

Biology 141 (INQ, WR) Cell Biology and Genetics Syllabus

Spring Semester 2014

Section 10A

Professor: Dr. M. Eloise Brown Carter

Office: Pierce Hall #107 (porch on south door to Pierce)

Lecture Hours: Monday, Wednesday, Friday; 10:45 a.m. – 11:50 a.m.

Lab Hours: Wednesday 2:30 p.m. – 5:30 p.m.

Phone: (770) 784-8343

Room: Pierce 102

Room: Pierce 123

Office Hours: Monday 5:00-6:00 p.m. Wednesday after lab. Students are encouraged to see Dr. Carter during class to make appointments for other times.

Required Texts: *Campbell Biology*, Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V., and Jackson, R.B. 2011, 9th edition, Benjamin/Cummings Publishing; *Practicing Biology*, Heitz, Jean and C. Griffen. Benjamin/Cummings Publishing Co., Inc. 2011.

Required Lab Text: SYMBOSIS: *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 ONLY in the bookstore. ***Used lab manuals are not permitted.***

Optional Writing Book: *A Student Handbook for Writing in Biology*, Karin Knisely, 2013, 4th 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.masteringbio.com Your text has instructions for accessing the site.

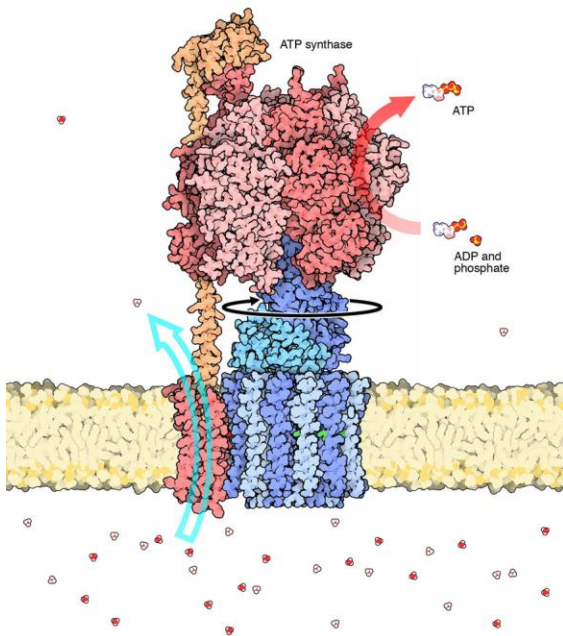
Course Objectives: The purpose of this course is to give you, the student, a firm foundation in the underlying themes of biology. You will study living organisms, cell structure and function, genetics, and evolution. You will first develop an understanding of the chemical molecules that make up the structure of a cell and how these molecules govern cell function. Secondly, you will study the fundamentals of cell function, including transport across cell membranes and energy transformation in living cells. Thirdly, you will learn the basic mechanisms of cell reproduction, inheritance of biological traits, and processing of genetic information. You will also develop an understanding of gene transmission within populations and how genes are responsible for the evolution of populations. A fourth objective of this course is for you to use your knowledge of cellular mechanisms to understand 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 these goals with the two components of the course integrated through study, laboratory exercises, group work, scientific writing, and individual disciplined study. Mastering these fundamental themes of biology will prepare you to further explore the more intricate and specialized areas of this field. *This course fulfills the Inquiry (INQ) and Continuing Writing Requirement (WR).*

Date		Topic	Assigned Reading
W, Jan	15	Science as a Way of Knowing	1
F	17	Major themes in Biology	1
M	20	Martin Luther King Day – no class	
W	22	Hierarchies: beginning with living chemistry and water	2,3
F	24	Building biological macromolecules: carbohydrates and lipids	4, 5
M	27	Proteins and nucleic acids	5
W	29	Structure and function revealed in cells	6
F	31	Cell biology - Problems/Case Study	
Feb. M	3	Membrane structure and cellular transport	7
W	5	Transport problems	
Th	6	<i>Scientific Literature & Research (Library - Required) 8:00 – 8:45am and 9:00 – 9:45am</i>	
F	7	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M	10	Cellular respiration I - Glycolysis	9
W	12	Cellular respiration II - Transition and the Krebs Cycle	9
Th	13th	EXAM I 8:00 - 9:30 a.m. (through membrane transport)	
F	14	<i>Presentation of Scientific Data – bring your lab data and laptop to class</i>	
M	17	Cellular respiration III – Chemiosmosis and The Electron Transport System	9
W	19	Review and recapitulation: Accounting Day	
F	21	Homage to photosynthesis	10
M	24	Photosynthesis I: the light dependent reactions	10
W	26	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10
F	28	Cell reproduction: cell cycle, mitosis	12
M	3	Sexual life cycles and meiosis	13
W	5	Chromosomal mutations	15 pp. 297-300
Th	6th	EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)	
F	7	Mendelian principles; genes and chromosomes	14, 15 pp. 286-288
March 10 - 14		***SPRING BREAK**	
M	17	Patterns of inheritance	14 pp. 271-281
W	19	Chromosomal theory and linkage	15
F	21	Genetics problems and review	14, 15
M	24	DNA structure	16
W	26	DNA replication	16
Th	27	<i>Effective Presentations Workshop - Pierce 206 8:00 – 8:45, 9:00 – 9:45 a.m.</i>	
F	28	Gene to Protein I: transcription and the genetic code	17

M	31	Gene to Protein II: translation and genetic mutations	17
W, Apr	2	Modeling Beyond Watson and Crick	
F	4	Molecular genetics workshop	
M	7	Charles Darwin and development of evolutionary concepts	22
W	9	Evidence for evolution	22, 25 pp. 510-512; 519-530
Th	10th	EXAM III - 8:00 – 9:30 a.m. (through genetics)	
F	11	Genetic Variation, Population Genetics and Hardy-Weinberg <i>Scientific Papers – “Ask THE EDITORS” 2:30-3:30 p.m.</i>	23
M	14	Microevolution: genetic drift, gene flow and mutation	23
W	16	Selection and Speciation <i>Research papers due in class</i>	23, 24 pp 487-501
F	18	Evolution of land plants	29
M	21	Sexual Encounters of the Floral Kind	38 pp. 801-807
W	23	Bryophytes and seedless vascular plants	29
F	25	Seed plants: gymnosperms and angiosperms	30
M	28	Evolutionary trends in land plants & Big Themes Revisited	

***** FINAL EXAMINATION *** May 5th, Monday, 9 a.m.- 12 noon*****

Illustrations by David Goodsell. <http://mgl.scripps.edu/people/goodsell/illustration/pdb>
Scripps Research Institute.



ATP synthase



DNA Polymerase in the nucleus

BIO 141 Wednesday Laboratory Schedule

Spring 2014

<u>Date</u>	<u>Lab Topic (#)</u>	<u>Writing Assignment*</u>
Jan. 22	Scientific Investigation	Materials and Methods; Title page
29	Microscopes and Cells	Review table**
Feb. 5	Diffusion and Osmosis	Introduction; References
12	Enzymes	Results; Table; Figure
14	<i>Respiration/Fermentation Proposal posted to Blackboard by 2:30 p.m.</i>	
19	Cellular Respiration and Fermentation	Figure; Discussion; References
20	(Thur.) LAB EXAM (thru Enzymes) (Sign up for exams at 6:00 p.m. or 6:30 p.m.)	
26	Mitosis and Meiosis	Comparison Table**
Mar. 5	Research Teams: Proposal Development <i>Team Research Proposal submitted to Blackboard on Friday March 7th, by 2:30 p.m.</i>	
10 - 14	*** SPRING BREAK ***	
19	Field Research: Ecology and Evolution on the Outcrops	
20	(Thur.) LAB EXAM (Mitosis and Meiosis) (6:00 p.m. or 7:00 p.m.)	
26	Microbial Diversity (Bacteriology)	<i>Research papers due in class 4/16</i>
Apr. 2	Research Symposium <i>Technology Rehearsal - Upload and check your presentation at 2:30!</i>	
9	Molecular Biology	Map**
16	Plant Diversity I & II	
23	Bioinformatics: Molecular Phylogeny of Plants	<i>Report completed in lab</i>
24 th	(Thurs.) LAB EXAM (Bacteriology, Molecular Biology and Plant Diversity I & II) (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**

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

January:

29 Materials & Methods; Title page due in lab

February:

6 *Scientific Literature Workshop, preliminary references due (required)*
12 Introduction; References due in lab
13 Exam I
14 *Effective Data Presentation Workshop – bring your data and laptops to class*
14 Respiration/Fermentation proposal due on Blackboard by 2:30 p.m.
19 Results; Table; Figure due in lab
20 Lab Exam I
26 Figure; Discussion; References due in lab

March:

6 Exam II
7 Laboratory research project proposals due on Blackboard by 2:30 p.m.
20 Lab Exam II
27 *Effective Presentations Workshop (2 group members must attend)*

April:

2 Research symposium (*Technology Rehearsal 2:30 p.m.*)
10 Exam III
11 *"Ask the Editors" session 2:30 p.m.*
16 Research paper due in class
23 Molecular phylogeny report completed in lab
24 Lab Exam III








May: 5 Final Exam

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. Please pay attention to any changes to the syllabus as some information may be subject to change during the semester.

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, 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 gain here will be required for your success.

Tips for Success: Biology 141 is an intensive course and requires time. To perform well in this course, you must develop a proper plan for managing your time and your work, beginning from the first day of class. The following are some good study habits that will help you succeed in BIO 141:

-  **Keep up with assigned readings.** The readings listed for each lecture in the syllabus must be done BEFORE the lecture. Always come to class prepared; know the fundamentals.
-  **Take good notes.** In lecture, I will explain the most significant concepts from your readings and present images and examples that may not be in your textbook. You are responsible for all of this information. Detailed and well-organized notes are critical for studying and learning in this course. Ask questions in class to help you connect the concepts. Since some classes use inquiry, case studies, or other activities, it is important to review the class material and annotate your notes after each class. Review your notes after every lecture and before the next class.
-  **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. Use the summary and review sections of your textbook as well as images and diagrams from your text and masteringbiology.com. 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 the concepts. Use the blank figures handed out in class for your study. Attend your SI sessions on a regular basis. Studying for exams should begin at least a week in advance. Really, you are studying for the next exam –every day! Take advantage of my office hours to get individual assistance.
-  **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.
-  **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*. Use the summary and review sections of your textbook to test your ability to apply your knowledge, take advantage of the practice exams and other resources at masteringbiology.com or use the study guide with these same materials at the library, make use of all of the handouts, and use each other to come up with practice questions. 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 an organized plan of study.
-  **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 and make detailed observations. Answer all questions in the lab manual either during lab or immediately following lab. *Review the objectives and prepare a study guide for the lab materials and activities on a weekly basis*. Learn to manage your time well and prepare in advance for the lab writing assignments. Pay attention to information about lab exams. Make use of open lab time.

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

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.

Sustainability: Life in Balance. This year many members of the Oxford College community will be exploring the theme of Sustainability: Life in Balance. In this course you will have the opportunity to connect your work in cell biology, energy transformation, and laboratory investigations to this theme.

Absences. The policy on absences and being late to class is provided in a separate handout. Unexcused absences or a failure to follow the procedures outlined in that handout ***will result in a significant reduction in your grade***. Any questions about absences should be asked immediately. 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 in lab and lecture.***

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

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 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**.


Office Hours. I *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.


Blackboard Site: Blackboard will have announcements, handouts, information about Practicing Biology questions, and more! Your SI and TA will email you from Blackboard. You will upload all writing assignments on Blackboard. The syllabus and other assignments for lecture and lab will be posted on Blackboard.

Additional Sessions. We have two required additional 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.

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, study material, abbreviations, or material that can be construed to be 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.*

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 exam 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. This course meets the Continuing Writing Requirement (WR).

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:
135 points	3 laboratory exams	90 – 100% A
175 points	final examination	80 – 89% B
35 points	scientific writing	70 – 79% C
75 points	lab project	60 – 69% D
720 points	total	<60 F
		Plus and minus grades are given

EC14

This illustration shows a cross-section of a small portion of an *Escherichia coli* cell. The cell wall, with two concentric membranes studded with transmembrane proteins, is shown in green. A large flagellar motor crosses the entire wall, turning the flagellum that extends upwards from the surface. The cytoplasmic area is colored blue and purple. The large purple molecules are ribosomes and the small, L-shaped maroon molecules are tRNA, and the white strands are mRNA. Enzymes are shown in blue. The nucleoid region is shown in yellow and orange, with the long DNA circle shown in yellow, wrapped around HU protein (bacterial nucleosomes). In the center of the nucleoid region shown here, you might find a replication fork, with DNA polymerase (in red-orange) replicating new DNA.
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