific paper.

**Ways of Inquiry (INQ):** Biology 141 is designated as a "Ways of Inquiry" or INQ course. In INQ courses, students "understand and question the way knowledge is sought by actively learning and practicing the discipline's approaches to inquiry" (INQ Vision Statement). In Biology 141, 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.

**Tips for Studying:** Biology 141 is an intensive course and requires time. If you are an average reader, you should spend about 8 hours a week outside class working in BIO 141. To perform well in this course, you must be diligent about the following:

- ✿ *Keep up with assigned readings.* The readings listed for each lecture in the syllabus must be done **BEFORE** the lecture. The best overall study **approach is to read assignments over quickly at first for an overview. Then read more carefully, jotting down questions or areas of confusion for later checking and review.**
- ✿ *Take good notes.* In lecture, I will explain 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.

- ✿ *Connect the lecture notes to your readings.* For the test, you are responsible for information in the textbook as well as the lecture notes. Make sure that you are able to grasp the major concepts thoroughly and in detail.
- ✿ *Study the diagrams in your text and lecture handouts.* Practice writing out pathways and link the concepts. It is helpful to **prepare your own tables and diagrams** as a study aid and review for much of the material in BIO 141.
- ✿ *Learn and think.* While studying, keep two things in mind: One is to **learn terminology** and most importantly, understand the relevance of that terminology to biological function. Second – it is crucial to remember that this course is designed to make you **think** and not just to have you memorize facts. Many of the test questions will revolve around applying your knowledge. Therefore you should be confident of what you know and what it means.
- ✿ *Be an active learner.* Attend Supplemental Instruction and organize an active study group. Develop study guides, comparison charts, concept maps (see Study Guide). Use the CD Study Guide and web resources for your textbook. **Don't be lulled into thinking familiarity is the same as knowledge.** The latter takes hard work!
- ✿ **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. Answer questions in the lab manual either during lab or immediately following lab. Pay attention to information about lab exams. Make use of open lab time. Learn to manage your time well and prepare in advance for the lab writing assignments.

**Supplemental Instruction (SI)** is provided for all students in Biology 141. I will explain this important program that provides assistance for students who wish to improve their performance in biology.

#### **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. Use the knowledge you gain in lab to help with understanding the lecture material. The final examination, worth 175 points, is

comprehensive. Three laboratory exams, each worth 50 points, will be given in this course. Each lab exams 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. The lab also involves a group independent investigation as a 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.

**Absences:** The policy on absences is provided in a separate handout. 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.

**Cell Phones:** The use of cell phones is strictly prohibited in the classroom and the laboratory. Please turn off your phone before you come to class and leave your phone at the front during exams. Photography with camera phones is also prohibited.

**Personal Computer:** If you would like to take notes on your personal laptop/tablet in class you must seek special permission from the instructor. Use of laptops for surfing the web, working on assignments, Facebook, Skype or other networking/chat during class is **completely unacceptable**.

**Honor Code:** Regulations of the Honor Code apply to all work for credit in this course, including lecture and lab examinations. Please pledge all of your work with your signature to indicate that you have followed the rules of the Honor Code.

**Office Hours:** I would like to encourage you to meet with me in person about any concerns or questions that may arise during the semester. I have scheduled specific office hours but if these times are not suitable for you, please do not hesitate to make an appointment with me by emailing me through Learnlink or [sbaker@emory.edu](mailto:sbaker@emory.edu)

**LearnLink Class Conference and Blackboard Site:** A class conference labeled "Bio 141 Baker" has been set up for this course on LearnLink. Please use the conference regularly to communicate with each other and to ask questions. I will use this conference to correspond with you about items we may have missed in class or lab or provide timely item. A Blackboard site is also set up for any additional materials and large files. The syllabus and weekly lab instructions will also be posted under the Biology 141 conference – check the folders

**Additional Sessions:** We have two required additional instruction sessions in this course for scientific literature research and data presentation. These sessions are held outside of class time and are critical for your laboratory assignments.



**Evaluation Points:** Students are evaluated on their performance in the classroom and the laboratory. The following is the distribution of points:

300 points	3 lecture exams	Final grade determination	
150 points	3 laboratory exams	90 - 100%	A
175 points	final examination	80 - 89%	B
10 points	Blackboard Quiz participation	70 - 79%	C
40 points	scientific writing	60 - 69%	D
60 points	lab project	<60	F
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735 points	total	Plus and minus grades are given	