Biology 141 – Cell Biology and Genetics
Course Syllabus
Fall 2007

Faculty Information: Dr. Nitya Jacob, *Office*: Room 104, Pierce Hall; *Phone*: 770-784-8346
Office Hours: Wed, 9:30-10:30AM; Th 9:30-10:30AM ; or by appointment.
Email: njacob@learnlink.emory.edu or njacob@emory.edu

Lecture: MWF 11:45AM-12:35PM, Room 102, Pierce Hall
Laboratory: Tuesday 2:00-5:00PM, Room 125, Pierce Hall

Required Text: *Biology*, N.A. Campbell and J.B. Reece, 2005, 7th edition, Benjamin/Cummings Publishing Co., Inc. The optional Study Guide is available on reserve in the library.

Required Lab Text: *Investigating Biology*, 5th ed. Morgan, J. G. and M. E. B. Carter. Benjamin/Cummings Publishing Company, Inc. 2005. *Used lab manuals are not permitted.*

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

Optional Supplements: *A Guide to Biology Lab*, Rust, T.G., Southwest Educational Ent.

Practicing Biology, Heitz, Jean. Benjamin/Cummings Publishing Co., Inc. 2005. A terrific workbook that is useful alone or in study groups. Some materials used in SI.

Course Objectives: The purpose of this course is to give you, the student, a firm foundation in the underlying themes of biology. To study living organisms, the knowledge of cell structure and function, genetics and evolution is vital. You will first develop an understanding of the chemical molecules that make up the structure of a cell and how these molecules govern cell function. Secondly, this course will help you comprehend crucial tasks conducted by cells; particularly how cells transport components across membranes, and how energy is generated within cells. Thirdly, you will learn the basic mechanisms of cell duplication, inheritance of biological traits and processing of genetic information. You will also become familiar with the study of gene transmission within a population and how genes are responsible for the evolution of organisms. A fourth objective of this course is for you to use your knowledge of cellular mechanisms towards understanding the concepts of evolution and diversity in the biological world. Finally, a very important objective of this course is teaching you to "think and act like a scientist" through methods of scientific inquiry and the practice of deductive reasoning. Both lecture and laboratory are designed to accomplish the above goals. Upon grasping these fundamental themes of biology, you will be prepared to further probe into more intricate and specialized areas of this field.

Biology 141 - Fall 2007 Lecture Schedule
Dr. Nitya Jacob

Date	Topic	Assigned Reading
W, Aug 29	Science as a Way of Knowing	1
F, Aug 31	Major themes in Biology	1
M, Sep 3	** Labor Day **	--
W, Sept 5	Hierarchies: beginning with living chemistry and water	2,3
Th Sep 6 8:15 – 9:30 am Scientific Literature and Research (Library - Required) and 9:30 – 10:45 am		
F, Sep 7	Building biological macromolecules: carbohydrates and lipids	4,5
M, Sep 10	Proteins and nucleic acids	5
W, Sep 12	Structure and function revealed in cells	6
F, Sep 14	Cellular Case Studies	---
M, Sep 17	Membrane structure and cellular transport	7
W, Sep 19	Transport problems	7
F, Sep 21	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M, Sep 24	Cellular respiration I - Glycolysis	9
Tues, Sep 25	**EXAM I 8:00 - 9:30 a.m. (through membrane transport)**	
W, Sep 26	Cellular respiration II - Transition and the Krebs Cycle	9
Th Sep 28 8:30 -9:30 am or F, Sep 28 2-3pm Presentation of Scientific Data – Pierce 123 (Required Session)		
F, Sep 28	Cellular respiration III - Chemiosmosis and the Electron Transport System	9
M, Oct 1	Review and recapitulation: Accounting Day	--
W, Oct 3	Homage to photosynthesis	10
F, Oct 5	Photosynthesis I: the light dependent reactions	10
M, Oct 8	** Fall Break **	
W, Oct 10	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10
F, Oct 12	Cell reproduction: cell cycle, mitosis *2-3pm Power Point Workshop - Pierce 206 (optional)*	12

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Date	Topic	Assigned Reading
M, Oct 15	Sexual life cycles and meiosis	13
Tues, Oct 16	**EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)**	
W, Oct 17	Chromosomal mutations	13, 15 pp. 285-288
F, Oct 19	Mendelian principles; genes and chromosomes	14, 15 pp. 274-275
M, Oct 22	Patterns of inheritance	14, pp. 260-270
W, Oct 24	Chromosomal theory and linkage	14
F, Oct 26	Genetics problems and review	15, pp. 276-285
M, Oct 29	DNA structure	16
W, Oct 31	DNA replication	16
F, Nov 2	Gene to Protein I: transcription and the genetic code *2:00 p.m., Writing Forum, Library*	17
M, Nov 5	Gene to Protein II: translation and genetic mutations	17
W, Nov 7	Molecular genetics workshop	--
F, Nov 9	Charles Darwin and development of evolutionary concepts	22
M, Nov 12	Evidence for evolution	22,25, pp. 481-495
W, Nov 14	Population Genetics and Hardy Weinberg	23
Thurs, Nov 15	**EXAM III - 8:00 – 9:30 a.m. (through genetics)**	
F, Nov 16	Microevolution: genetic drift, gene flow and mutation	23
M, Nov 19	Genetic variation and selection	23
W, F 21-23	** Thanksgiving Break **	
M, Nov 26	Simulations – Evolution and population genetics	
W, Nov 28	Speciation	24, pp. 472-480
F, Nov 30	Evolution of land plants:	29
M, Dec 3	Bryophytes and seedless vascular plants	29
W, Dec 5	Seed plants: gymnosperms and angiosperms	30
F, Dec 7	Evolutionary trends in land plants	
M, Dec 10	The Big Themes Revisited	

***** FINAL EXAMINATION*** Tuesday, December 18, 2-5pm**

BIOLOGY 141
LABORATORY SCHEDULE
Fall 2007
Dr. Nitya Jacob and Dr. Steven Nilsen

Date		**Lab Topic (#)**	**Writing Assignment**
Sept.	4,5	Scientific Investigation (1)	Title page; Introduction; References *(due in class on 9/17)*
	11,12	Microscopes and Cells (3)	Review table+
	18,19	Diffusion and Osmosis (4)	Materials & Methods; Results with figure and table *(due in class 10/1)*
	25,26	Enzymes (2)	Discussion and references *(due in class on 10/10)*

Group Proposal for Cellular Respiration Research Project due 9/28 by 9AM on Learnlink

Oct. 2nd (Tues.) LAB EXAM (1,2,3,4) (8:00 – 9:15 a.m. or 8:30 – 9:45 a.m.)

	2,3	Cellular respiration (5) Research project	Research symposium *(in lab on 10/23,24)* Research paper *(due in class on 11/5)*
	9	***Fall Break***	
	10,12	Week of Fall break - Time to repeat experiments for research project	
	16,17	Mitosis and Meiosis (7)	Comparison table+
	23,24	Research Symposium *(Technology Rehearsal, 9 a.m. Pierce 102)*	

Oct. 30th (Tues.) LAB EXAM (5, 7, and outcrops) (8:00 – 9:15 a.m. or 8:30 – 9:45 a.m.)

Oct.	30,31	Field Trip: Ecology and Evolution on the Outcrops	
	6,7	Molecular Biology (10)	Map+

BIOLOGY 141
LABORATORY SCHEDULE
Fall 2007
Dr. Nitya Jacob and Dr. Steven Nilsen

Date	Lab Topic (#)	Writing Assignment
Nov.13,14	Microbial Diversity (13)	
20,21	***Thanksgiving Break***	
27,28	Plant Diversity I & II (15, 16)	
Dec. 4,5	Molecular Phylogeny	Report at the end of lab

Dec. 6th (Thurs.) LAB EXAM (10, 13, 15, 16) (8:00 – 9:15 a.m. or 8:30 – 9:45 a.m.)

+These assignments are not turned in for a grade

Important Dates for Biology 141 (includes out of class supplemental sessions)

September:
- *6* *Literature workshop, preliminary references due*
- 17 Title page, Introduction and references due in class
- *27/28* *Data presentation workshop*
- **25** **Exam I**
- 28 Cellular respiration research project group proposal due on Learnlink by 9AM

October:
- 1 Materials and Methods; Results with figure and table due in class
- **2** **Lab Exam I**
- 10 Discussion with figure, table and references due in class
- *12* *Powerpoint workshop (optional, 1 group member must attend)*
- **16** **Exam II**
- 23 Research symposium
- **30** **Lab Exam II**

November:
- *2* *Writing forum to discuss research paper*
- **5** **Research paper due in class**
- **15** **Exam III**

December:
- **6** **Lab Exam III**
- **18** **Final Exam, 2-5pm**

EXPECTATIONS, EVALUATION AND TIPS FOR SUCCESS IN BIOLOGY 141

Welcome to Biology 141! Please read carefully and follow the information in this handout and any accompanying materials. You are responsible for understanding all of the information presented here, so please ask questions if needed.

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. The course demands that you learn detailed and complicated information, organize this information within the major concepts of biology, and apply your knowledge. In addition, there are multiple exams and assignments associated with this course. Your competence in basic biology will be assumed in other Biology courses, therefore it is crucial for you to succeed in this course. Many of you will be taking examinations to enter graduate or professional schools, and the knowledge you will gain here will be required for these tests.

Tips for Success: Biology 141 is an intensive course and requires time. 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. The following are some good study habits that will help you succeed in Biology 141:

- **Keep up with assigned readings**. The readings listed against each lecture in the syllabus must be done BEFORE the lecture.

- **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. Ask questions in class to help you connect with the concepts.

- **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. In addition, connect the concepts learned in lecture to the lab exercises.

- **Review material on a regular basis**. Study the diagrams in your text and lecture handouts. Practice writing out pathways and linking concepts. Use the blank figures handed out in class for your study. Attend your SI sessions on a regular basis. Take advantage of my office hours to get individual direction.

- **Keep two things in mind**. One - learn terminology and most importantly, understand the relevance of that terminology to biological function. Second – this course is designed to make you think and not just to have you

memorize facts. Memorizing facts is important to establish a basis for your knowledge but it is not sufficient. You must be able to use your knowledge to think logically and analytically. Many of the test questions will revolve around applying your knowledge. Therefore you should be confident of what you know and what it means.

- **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. Your Biology 141 SI leaders are **Shannon Croom** (Jacob) and Maulik Patel (Nilsen).

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: Cell phones must be turned off during lecture and lab. Cell phones are not permitted in the classroom during lecture and laboratory examinations.

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 for a different time.

LearnLink Class Conference: A class conference labeled "Jacob 141" 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. The syllabus and weekly lab instructions will also be posted under the Biology 141 conference – check the folders.

Additional Supplementary Sessions: We have two required supplementary instruction sessions in this course for library and information technology. 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
150 points	3 laboratory exams
175 points	final examination
40 points	scientific writing
60 points	lab project
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725 points	total

Final grade determination

90 - 100%	A
80 – 89%	B
70 – 79%	C
60 – 69%	D
<60	F

Plus and minus grades are given