**Biology 141 Cell Biology and Genetics Syllabus**
**Fall Semester 2010**

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**Professor:** Dr. M. Eloise Brown Carter
**Office:** Pierce Hall #107(side porch of Pierce)
**Phone:** (770) 784-8343
**Lecture Hours:** Monday, Wednesday, Friday 8:30 a.m. – 9:20 p.m. **Room:** Pierce 102
**Lab Hours:** Thursday morning 9:45 a.m. – 12:45 a.m. **Room:** Pierce 125

**Office Hours:** Monday, 1:30 – 2:30 p.m. and Wednesday – 9:30 to 10:30 a.m. Students are encouraged to see Dr. Carter during class to make appointments for other times.

**Required Texts:** *Biology*, N.A. Campbell and J.B. Reece, 2008, 8th edition, Benjamin/Cummings Publishing
*Practicing Biology*, Heitz, Jean and C. Griffen. Benjamin/Cummings Publishing Co., Inc. 2008.

**Required Lab Text:** *Investigating Biology*, 6th 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 Text:** *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:** *MasteringBiology* provides online study materials, practice exams, learning activities and strategies for success. www.masteringbiology.com Your text has instructions for accessing the site.

| 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 and lipids | 4 |
| F, Sep 3 | Proteins and nucleic acids | 5 |
| *Fri., Sep 3rd* | *Scientific Literature and Research (Required)*<br>*1-2 pm ;2- 3 pm in the Library. Sign up with instructor.* | |
| M, Sep 6 | **Labor Day** | |
| 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 17th | Fundamentals of energy transformations:<br>enzymes, ATP and electron carriers | 8 |
| M, Sep 20 | Presentation of Scientific Data – P125 | |
| **Tues, Sep 21** | **EXAM I 8:00 - 9:30 a.m. (through membrane transport)** | |
| W, Sep 22 | Cellular respiration I - Glycolysis | 9 |
| F, Sep 24 | Cellular respiration II - Transition and the Krebs Cycle | 9 |

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|---|---|---|
| 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 | *** Fall Break*** | |
| W, Oct 13 | Chromosomal mutations | 15 pp. 297-300 |
| **Thur, Oct 14** | **EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)** | |
| 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<br>*Effective Presentations Workshop (1-2pm; 2-3pm in P206)* | 14, 15 |
| 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<br>*Scientific Papers – "Ask the Experts"- 2:00 p.m.* | 22 |
| M, Nov 8 | Evolutionary evidence<br>**Research Papers due in class** | 22,25, pp. 481-495 |
| 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 |
| **Tue, Nov 16** | **EXAM III - 8:00 – 9:30 a.m. (through genetics)** | |
| 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 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 *****Monday, Dec. 13th 2 pm – 5 pm**

**BIO 141 LABORATORY Fall 2010**
**Dr. Eloise Carter, Dr. Nitya Jacob, Dr. Amanda Pendleton**

| **Date** | **Lab Topic (#)** | **Writing Assignment*** |
|---|---|---|
| Aug. 30, 31 | | |
| Sept. 1, 2 | Scientific Investigation | Title page; Introduction, References |
| Sept. 6 | **Labor Day** – ***Monday lab students - lab Fri., Sept. 10th*** | |
| 7, 8, 9 | Microscopes and Cells | Review table+ |
| 13, 14, 15, 16 | Diffusion and Osmosis | Results; Table; Figure |
| 20, 21, 22, 23 | Enzymes | (Table, Figure) Discussion, References |
| 27, 28, 29, 30 | Cellular Respiration;<br>Introduction to Research | Materials & Methods<br>Proposal completed in lab |

**Sept. 30th (Thur.) LAB EXAM (thru Enzymes) begins at 6:00 p.m.**

| | | |
|---|---|---|
| Oct. 4, 5, 6, 7 | Mitosis; Independent Research Projects | Scientific Paper (due 11/8) |
| *11, 12,* | ****Fall Break*** No Lab This Week* | |
| 18, 19, 20, 21 | Molecular Biology | Map+ |
| 25, 26, 27, 28 | Research Symposium<br>*(Technology Rehearsal – 9 a.m. – Pierce 101; one team member must be there)* | ***Research papers due in class on Nov. 8th*** |
| Nov. 1, 2, 3, 4 | Ecology and Evolution on the Outcrops | |

**Nov. 4th (Thur.) LAB EXAM (Respiration, Mitosis, and Molecular Biology) begins at 6:00 p.m.**

| | | |
|---|---|---|
| 8, 9, 10, 11 | Microbial Diversity (Bacteriology) | |
| 15, 16,17,18 | Plant Diversity I & II | |
| 22, 23**,** 24, 25 | ***Thanksgiving Break*** No Labs | |
| Nov. 29, 30 | | |
| Dec. 1, 2 | Molecular Phylogeny of Plants | Report completed in lab |

**2nd (Thurs.) LAB EXAM (Outcrops, Microbial Diversity, Plant Diversity) begins at 6:00 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

**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 Cell Biology and Genetics. If you do not understand everything in this handout, you should ask for clarification.

Introductory 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. This may be one of the more difficult courses you will take, demanding that you learn detailed and complex information, organize this information around conceptual themes and apply your knowledge. This knowledge will be essential to your success in other biology courses, where your competence in fundamental 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 your success.

**Course Objectives.** The purpose of this course is to give you, the student, a firm foundation in the underlying themes of biology. You will study living organisms, cell structure and function, genetics and evolution. You will develop an understanding of the biochemical molecules that make up the structure of cells and how these molecules govern cell function. You will study the fundamentals of cell function, including transport across cell membranes, and energy transformation in living cells. Then you will explore cell reproduction, inheritance of biological traits and processing of genetic information. You will study the genetics of populations and how genes are responsible for evolution and biological diversity. Finally, a very important objective of this course is teaching you to "think and work like a scientist" through methods of scientific inquiry and the practice of scientific thinking. Both lecture and laboratory are designed to accomplish these goals with the two components of the course integrated through study, laboratory exercises, group work, scientific writing, and individual disciplined study.

**Tips for Success:** Biology 141 is an intensive course and requires time and commitment. 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.

- *Review material on a regular basis*. 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. Attend your SI sessions on a regular basis. Take advantage of my office hours to get individual assistance.

- *Memorize and think*. While studying, keep two things in mind: One is to **master the facts of biology** and most importantly, understand the connections among these biological facts. Second – it is crucial to remember that this course is designed to make you **think** and not just to recall facts. Learning the facts is important to establish a knowledge base, but it is not sufficient! You must be able to apply your knowledge to think logically and analytically. Therefore you should be confident of what you know, what it means, and how it relates to major themes in biology.

- *Be an active learner*. Develop study guides, comparison charts, and concept maps. Use the MasteringBiology (www.masteringbiology.com) web resources provided with your textbook. Complete assignments in *Practicing Biology*. Attend Supplemental Instruction and organize your own active study group. **Don't be lulled into thinking familiarity is the same as knowledge.** The latter takes time and hard work!

- *Be prepared for laboratory and invest time and effort in lab each week.* Read the lab and review terminology and diagrams BEFORE lab each week. During lab complete all components of the lab. Take good notes and make detailed observations. Answer all questions in the lab manual during or after lab. Immediately after lab review the objectives and prepare a study guide for the lab materials and activities. Be serious about completing the writing assignments!

**Supplemental Instruction**. is provided for all students in BIO 141. The instructor will explain this important program that provides assistance for all students who wish to improve their performance in biology. Your BIO 141 SI leader is *Corbin Harris* this semester.

**Examinations**. There will be three lecture exams (100 pts. each) that will be a combination of multiple choice, short answer, problems, and short essay questions. Exams will cover all material covered in lecture in addition to assigned readings in the text. The final examination is comprehensive (175 pts.). There are three laboratory practical exams that include a written portion (50 pts. each). These exams cover the laboratory topics and exercises. Students should feel free to ask for clarification about any question during the exams.

**Scientific Writing and Laboratory Project.** Students will write individual sections of a scientific paper for specific laboratory investigation. Students will design and perform an independent investigation as a team research project. For this laboratory, you will prepare a team symposium presentation and write an individual complete scientific paper. Specific instructions will be provided in lab.

**Honor Code**. All examinations and all work for credit in this course come under the regulations of the Honor Code. Your signature on your work attests to your upholding the Honor Code. Please ask if you have any questions about an assignment.

**Absences**. The policy on absences is provided in a separate handout. Unexcused absences 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. This is essential for the laboratory portion of the course.

**Evaluation**. Students are evaluated on their performance in the classroom and laboratory. Plus and minus grades are given. The assignment of points will be:

| | | Final grade determination: | |
|---|---|---|---|
| 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 |
| **725 points** | **total** | | |