

BIO 141Q WR CELL BIOLOGY AND GENETICS

LECTURE: OSB 115, MWF 9:30-10:35 | LAB: OSB 325, MON 2:30-5:30 |

M. Eloise Brown Carter, OSB 326, ecarter@emory.edu; Office Hours: Wednesday 1:30. You are welcome to just come by and see me or talk to me in lab or class to find times that match our schedules.

Required Text:

Campbell Biology, Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V., and Jackson, R.B. 11th edition, Pearson, 2017; *Practicing Biology*, Heitz, Jean and C. Griffen. Pearson, 2017

Required Lab Text:

SYMBOSIS: Investigating Biology, 9th ed. Morgan, J. G. and M. E. B. Carter. Pearson, B 2017. A customized new edition published for BIO 141 is available ONLY in the bookstore. **Used lab manuals are not permitted.**

Optional Resources:

A Student Handbook for Writing in Biology, Karin Knisely, 2017, 5th edition, W.H. Freeman and Co. This is a great resource for writing, and is also on reserve in the library, **MasteringBiology** (www.masteringbio.com) provides online study materials, practice exams, learning activities and strategies for success. Your



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 (IN2) and Continuing Writing Requirement (WR).*

Strategies for Success

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. Complete worksheets *prior* to coming to class. These are often called, “What’s the Big Deal”

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. Creating detailed and well-organized notes is critical for successful 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 material covered in class, annotate your notes and add material from your text, including images. You will gain the greatest benefit, when you annotate and review your notes immediately after every lecture and before the next class.

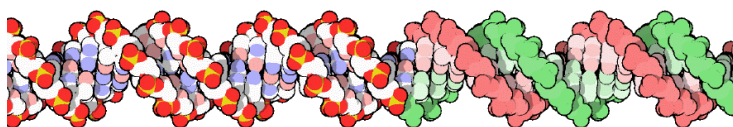
Connect the lecture notes to your readings. For the test, you are responsible for information in the textbook as well as the lecture notes. Make sure that you are able to grasp the major concepts thoroughly and also include details. Use your notes, handouts, and the summary and review sections of your 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. *Sketch and draw* structures, metabolic pathways, and life cycles. Drawing is another tool for learning! 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.



How this course works

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.

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 165 points, is comprehensive. Three laboratory exams, (1st and 3rd each worth 50 points & 2nd worth 35 points), will be given in this course. Each lab exam will cover the material from the lab exercises and 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).

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

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 **Canvas**. <http://oxford.emory.edu/catalog/regulations/honor-code.html>

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 bring notecards or paper in your pockets or on your person. All cell phones are to be turned off and either in your bag or on the instructor’s bench. **You may NOT have phones on your person.** Do not write notes, 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.*

Cell Phones. Please turn off your phone and stow it before you come to class. **Photography with cameras or phones is also prohibited in lab.**

Personal Computer. To use a laptop in class for notes, you must see me and discuss the benefits and constraints.

Accommodations: Please see me as soon as possible, if you are registered with the Office of Accessibility. Contact Megan Bohinc for more information at oas_oxford@emory.edu

Inclusivity: We encourage a climate of respect and inclusiveness that welcomes and embraces community members with diverse backgrounds and life experiences.

Resources

Supplemental Instruction. SI is for all students in BIO 141, who wish to improve their performance in biology. The BIO 141 SI leader is *Shipra Bethi* this semester.

Office Hours. I encourage you to meet with me during office hours about any concerns or questions that may arise during the semester. Do not hesitate to make an appointment for a different time.

Canvas Site: Canvas will have announcements, handouts, assignments and more! Your SI and TA will email you from Canvas. The syllabus and other assignments will be posted on Canvas.

Evaluation:

300 points	3 lecture exams
135 points	3 lab exams
165 points	final examination
35 points	scientific writing
75 points	lab project
710 points	total

Final grade determination:

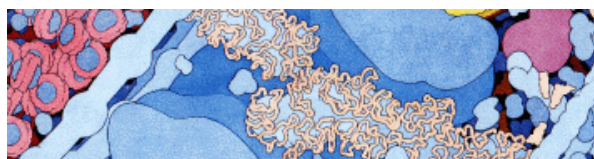
90 – 100%	A
80 – 89%	B
70 – 79%	C
60 – 69%	D
<60	F

Plus and minus grades are given

Date	Topic	Chapters Assigned
W, Jan 17	Science as a Way of Knowing	1
F 19	Major themes in Biology	1
M 22	Hierarchies: beginning with living chemistry and water	2,3
W 24	Building biological macromolecules: carbohydrates and lipids	4, 5
F 26	Proteins and nucleic acids	5
M 29	Structure and function revealed in cells	6
W 31	Cell biology - Problems/Case Study	
F Feb 2	Membrane structure and <i>Strategies for success</i>	
M 5	Cellular Transport	7
W 7	Cells and Transport problems	
Th 8	<i>Scientific Literature & Research (OSB115 and 101 - Required) 8:00 – 8:45am and 9:00 – 9:45am</i>	
F 9	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M 12	Cellular respiration I - Glycolysis	9
W 14	Cellular respiration II - Transition and the Krebs Cycle	9
Th 15	EXAM I 8:00 - 9:30 a.m. (through membrane transport)	
F 16	<i>Presentation of Scientific Data – bring your lab data and laptop to class</i>	
M 19	Cellular respiration III – Chemiosmosis and The Electron Transport System	9
W 21	Review and recapitulation: Accounting Day	
F 23	Homage to photosynthesis	10
M, 26	Photosynthesis I: the light dependent reactions	10
W 28	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10
F Mar 1	Cell reproduction: cell cycle	
M 5	Mitosis and control of cell cycle	12
W 7	Sexual life cycles and meiosis	13
Th 8	EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)	
F 9	Chromosomal mutations	15 pp. 306-309
Mar 12-16	SPRING BREAK	
M 19	Mendelian principles; genes and chromosomes	14, 15 pp 294-297
W 21	Patterns of inheritance	14 pp. 278-283
F 23	Chromosomal theory and linkage	15
M 26	Genetics problems and review	14, 15
W 28	DNA structure	16
F 30	DNA replication	16
M Apr 2	Gene to Protein I: transcription and the genetic code	17
W 4	Gene to Protein II: translation and genetic mutations	17
F 6	Molecular genetics workshop	
M 9	Charles Darwin and development of evolutionary concepts	22
W 11	Evidence for evolution	22, 25 pp 523-535
Th 12	EXAM III - 8:00 – 9:30 a.m. (through molecular genetics)	
	<i>Scientific Papers – “Ask THE EDITORS” 5:00 – 6:00 p.m. OSB 115</i>	
F 13	Genetic Variation, Population Genetics and Hardy-Weinberg	23

M	16	Microevolution: genetic drift, gene flow and mutation	23
W	18	Selection and Speciation	23, 24 pp 504-513
F	20	Evolution of land plants , bryophytes and seedless vascular plants <i>Research papers due in class</i>	29
M	23	Seed plants: gymnosperms and angiosperms	30, 38 pp 822-826
W	25	Sexual Encounters of the Floral Kind	38 pp. 821-829
F	27	Evolutionary trends in land plants	
M	30	Big Themes Revisited	

***** FINAL EXAMINATION ***May 9th, Wednesday 9 a.m. – 12 noon*****



Monday Laboratory – Spring 2018

<u>Date</u>	<u>Lab Topic (#)</u>	<u>Writing Assignments¹</u>
Jan. 22	Scientific Investigation	Materials and Methods; Title page
29	Microscopes and Cells	Review table ²
Feb 5	Diffusion and Osmosis	Introduction; References
12	Enzymes	Table; Figure
16	<i>Respiration Proposal submitted to Canvas by 1:00 p.m.</i>	
19	Cellular Respiration and Fermentation	Figure; Results; Discussion; References
22	(Thur.) LAB EXAM (thru Enzymes)³	
26	Mitosis and Meiosis	Comparison Table ²
Mar 5	Research Teams: Proposal Development	
9	<i>Team Research Proposal submitted to Canvas on Friday by 1:00 p.m.</i>	
12	*** SPRING BREAK ***	
19	Field Research: Ecology and Evolution on the Outcrops	
22	(Thur.) LAB EXAM (Mitosis and Meiosis)³	
26	Microbial Diversity (Bacteriology)	<i>Research papers due in class 4/20</i>
Apr 2	Research Symposium	
	<i>Technology Rehearsal - Upload and check your presentation at 2:30</i>	
9	Molecular Biology	Map ²
16	Plant Diversity I & II	
23	Bioinformatics: Molecular Phylogeny of Plants	
	<i>Report completed in lab</i>	
26	(Thur.) LAB EXAM (Molecular Biology and Plant Diversity I & II)³	

¹Writing assignments are due one week later at the beginning of the lab period unless otherwise noted.

²These assignments are **not** turned in for a grade

³Lab exams are scheduled in several sessions on Thursday afternoon and evening. Sign up in class for a time.

(Includes lecture, lab, and out of class sessions)

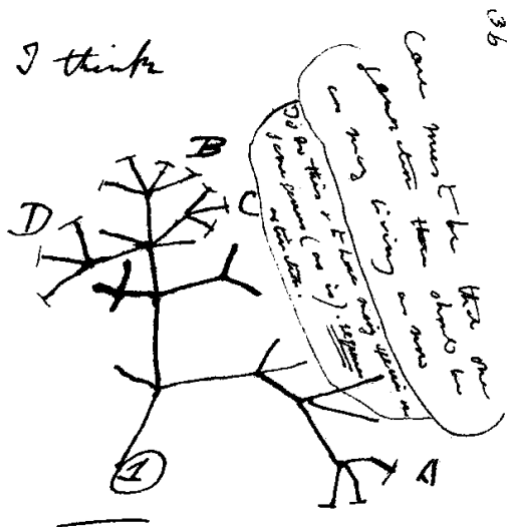
29 Materials & Methods; Title page due in lab

8 *Scientific Literature Workshop, preliminary references due (required)*
12 Introduction; References due in lab
15 **Exam I**
16 *Effective Data Presentation Workshop – bring your data and laptops to class*
16 Team Respiration proposal due on Canvas by 1:00 p.m.
21 Table; Figure due in lab
22 **Lab Exam I**
26 Figure; Results; Discussion; References due in lab

8 **Exam II**
9 *Team Research Proposal submitted to Canvas by 1:00 p.m.*
22 **Lab Exam II**

2 Research Symposium (*Technology Rehearsal 2:30 p.m.*)
12 **Exam III**
12 “Ask the Editors” session 5 p.m.
20 **Research paper due in class**
23 Molecular phylogeny report completed in lab
26 **Lab Exam III**

1



Darwin's Notebook D 1838, "I think..."