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

SPRING SEMESTER 2015 SECTION 9A

Professor: Dr. Elizabeth Gleim **Office:** Pierce 113B **Phone:** (770) 784-4745
Lecture Hours: MWF 9:30 AM – 10:35 AM **Room:** Pierce 101
Lab Hours: Wednesday 2:30-5:30 PM **Room:** Pierce 125

Office Hours: Tuesday 3:00-4:00 PM and Friday 10:35-11:35 AM. You may also catch me by chance or by appointment; I am generally here from 8:00 AM -5:00 PM daily. To make an appointment, see me after class or email to set up a time.

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; 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 a great resource for writing, and is 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 (www.masteringbio.com) 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 SPRING 2015 LECTURE SCHEDULE

Date		Topic	Assigned Reading
January:			
W	14	Science as a Way of Knowing	1
F	16	Major themes in Biology	1
M	19	Martin Luther King Day – no class	
W	21	Hierarchies: beginning with living chemistry and water	2,3
F	23	Building biological macromolecules: carbohydrates and lipids	4, 5
M	26	Proteins and nucleic acids	5
W	28	Structure and function revealed in cells	6
F	30	Cell biology - Problems/Case Study	
February:			
M	2	Membrane structure and cellular transport	7
W	4	Transport problems	
Th	5	*Scientific Literature & Research (Library - Required) 8:00 – 8:45am and 9:00 – 9:45am*	
F	6	Fundamentals of energy transformations: enzymes, ATP and electron carriers	8
M	9	Cellular respiration I - Glycolysis	9
W	11	Cellular respiration II - Transition and the Krebs Cycle	9
Th	**12th**	**EXAM I 8:00 - 9:30 a.m. (through membrane transport)**	
F	13	*Presentation of Scientific Data – bring your lab data and laptop to class*	
M	16	Cellular respiration III–Chemiosmosis and the Electron Transport Chain	9
W	18	Review and recapitulation: Accounting Day	
F	20	Homage to photosynthesis	10
M	23	Photosynthesis I: the light dependent reactions	10
W	25	Photosynthesis II: the light independent reactions; also C4 & CAM	10
F	27	Cell reproduction: cell cycle, mitosis	12
March:			
M	2	Sexual life cycles and meiosis	13
Tu	**3rd**	**EXAM II – 8:00 – 9:30 a.m. (through photosynthesis)**	
W	4	Chromosomal mutations	15 pp. 304-307
F	6	Mendelian principles; genes and chromosomes	14, 15 p292-304
9 – 13		***SPRING BREAK**	
M	16	Patterns of inheritance	14 pp. 276-288
W	18	Chromosomal theory and linkage	15
F	20	Genetics problems and review	14, 15

M	23	DNA structure	16
W	25	DNA replication	16
Th	26	*Effective Presentations Workshop - Pierce 206 8:00 – 8:45, 9:00 – 9:45 a.m.*	
F	27	Gene to Protein I: transcription and the genetic code	17
M	30	Gene to Protein II: translation and genetic mutations	17
April:			
W	1	Modeling Beyond Watson and Crick	
F	3	Molecular genetics workshop	
M	6	Charles Darwin and development of evolutionary concepts	22
W	8	Evidence for evolution	22, 25 pp 522-527; 531-538
Th	**9th**	**EXAM III - 8:00 – 9:30 a.m. (through genetics)**	
F	10	Genetic Variation, Population Genetics and Hardy-Weinberg *Scientific Papers – "Ask THE EDITORS" 2:30-3:30 p.m. in Pierce 101*	23
M	13	Microevolution: genetic drift, gene flow and mutation	23
W	15	Selection and Speciation	23, 24 pp 500-510
F	17	Evolution of land plants *Research papers due in class, 9:30AM sharp!*	29
M	20	Sexual Encounters of the Floral Kind	38 pp. 815-821
W	22	Bryophytes and seedless vascular plants	29
F	24	Seed plants: gymnosperms and angiosperms	30, 38 pp 822-826
M	27	Evolutionary trends in land plants & Big Themes Revisited	

***** FINAL EXAMINATION ***April 29th, Wednesday, 9 a.m.- 12 p.m.*****

BIOLOGY 141 WEDNESDAY LABORATORY SCHEDULE

SPRING 2015 DR. ELIZABETH GLEIM

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

Date		Lab Topic (#)	Writing Assignment
Jan.	21	Scientific Investigation	Materials and Methods; Title page
	28	Microscopes and Cells	Review table*
Feb.	4	Diffusion and Osmosis	Introduction; References
	11	Enzymes	Table & Figure
	13	*Respiration/Fermentation Proposal posted to Blackboard by 2:30 p.m.*	
	18	Cellular Respiration and Fermentation	Results; Figure; Discussion, References
	19	**(Thur.) LAB EXAM I (thru Enzymes) (Sign up for exams at 6:00 p.m. or 6:30 p.m.)**	
	25	Mitosis and Meiosis	Comparison Table*
Mar.	4	Research Teams: Proposal Development	
	6	*Team Research Proposal submitted to Blackboard by 2:30 p.m.*	
9 - 13		***** SPRING BREAK *****	
	18	Field Research: Ecology and Evolution on the Outcrops	
	19	**(Thur.) LAB EXAM II (Mitosis and Meiosis) (Time TBA)**	
	25	Microbial Diversity (Bacteriology) Note: *Research papers due in class 4/17, 9:30AM*	
Apr.	1	Research Symposium *Technology Rehearsal - Upload and check your presentation at 2:30!*	
	8	Molecular Biology	Mapping Problems*
	15	Plant Diversity I & II	
	22	Bioinformatics: Molecular Phylogeny of Plants	*Report completed in lab*
	23rd	**(Thurs.) LAB EXAM III (Bacteriology, Molecular Biology and Plants)(6:00 or 6:30 p.m.)**	

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

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

January:

28 Materials & Methods; Title page due in lab

February:

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

March: 3 Exam II
6 Laboratory research project proposals due on Blackboard by 2:30 p.m.
19 Lab Exam II
26 *Effective Presentations Workshop (2 group members must attend) in Pierce 206*

April: 1 Research symposium (*Technology Rehearsal 2:30 p.m.)*
TBD *Advanced Literature Search Techniques Workshop (optional, times and dates TBD)*
9 Exam III
10 *"Ask the Editors" session 2:30 p.m. in Pierce 101*
17 Research paper due in class at 9:30AM sharp!
22 Molecular phylogeny report completed in lab
23 Lab Exam III
29 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 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.**
  - **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.** Study the diagrams in your text and lecture handouts. Practice writing out pathways and linking the concepts.

- **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 to get individual assistance, I am always happy to help.

- **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 also be able to use your knowledge to think logically and analytically and this takes practice just like memorizing concepts does!

- **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, 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.

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 for this section is **Colleen Isdahl**.

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.

Absences. 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 even in the power points, but this is a highly participatory course in which we often have discussions and have individual as well as group in-class exercises. Please see the absence policy that is handed out separately from this syllabus.

Cell Phones: 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.***

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, 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.

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 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.

Blackboard Site: Blackboard will have announcements, your syllabus, power points, answer keys, and other helpful resources! Myself, your SI and TA will all email you from Blackboard so do be sure that you are set-up to receive these messages. You will upload all writing assignments on Blackboard.

Additional Required 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. 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, 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. All cell phones must be left on silent 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, 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, is comprehensive. There are three laboratory exams, the 1st 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:

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

The instructor reserves the right to adjust dates and topics on lecture and lab syllabi if she determines it is necessary.