

# Biology 141QW– Cell Biology and Genetics

Fall 2017

**12A –**  
MWF 12-1:05 PM  
OSB 115

Lab:  
Tuesday  
9:45am-12:45pm,  
OSB 325



<https://www.pinterest.com/pin/249527635581972275/>

## Course Description and Objectives:

The purpose of this course is to give you 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 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 this, with the two components of the course integrated through study, laboratory exercises, group work, scientific writing, and individual disciplined study.

### Required Purchases:

Textbook: *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.

Laboratory Manual: SYMBOSIS: *Investigating Biology*, 9<sup>th</sup> 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.***

### Highly Recommended:

*MasteringBiology*  
([www.masteringbio.com](http://www.masteringbio.com))  
provides online study materials, practice exams, learning activities and strategies for success.

Writing in Biology: *A Student Handbook for Writing in Biology*, Karen Knisely, 2013, 4th edition, W.H. Freeman and Co. Very useful for writing assignments.

**Instructor:** Sarah Fankhauser  
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**Office Hours:** Thursday 11-12 and by appointment

### Contents:

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Grading scale and syllabus..... 4-end

## Tips for Success:

### Take detailed class notes

Take notes in class, draw images, and keep it organized

Review your notes often, re-draw images and diagrams

Practice the problems (without the answers in front of you!)

### Actually read the textbook

Read the relevant chapter(s) before class, take notes

Use [www.masteringbiology.com](http://www.masteringbiology.com). Complete assignments in *Practicing Biology*

### Communicate, communicate, communicate

Ask questions IN class, answer questions, participate in group discussions

Email, call, telegram me! Come to my office hours, or set up a different time to meet

### Attend SI!!!

Attend SI sessions; this is a time for you to work problems, ask questions and seek answers.

Your SI:  
Princess Ekpo  
[princess.ekpo@emory.edu](mailto:princess.ekpo@emory.edu)

### Engage fully in the lab

Read each lab, pay attention to detail; complete the lab questions in lab

Note the lab exams and make use of *open lab* time.

## How to study (yes you need a diagram for this)

Study all handouts and additional class resources...on a daily and weekly basis. YOU CANNOT wait until the week before the exam!

Read, in detail, the textbook; connect the material back to your notes and lectures. If there is a discrepancy then come talk to me or email me.

Make visuals, diagrams, pictures, flow charts and tables of the content. This will help connections emerge and help you identify areas or content that you still have questions about.

Practice all problems, worksheets and questions. Come see me to look at and discuss the answers. Do this daily and weekly, not right before the exam!

### What Ways of Inquiry really means:

You will learn about cell biology and genetics in this course not just by learning information simply "given" to you. You will learn about the subject by practicing methods that led to the discovery of that knowledge in the first place - by asking questions, designing experiments, reading and writing critically, working independently, making connections, and thinking beyond the confines of the discipline.

## **Policies, requirements, etc...**

**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 Canvas**. Please follow the Honor Code in ALL aspects of this course and include your signature on your work as your pledge.

**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 or study material, or anything that could be construed as 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.

**Class Participation:** This is an interactive course. Participating in discussions, exercises and labs will only further help you make critical connections in biology.

**Absences:** The policy on absences is provided in a separate handout. Unexcused absences, tardiness, or a failure to follow the procedures outlined in that handout can result in a reduction in your grade. It is your responsibility to clearly communicate with the instructor as much in advance as possible about medical or family emergencies.

**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 only permitted to gather evidence for your research project.

**Personal Computer or Tablet:** If you would like to take notes on your personal laptop or tablet in class you must first seek special permission from the instructor. Surfing the web, Facebook, Skype or other multitasking/networking/chat during class is completely unacceptable and will not be tolerated.

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

**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.

**College-Wide Assessment:** Student work submitted as part of this course may be reviewed by Oxford College and Emory College faculty and staff for the purposes of improving instruction and enhancing Emory education.

Date	Topic	Chapters Assigned
W, Aug 23	Science as a Way of Knowing	1
F 25	Major themes in Biology	1
M 28	Hierarchies: beginning with living chemistry and water	2,3
W 30	Building biological macromolecules: carbohydrates and lipids	4, 5
F, Sep 1	Proteins and nucleic acids	5
<b>M 4</b>	<b>**Labor Day**</b>	
W 6	Structure and function revealed in cells	6
F 8	Cell biology - Problems/Case Study <i>Strategies for success on exam I</i>	
M 11	Membrane structure and cellular transport	7
W 13	Transport problems	
Th 14	<b>Scientific Literature &amp; Research (OSB115 - Required) 8:00 – 8:45am and 9:00 – 9:45am</b>	
F 15	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M 18	Cellular respiration I - Glycolysis	9
<b>Tue 19</b>	<b>EXAM I 8:00 - 9:30 a.m. (through membrane transport)</b>	
W 20	Cellular respiration II - Transition and the Krebs Cycle	9
F 22	<i>Presentation of Scientific Data – bring your lab data and laptop to class</i>	
M 25	Cellular respiration III – Chemiosmosis and The Electron Transport System	9
W 27	Review and recapitulation: Accounting Day	
F 29	Homage to photosynthesis	10
M, Oct 2	Photosynthesis I: the light dependent reactions	10
W 4	<i>Development of Team Research Proposals – (Bring laptop to class)</i>	
F 6	Photosynthesis II: the light independent reactions and variations (C4 and CAM)	10
<b>October 9 &amp; 10</b>	<b>**FALL BREAK**</b>	
W 11	Cell reproduction: cell cycle, mitosis	12
<b>Th 12</b>	<b>EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)</b>	
F 13	Sexual life cycles and meiosis	13
M 16	Chromosomal mutations	15 pp. 306-309
W 18	Mendelian principles; genes and chromosomes	14, 15 pp 294-297
F 20	Patterns of inheritance	14 pp. 278-283
M 23	Chromosomal theory and linkage	15
W 25	Genetics problems and review	14, 15
F 27	DNA structure	16
M 30	DNA replication	16
W, Nov 1	Gene to Protein I: transcription and the genetic code	17
F 3	Gene to Protein II: translation and genetic mutations	17

M	6	Molecular genetics workshop	
W	8	Charles Darwin and development of evolutionary concepts	22
<b>Th</b>	<b>9</b>	<b>EXAM III - 8:00 – 9:30 a.m. (through genetics)</b>	
F	10	Evidence for evolution	22, 25 pp 523-535
M	13	Genetic Variation, Population Genetics and Hardy-Weinberg	23
W	15	Microevolution: genetic drift, gene flow and mutation	23
Th	16	<i>Scientific Papers – “Ask THE EDITORS” 5:00 – 6:00 p.m. OSB 115</i>	
F	17	Selection and Speciation	23, 24 pp 504-513
M	20	Evolution of land plants	29
		<i>Research papers due in class</i>	
<b>November 22-24</b>		<b>**Thanksgiving Break</b>	
M	27	Bryophytes and seedless vascular plants	29
W	29	Seed plants: gymnosperms and angiosperms	30, 38 pp 822-826
F, Dec	1	Sexual Encounters of the Floral Kind	38 pp. 821-829
M	4	Evolutionary trends in land plants & Big Themes Revisited	

**\*\*\* FINAL EXAMINATION \*\*\*December 7<sup>th</sup>, Thursday, 7 p.m.- 10p.m.\*\*\***

# BIO 141 Tuesday Morning Laboratory Schedule

Fall 2017

<u>Date</u>	<u>Lab Topic (#)</u>	<u>Writing Assignments<sup>1</sup></u>
Aug. 29	Scientific Investigation	Materials and Methods; Title page
Sept. 5	Microscopes and Cells	Review table <sup>2</sup>
12	Diffusion and Osmosis	Introduction; References
19	Enzymes	Table; Figure
22	<i>Respiration Proposal</i>	<i>posted to Canvas by 2:30 p.m.</i>
26	Cellular Respiration and Fermentation	Figure; Results; Discussion; References
<b>28 (Thur.) LAB EXAM (thru Enzymes)<sup>3</sup></b>		
Oct. 3	Mitosis and Meiosis Research Teams: Proposal Development	Comparison Table <sup>2</sup>
6	<i>Team Research Proposal submitted to Canvas on Friday by 2:30 p.m.</i>	
10	<b>*** FALL BREAK ***</b>	
17	Field Research: Ecology and Evolution on the Outcrops	
19	<b>(Thur.) LAB EXAM (Mitosis and Meiosis)<sup>3</sup></b>	
24	Microbial Diversity (Bacteriology)	<i>Research papers due in class 11/20</i>
31	Research Symposium <i>Technology Rehearsal - Upload and check your presentation at by 9:15am!</i>	
Nov. 7	Molecular Biology	Map <sup>2</sup>
14	Plant Diversity I & II	
28	Bioinformatics: Molecular Phylogeny of Plants	<i>Report completed in lab</i>
30	<b>(Thur.) LAB EXAM (Bacteriology, Molecular Biology and Plant Diversity I &amp; II)<sup>3</sup></b>	

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

<sup>2</sup>These assignments are **not** turned in for a grade

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

## Important Dates for Biology 141

(Includes lab and out of class sessions)

### September:

- 5 Materials & Methods; Title page due in lab
- 14 *Scientific Literature Workshop, preliminary references due (required)*
- 19 Introduction; References due in lab
- 19 Exam I**
- 22 *Effective Data Presentation Workshop – bring your data and laptops to class*
- 22 Respiration proposal due on Canvas by 2:30 p.m.
- 26 Table; Figure due in lab
- 28 Lab Exam I**

### October:

- 3 Figure; Results; Discussion; References due in lab
- 6 *Team Research Proposal submitted to Canvas by 2:30 p.m.*
- 12 Exam II**
- 19 Lab Exam II**
- 31 Research Symposium (*Technology Rehearsal (2:30 p.m.)*)



### November:

- 9 Exam III**
- 16 *"Ask the Editors" session 5 p.m.*
- 20 Research paper due in class**
- 28 Molecular phylogeny report completed in lab
- 30 Lab Exam III**

### December:

- 7 Final Exam**

## 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, (1<sup>st</sup> and 3<sup>rd</sup> each worth 50 points & 2<sup>nd</sup> 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).

**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
<b>720 points</b>	<b>total</b>	<60 F
		Plus and minus grades are given