

BIOLOGY 212

A CLASS COVERING PLANT & ANIMAL PHYSIOLOGY
AND DEVELOPMENT

With an evolutionary perspective



and a focus on the experimental data we use to build a scientific worldview

Syllabus for Summer 2015

BI 212 General Biology II: Organisms; Summer 2014

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Course Overview

The purpose of this class is to invite students to join the scientific community in our quest to use experimental data to increase our understanding of how life works. This course is about plant and animal physiology and development. We study the constraints set by geometry, the environment, and natural laws that dictate what organisms must accomplish in order to survive and reproduce. We study the forces and machinery that allow movement across membranes, enzyme regulation and kinetics, differential gene expression, and mechanisms of cellular computation and perception. We generate models of systems that organisms use to create homeostasis, which is an internal environment in which their individual cells can participate optimally in the process of meeting the challenges of life on earth. We also study how cells manage to take on specific and unique roles in the organism, which is the study of developmental biology.

Students taking the course will learn how to carry out epistatic analyses of various biological pathways and to interpret and generate complex graphical representations of data. Students propose, design, and conduct experiments on the physiology of long-range transport in plants or animals. They analyze the data they generate and write a scientific paper describing their work. This course is part of the introductory biology sequence, and has as a prerequisite Bi211. This course is itself a prerequisite for Biology 214 (but not 213) and for the introductory human physiology sequence.

Course Prerequisite

The prerequisites for Bi 212 are C-, P, or better in Bi 211 and one term of Chemistry (111 or higher).

LECTURE SCHEDULE (subject to change by instructor)

| Lecture Week 1 | Topic | Homework | Lab | Videos |
|----------------|---|---|---|---|
| 1 – July 13 | Class introduction, Homeostasis | | | |
| 2 – July 13 | temperature regulation, Metabolic thermogenesis | Read Saper Paper for Tomorrow | Writing Tutorial 1: Introduction | Metabolic thermogenesis video MR v Temp videos |
| 3 – July 14 | Saper Paper, Gene constructs | | | Saper paper video |
| 4 – July 14 | Enzyme Kinetics, competitive/non competitive regulation | | | Kinetics videos |
| 5 – July 15 | Cell size, Kleiber's law, Homology vs. homoplasy | | | SA/V ratio SA/Mass video temp vs size video |
| 6 – July 15 | Plant anatomy, plant development | | Wet Lab 1: Enzyme Kinetics | Plant cells, tissues and development videos Urb-Dnu video and Pulvini video for help with Homework |
| 7 – July 16 | Gene regulation | | | |
| 8 – July 16 | Movement through membranes Water potential | Read: Serna paper for Monday | | |
| Week 2 | | | | |
| 9 – July 20 | Transpiration, guard cells | HOMEWORK 1 DUE IN LECTURE | | Transpiration and stomata videos |
| 10 – July 20 | stomatal opening/closure, Serna Paper | | Writing Tutorial 2: Materials and Methods | |
| 11 – July 21 | Phloem loading/unloading, rubisco and photorespiration, C4/Cam photosynthesis | | | 'Multiple mutant' video for help with HW |
| 12 – July 21 | Mammalian circulation | | | Animal circulation videos |
| 13 – July 22 | Blood flow regulation | | | 'Moving material to and from blood' video for help with HW |
| 14 – July 22 | Pacemaker cells, action potential, maybe touch on nervous system | Read: Carroll and Salmon paper for tomorrow | Wet Lab 2: Transpiration | |
| 15 – July 23 | Red blood cells hemoglobin, cooperativity, Carroll paper and Salmon paper | | | |
| 16 – July 23 | Nutrients, plant nutrition Soil, cation exchange | | | Plant nutrition videos Nitrogen cycle video for homework problems |

| Week 3 | Topic | Homework | Lab | Videos |
|-----------------------|---|---|---------------------------------------|--|
| MIDTERM – July 27 | Midterm Exam (No Lecture After) | HOMEWORK 2 DUE IN LECTURE | Writing Tutorial 3: Results | |
| 17 – July 28 | Animal nutrition and digestion of macromolecules | | | |
| 18 – July 28 | Brush border cells, cholera, cystic fibrosis | Read: LDL paper for tomorrow | | Cholera and CF video |
| 19 – July 29 | Cholesterol | | | |
| 20 – July 29 | LDL paper, Statins | | Wet Lab 3: Plant form and function | LDL videos |
| 21 – July 30 | blood sugar homeostasis, Insulin, Pancreatic beta cells | | | Beta cell function and insulin uptake videos |
| 21 – July 30 | Leptin, weight gain/weight loss circuits | | | Body fat homeostasis videos |
| Week 4 | | | | |
| 22 – Aug 4 | plant responses to light, Shade avoidance response, Auxin transport | HOMEWORK 3 DUE IN LECTURE | | Auxin videos |
| 23 – Aug 4 | Auxin, elongation and gravitropism, photoperiod | | Writing Tutorial 4: Discussion | |
| 24 – Aug 5 | Circadian clocks, flowering, long day/short day plants, | | | |
| 25 – Aug 5 | florigin, flower whorls | Read: Nusslein-Volhard paper for tomorrow | | |
| 26 – Aug 6 | Animal fertilization and development | | | Fertilization videos |
| 27 – Aug 6 | Bicoid | | Wet Lab 4: Fertilization | |
| Final Exam – Aug 6 | FINAL EXAM | | | |

Course Format

Grading:

| <u>Course component</u> | <u>% Grade</u> |
|---------------------------|----------------|
| Clickers/Class attendance | 5% |
| Writing Tutorials | 15% |
| Wet Labs | 10% |
| Homework | 10% |
| Midterm Exam | 30% |
| Final Exam | 30% |

Lectures: (Monday, Tuesday, Wednesday, Thursday: 9:00-10:50 in room 240C MCK)

Clickers (Personal Response Systems) will be used in almost every class to encourage participation and to provide valuable feedback to instructors and students. Each student is expected to purchase a clicker for use in this class. You should register your clicker on the course Canvas site. (If you've already registered your clicker *this term*, for another class, then you don't need to register it again.)

Lab activities:

The lab is a smaller group that meets *twice* a week for 110 minutes. Monday labs will be Writing Tutorials, which will focus on scientific writing and how to write a scientific paper. Wednesday lab will be Wet Labs (real experiments) related to physiology. Writing Tutorial assignments will be due the following lab period. Wet Lab worksheets will be turned in at the end of lab. **Attendance at lab is mandatory. Missing multiple labs without an acceptable excuse will result in a failing grade for the course.**

Textbook *Biological Science* by Freeman, 3rd, 4th, or 5th edition.

The text should be used as a general reference throughout the three quarters of General Biology. Pertinent chapters are indicated in the reading schedule posted to Canvas. The readings include background material useful to prepare you for lecture and for studying for exams.

Course Packet:

This packet contains many of the handouts you will need during the quarter including lab handouts and homework assignments. You should bring the packet with you to lab section. The packet will also be available on Canvas.

Assigned Readings:

We will make available a set of assigned and a set of optional readings on our website. Our assigned articles are designed to provide examples of the science methodology that leads to an understanding of the field, and provide discussion of topics that may not make it into textbooks for years to come.

Homework Assignments: There will be three weekly homework assignments, found in the course packet, and also available on the website. These will be due at the beginning of lecture on Mondays, see dates noted in the course schedule and Canvas.

Exams and grading: There will be one midterm and one final exam. The exams will cover material from all aspects of the course including lectures, labs and readings. **EXAMS CANNOT BE MADE UP. EVERYONE IS REQUIRED TO TAKE THE FINAL EXAM. BE CAREFUL WHEN MAKING TRAVEL PLANS AS THE FINAL IS ON THURSDAY AUGUST 6TH at 9am AND THERE WILL BE NO EARLY EXAMS AND NO MAKE-UP EXAMS.**

Exams are graded by Graduate Teaching Fellows under the supervision of the faculty. To promote consistency, one person grades the same question on all exams. If, upon receiving your exam back and reading the posted key, you think that you should have received more credit for an answer, submit your exam to your GTF, along with a **WRITTEN EXPLANATION** of why you think your answer is correct, within **ONE WEEK** of getting your exam back. Your entire exam will then be re-graded by the people who originally graded it and by the faculty member and your new score will be used. If a simple addition error occurred, you may just take it to a GTF.

Office Hours:

The single biggest problem students have in general biology is solving the kinds or problems presented in homework problems and exams. These are similar to the kinds of questions that biologists ask; many can't be solved by memorization of facts. Although attendance is not required, we strongly encourage you to regularly attend the office hours of the instructor, GTFs and undergraduate TAs.

Review Sessions:

Undergraduate TAs often volunteer to organize review sessions to help students prepare for quizzes and exams. *Review sessions are much more likely to be offered when office hours and biology tutoring hours are well attended.* We get access to large classrooms for these events. Review sessions are run on a question and answer basis.

Classroom Conduct

This syllabus is, in effect, an agreement about how all of us will carry out our duties and conduct ourselves this quarter. You should read this carefully and talk to us about it as soon as possible if you are uneasy with parts of this syllabus. We will work hard to make

this course valuable to your learning. We welcome suggestions from you at anytime about things you think could be done to improve the course. In return, we ask that you arrive at lab and lecture on time and stay until class is over without making unnecessary noise that could distract your classmates (please turn cell phones off). **Please put away and do not use your own computers, cell phones or other electronic devices during lecture or lab.** Computers are not a very good way for taking notes in biology courses and they are distracting to other students.

The University of Oregon is working to create inclusive learning environments. Please notify me if there are aspects of the instruction or design of this course that result in disability related barriers to your participation. You are also encouraged to contact the Accessible Education Center (formerly Disability Services) in 164 Oregon Hall at 346-1155 or uoac@uoregon.edu.

There are some university guidelines for behavior to which we expect all students to adhere. One of these has to do with plagiarism, or taking credit for the work of others. This is a serious offense and will be treated according to the guidelines in the Student Conduct Code (<http://studentlife.uoregon.edu/LinkClick.aspx?fileticket=puLfAzFDbsg=&tabid=69>). This doesn't mean you shouldn't talk with other students about what you are thinking or writing; it does mean that when you write something, it should be in your own words, not copied from someone else. We take this seriously and have sent several academic dishonesty cases to the Student Judicial Affairs Office. It is one of the least favorite parts of our job and it can have serious consequences for your academic career. Please don't be tempted to commit any of these offenses. Academic dishonesty includes cheating, plagiarizing (taking credit for the work of others) or knowingly supplying false information -- it is a serious offense. Every assignment you turn in should represent your own work. This includes homework assignments. We want you to learn and to do well in the course, but we will not tolerate academic dishonesty. Sanctions for academic dishonesty include a lowered or failing course grade. If you find yourself in trouble, or if you are aware of academic dishonesty occurring, please talk to one of the instructors.

Out of respect for other students, and in keeping with departmental policy, you should plan to arrive at class on time and to stay until class is over. If, on occasion, you do arrive late, please be considerate of others and enter quietly at a time and in such a way that you don't disturb other students. If you need to leave early, please sit near an exit so that you can leave without disrupting the class. **We ask that you not interfere with the ability of other students to learn by making noise when someone else (instructor or classmate) is talking.**

We all have crises now and then. If you are having a problem that interferes with your ability to do the work in this class, please tell us about it as soon as you can. We are willing to give grades of incomplete or to make some kinds of special arrangements when the need is real **and** when you have done your best to deal with the situation and let us know about it in a timely manner.