BIOLOGY 141 (INQ, WR) CELL BIOLOGY AND GENETICS SYLLABUS

FALL SEMESTER 2015

SECTION 9A

Professor: Dr. Elizabeth Gleim **Office:** 807 Whatcoat St. (yellow house across from Mail Center)

Lecture Hours: MWF 9:30 AM – 10:35 AM **Room:** Pierce 101 **Lab Hours:** Wednesday 2:30-5:30 PM **Room:** Pierce 123

Office Hours: To be held in the Math Center unless announced otherwise Tuesday 4:00-5:00 PM and Friday 10:35-11:35 AM. You may also catch me by chance in my office and if I am free I happy to talk with you. Alternatively, you can e-mail or talk to me before or after class to make an appointment to meet.

- Required Texts: 1) Campbell Biology, Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V., and Jackson, R.B. 2011, 10th edition, Benjamin/Cummings Publishing 2014 (See note below regarding the website Mastering Biology); 2) Practicing Biology, Heitz, Jean and C. Griffen. Benjamin/Cummings Publishing Co., Inc. 2014.
- **Optional Writing Book (***strongly encouraged***):** A Student Handbook for Writing in Biology, Karen Knisely, 2013, 4th edition, W.H. Freeman and Co. This is also on reserve in the library.
- **Required Lab Text:** SYMBIOSIS: *Investigating Biology*, 8th ed. Morgan, J. G. and M. E. B. Carter. Benjamin/Cummings Publishing Company, Inc. 2014. A customized edition published for BIO 141 is available in the bookstore. *Used lab manuals are not permitted*.
- **Web Site:** Mastering Biology (<u>www.masteringbio.com</u>) provides online study materials; practice exams, learning activities, and strategies for success. You will need to purchase the specific version of the text book that includes access to mastering biology or pay a fee at the website in order to use these resources.
- Course 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. 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. 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).

BIOLOGY 141Q FALL 2015 LECTURE SCHEDULE

Date		Topic Assi	gned Reading
<u>Augu</u>	st:		
W	26	Science as a Way of Knowing	1
F	28	Major themes in Biology	1
М	31	Hierarchies: beginning with living chemistry and water	2, 3
	ember:		
W	2	Building biological macromolecules: carbohydrates and lipids	4, 5
Th	3	Scientific Literature & Research (Library - Required) 8:00 – 8:45am an	
F	4	Proteins and nucleic acids	5
М	7	**Labor Day – No Classes**	
W	9	Structure and function revealed in cells	6
F	11	Cell biology - Problems/Case Study	
М	14	Membrane structure and cellular transport	7
W	16	Transport problems	
F	18	Fundamentals of energy transformations: enzymes, ATP	
		and electron carriers	8
М	21	Cellular respiration I - Glycolysis	9
W	23	Cellular respiration II - Transition and the Krebs Cycle	9
Th	24 th	EXAM I 8:00 - 9:30 a.m. (through membrane transport)	
F	25	Presentation of Scientific Data – bring your lab data and laptop to cla	ISS
М	28	Cellular respiration III–Chemiosmosis and the Electron Transport Cha	in 9
W	30	Review and recapitulation: Accounting Day	
<u>Octo</u>			
F	2	Homage to photosynthesis	10
М	5	Photosynthesis I: the light dependent reactions	10
W	7	Development of Team Research Proposal (bring laptop to class)	
F	9	Photosynthesis II: the light independent reactions; also C4 & CAM	10
		Team Research Proposals due in class and uploaded to Blackboard by	v 2:30PM
М	12	**FALL BREAK – No Classes**	
W	14	Cell reproduction: cell cycle, mitosis	12
Th	15th	EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)	
F	16	Sexual life cycles and meiosis	13
М	19	Chromosomal mutations	15 pp. 304-307
W	21	Mendelian principles; genes and chromosomes	14, 15 p292-304
F	23	Chromosomal theory and linkage	15
M	26	Patterns of inheritance	14 pp. 276-288

W	28	Genetics problems and review	14, 15
Th	26	Effective Presentations Workshop - Pierce 206 8:00 – 8:45, 9:00 – 9:45 a.m.	
F	30	DNA structure	16
Noven			
М	2	DNA replication	16
W	4	Gene to Protein I: transcription and the genetic code	17
F	6	Gene to Protein II: translation and genetic mutations	17
М	9	Molecular genetics workshop	
W	11	Charles Darwin and development of evolutionary concepts	22
Th	12th	EXAM III - 8:00 – 9:30 a.m. (through genetics)	
F	13	Evidence for evolution	22, 25 pp. 522-
	527;		
	,	Scientific Papers – "Ask THE EDITORS" 2:30-3:30 p.m. in Pierce 101	531-538
М	16	Genetic Variation, Population Genetics and Hardy-Weinberg	23
W	18	Microevolution: genetic drift, gene flow and mutation	23
F	20	Selection and Speciation	23, 24 pp. 500-
510		·	
М	23	Evolution of land plants	29
		Research papers due in class, 9:30AM sharp!	
W-F	25-27	THANKSGIVING BREAK – No Classes	
M	30	Bryophytes and seedless vascular plants	29
Decen	nber:		
W	2	Seed plants: gymnosperms and angiosperms	30, 38 pp. 822-
826			• • •
F	4	Sexual Encounters of the Floral Kind	38 pp. 815-821
М	7	Evolutionary trends in land plants & Big Themes Revisited	

^{***} FINAL EXAMINATION ***December 10th, Thursday, 2PM- 5PM***



BIOLOGY 141 WEDNESDAY LABORATORY SCHEDULE

All writing assignments are due at the beginning of the following week's lab unless otherwise noted.

<u>Date</u>		Lab Topic (#)	Writing Assignment		
Sep.	2	Scientific Investigation	Introduction, References Cited, Title Pg.		
	9	Microscopes and Cells	Review table*		
	16	Diffusion and Osmosis	Methods		
	23	Enzymes	Results, Table & Figure		
	25	Respiration/Fermentation Proposal posted to E	ion/Fermentation Proposal posted to Blackboard by 2:30 p.m.		
	30	Cellular Respiration and Fermentation	Figure; Discussion, References Cited		
Oct.	1 (Thur.) LAB EXAM I (thru Enzymes) (Sign up for exams at 6:00 p.m. or 6:30		or exams at 6:00 p.m. or 6:30 p.m.)		
	7	Mitosis and Meiosis	Comparison Table*		
	9	Team Research Proposals due in class and uplo	aded to Blackboard by 2:30PM		
	14	***NO LAB (Week of Fall Break)***			
	21	Field Research: Ecology and Evolution on the G	Outcrops		
	22	(Thur.) LAB EXAM II (Mitosis and Meiosis) Microbial Diversity (Bacteriology) Note: Research papers due in class 11/23, 9:30AM sharp!!			
	28				
Nov	4	Research Symposium Technology Rehearsal - Upload and check your presentation at 2:30!			
	11	Molecular Biology	Mapping Problems*		
	18	Plant Diversity I & II			

	3 rd	(Thurs.) LAB EXAM III (Bacteriology, Molecular Biology and Plants)(6:00 or 6:30 p.m.)	
Dec	2	Bioinformatics: Molecular Phylogeny of Plants Report completed in lab	
	25	***NO LAB – Thanksgiving Break***	

^{*}These assignments are **not** turned in for a grade.

IMPORTANT DATES FOR BIOLOGY 141 (INCLUDES LAB AND OUT OF CLASS SESSIONS)

September:

- 3 Scientific Literature Workshop (in the Library) (required)
- 9 Introduction, References Cited, and Title page due in lab
- 23 Methods due in lab
- 24 Exam I
- 25 Effective Data Presentation Workshop bring your data and laptops to class AND Respiration/Fermentation proposal due on Blackboard by 2:30 p.m.
- 30 Results, Table, Figure due in lab

October:

- 1 Lab Exam I
- 7 Figure; Discussion; References Cited due in lab
- 9 Laboratory research project proposals due in class and uploaded to Blackboard by 2:30 p.m.
- 15 Exam II
- 22 Lab Exam II
- 26 Effective Presentations Workshop (2 group members must attend) in Pierce 206

November:

- 4 Research Symposium (*Technology Rehearsal 2:30 p.m.*)
- TBD Advanced Literature Search Techniques Workshop (optional, times and dates TBD)
- 12 Exam III
- 13 "Ask the Editors" session 2:30 p.m. in Pierce 101
- 23 Research paper due in class at 9:30AM sharp!

December:

- 2 Molecular phylogeny report completed in lab
- 3 Lab Exam III
- 10 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 (NBB), 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, as you will be expected to go beyond simple memorization of biological concepts and mechanisms, but have a strong enough grasp and understanding of these concepts and mechanisms to apply and think critically about them---in short, you will begin the process of learning how to think like a scientist. The material you learn in this course and the shift in thinking about science critically will serve as a foundation for the rest of your course work in biology and beyond; because of this, it is critical that you succeed in this course. Many of you in the future will be applying for summer jobs and internships and further down the line taking examinations to enter graduate or professional schools and/or applying for jobs in science and the knowledge and skills you gain here will be required for your success.

Tips for Success: Biology 141 is an intensive course and <u>requires time</u>. 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:

- Meep up with assigned readings.
 - How to Read Effectively: Take the time to summarize what you read in your own words in the form of notes that can later be used to study. This will help you learn what you've read while also allowing you to determine any questions you might have which you are encouraged to ask in or outside of class. Finally, don't skip the figures, for many people they are more helpful than the text.
- **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. I strongly recommend taking notes on the printed power points that I provide so that they correlate to specific slides. Review your notes frequently.
 - If I say "write this down" or "this is important"---write it down. Even if you think you'll remember that and don't need to write it down...write it down and put a star by it. That information may very well re-visit you!
- Review material on a regular basis. Take time to review the lecture PowerPoint's, your notes, handouts, and worksheets at least once a week if not more frequently. While you are reviewing material, practice writing out pathways and re-working questions from worksheets and other study guides.
- Do the worksheets and check your answers. You will be given many ungraded worksheets and handouts throughout the semester. These worksheets and handouts are a way for you to organize and learn material and/or practice applying your knowledge and critical thinking skills. It is almost guaranteed that the types of questions you answer on worksheets will also be on exams. Be sure to check your answers to ensure that you are learning correctly. Answer sheets are available on Blackboard for almost all handouts. If you are struggling with a particular worksheet or question: 1) Attend SI sessions, handouts are almost always covered 2) Check

answers and/or work on the handouts in a study group, or 3) Come see me and we can work through things together.

- **Take advantage of your resources:** Attend SI on a regular basis, attend open labs, and attend optional sessions. Finally take advantage of my office hours or make an appointment to get individual assistance. I am always happy to help. *The importance of these resources cannot be overstated!*
- **Weep this in mind**. In this course we hope to lay your foundation as a biologist. This means that we expect you to not only learn foundational knowledge (i.e. terms, concepts, processes, etc.) but to also be able to apply and integrate this knowledge in meaningful ways. *Both* of these tasks take work and practice. Thus, studying should always be a two-step process 1) Learn the foundational knowledge, 2) Learn how to apply and integrate this knowledge. Only doing step one will not be sufficient in this course! To practice and learn how to do step two, make use of the in-class worksheets and handouts, mastering biology website, and questions at the ends of sections and chapters in your textbook.
- Lab is equally important! Please read your lab manual BEFORE lab and pay attention to the details. During lab, take good notes and make detailed observations---drawings can often be helpful. Always ask yourself, have I taken thorough enough notes that if I revisit these in a few weeks, I will 1) remember the purpose of each reagent and piece of equipment used & identify organisms studied, 2) remember why I did things the way I did, 3) be able to interpret and understand data? 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.

<u>Supplemental Instruction.</u> 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 for this section is **Athira Penghat**.

<u>Ways of Inquiry (INQ)</u>. 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.

<u>Absences</u>. Your attendance in this class is crucial to your success in this course. Not only will you receive information in class that is not necessarily available in your text or power points, but this is also a highly participatory course. Indeed we often have discussions, individual, and group in-class exercises that are crucial for your understanding. Please read carefully the absence policy that is handed out separately from this syllabus as you will be responsible and held accountable for this information.

<u>Cell Phones:</u> The use of cell phones (texting, ringing, etc.) is strictly prohibited in the classroom and the laboratory. Please turn off your phone before you come to class (or just don't bring it!) and leave your

phone at the front during exams. If you feel that you have a legitimate need to use your phone or leave the ringer on, please speak to me *before* class. *Photography with camera phones is also prohibited in lab and lecture.*

<u>Personal Computer.</u> Personal laptops may not be used in class unless you have received special permission from the instructor. Use of laptops to surf the web, login to Facebook, and/or online chat during class is completely unacceptable and may result in you losing your privilege to use a laptop if you did have prior permission.

<u>Honor Code</u>. 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**.

<u>Office Hours.</u> I would like to encourage you to meet with me in person about any concerns or questions that may arise during the semester. I want you to succeed in this course and am here to help in whatever capacity that I can. 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 or just drop by.

<u>Blackboard Site:</u> Blackboard will have announcements, your syllabus, power points, answer keys, and other helpful resources. Your SI, TA, and I will email you from Blackboard with important announcements and information so do be sure that you are set-up to receive these messages. You will also upload all writing assignments to SafeAssign via Blackboard.

<u>Additional Required Sessions.</u> We have two required and three optional additional instruction sessions in this course for writing, library and information technology. These sessions are held outside of class time and are critical for your laboratory assignments.

Exam Protocols. Any item/s you bring to class with you the day of an exam must be left at the front of the room. This includes but is not limited to backpacks, folders, notecards, coats, calculators, and cell phones (which must be turned off or silenced). Do not come to any exam with notecards or cell phones in your pockets or on your person; finding either of these items on your person during an exam is a breach of the Honor Code. No hats or hoodies can be worn while taking an exam. 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 as 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, matching, short answer and short essay questions. Exams will cover all material in lecture in addition to assigned textbook readings and other supplemental materials. The final examination, worth 175 points, will be both a comprehensive final exam and your last regular exam. There are three laboratory exams, the 1nd and 3rd are worth 50 pts. and the 2nd is worth

35 pts. Each lab exam covers topics covered in lab as well as *all* material in your lab manual. 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%	Α
175 points	final examination	80 – 89%	В
35 points	scientific writing	70 – 79%	С
75 points	lab project	60 – 69%	D
720 points	total	<60	F
		Plus and m	inus grades are given

The instructor reserves the right to adjust dates, topics, and any other aspect of the lecture and lab syllabi if she determines it is necessary.