

BIO52: Experiments in Cell Biology

Time: Thursday 1:30 p.m. – 5:30 p.m. or until finished

Location: Barnum teaching laboratory 001

Course description:

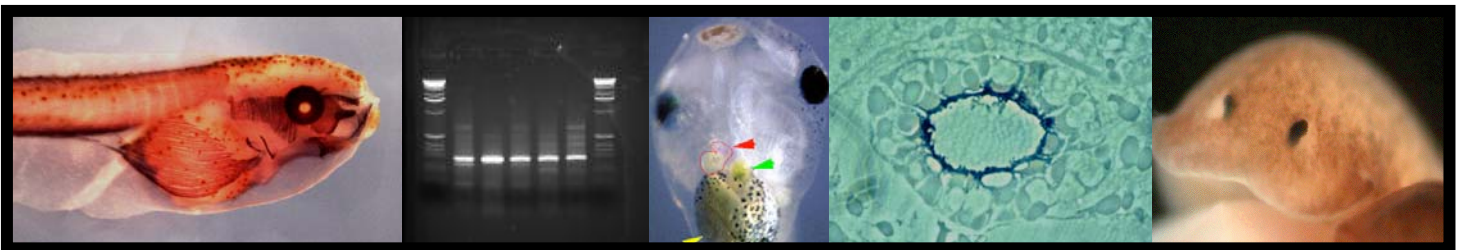
In order for a complex organism to develop from a single egg cell, and then stay alive by staving off aging, cancer, and injury, cells must be able to carry out a variety of diverse functions related to pattern formation, regeneration, and homeostatic physiology. Some cells are designed to perform specialized functions such as movement or proliferation. At the same time, these cells still must maintain the right concentration of chemicals in their cytoplasm, ingest food and use it for energy, recycle molecules, expel wastes, construct proteins, and communicate with each other and the host organism. The field of Cell Biology focuses on examining cells and the behaviors they perform. This course will introduce students to the investigation of several laboratory problems using standard techniques of cell biology. Since there are numerous techniques employed by researchers in this exciting field, this semester there will be an emphasis on the following procedures/concepts: microscopy, polymerase chain reaction, cell communication, tissue organization and regeneration. Prerequisites: sophomore standing and Biology 13 with Lab or equivalent.

| Course Instructors | Contact Information |
|---|---|
| Dr. Michael Levin (course coordinator) | Office hours: Wednesdays, 9:00-11:00am, or by appointment Office location: 200 Boston Ave Suite 4600 Email: michael.levin@tufts.edu |
| Dr. Laura Vandenberg | Office hours: Mondays, 4:00-6:00pm, or by appointment Office location: 200 Boston Ave Suite 4600 Email: laura.vandenberg@tufts.edu |
| Ms. Kelly Beagan (Grad. Teaching Assistant) | Office hours: Tuesdays, 4:00-6:00pm Office location: Dana 020 Email: kelly.beagan@tufts.edu |

Guest instructors: Dr. Kelly McLaughlin, Dr. Douglas Blackiston, Dr. Kelly Tseng, Dr. Dany Adams

Course Goals and Objectives:

1. Learn and use current techniques and powerful model systems utilized in cell biology research
2. Gain experience in experimental design, data collection, and interpretation of results
3. Explore several representative mechanisms underlying key cell-biological functions
4. Hone skills of scientific writing
5. Prepare and give an oral presentation



SYLLABUS*

| DATE | FACULTY | TOPIC – class activity | NOTES and assignments |
|----------|---------|---|---|
| Jan. 20 | ML, LV | Introduction of teaching team & overview of course logistics: syllabus, policies, resources, formative assessment | General information handouts (guest instructor: Dr. Adams) |
| Jan. 27 | LV | Endocrine Disrupting Chemicals, In vivo & In vitro assays | |
| Feb. 3 | LV | Cells in context: tissues and organs | Due: Opinion Piece # 1 Topic = endocrine disrupting chemicals |
| Feb. 10 | LV | Head to Tail – Differentiation & Patterning | |
| Feb. 17 | LV | Cell Death, the Final Frontier | |
| Feb. 24 | | MONDAY SCHEDULE NO LAB TODAY | |
| March 3 | LV, ML | Gap Junctions & Left-Right Asymmetry | Due: LAB REPORT #1 |
| March 10 | KM | PCR | |
| March 17 | KM | Biotechnology: altering genes to change phenotypes in living organisms (GMO) | |
| March 24 | | SPRING BREAK NO LAB TODAY | |
| March 31 | ML | Voltage control of Melanocytes | Due: Opinion Piece #2 Topic = GMO |
| April 7 | ML | Xenopus tail regeneration) | |
| April 14 | ML, LV | Laboratories in Motion: Introduction to behavior studies, fluorescence microscopy, and animal husbandry | Due: LAB REPORT #2 Handout of: “How to give an effective presentation” – and assignment/exercise due 4/22 |
| April 21 | LV, ML | Effective presentations | DUE: final project draft version, short oral presentation (Note: will be video taped) |
| April 28 | ML, LV | Final Oral presentations of independent projects, 10 minutes | DUE: Final oral presentation and written lab exercise proposal assignment |

*Please note: we will do our best to follow the course syllabus – however, we reserve the right to make modifications as needed during the semester.

GRADING RUBRIC & Assignments

A total of 700 points can be earned throughout the semester (see the breakdown for these points below). We believe that science is an active experience; while we expect you to learn fundamental concepts from class and assignments, the point is to synthesize information, not to cram facts. For this reason, assignments have been designed to reinforce important ideas while assessing important skills critical for the practice of science. All assignments are due at the beginning of class (1:30 p.m.) in hardcopy and will not be accepted electronically unless prior permission is given by the instructor or course coordinator.

Because there are many opportunities to demonstrate your understanding and application of course material, there will be no extra credit.

- Each class (from **Jan. 20 – April 14**) will be worth 20 points. These points may be earned through various assessment methods including: homework assignments, unannounced quizzes, in-class assignments, mini presentations, class debates or lab worksheets.
- Two short opinion pieces worth 50 points each. The first will be **due February 3, 2011** on the topic of environmental endocrine disruptors. The second will be **due March 31, 2011** on the topic of genetically modified organisms. Detailed instructions will be provided.
- Two lab reports worth 100 points each. Detailed instructions will be provided. All exercises will be completed in groups (usually of two), **HOWEVER - lab reports must be individually written.** Plagiarism, or any form of academic dishonesty, will not be tolerated. Any lab reports turned in late will be lowered ONE letter grade for each day late. The first will be **due March 3, 2011** and may be written about any ONE of the following labs:
 - Feb. 3rd - Cells in context: tissues & organs
 - Feb. 10th – Head to Tail: Differentiation & Patterning
 - Feb. 17th - Cell Death, the Final Frontier

The second lab report will be **due April 14, 2011** and may be written about any ONE of the following labs:

 - March 3rd – Gap Junctions & Left-Right Asymmetry
 - March 31st – Voltage control of melanocytes
 - April 7th – Xenopus tail regeneration
- A final written research proposal & oral presentation **due April 28, 2011** will be worth a total of 100 points. For this assignment, students are expected to propose a scientific experiment using two techniques covered during the semester in this class. The student will apply the techniques learned to a new hypothesis (a more detailed description of the assignment/expectations will be provided). In order to help you prepare for this assignment a written description (draft) of your experimental proposal is **due April 21, 2011**, and a practice version of your oral presentation will also be given that day (30 points total). This proposal will be the focus of a graded peer-review assignment conducted in class (20 pts).

ASSIGNMENTS

semester total

| | |
|--|--------|
| Lab exercise activities (Jan. 20-April 14, 2011) 20 points/each class | 200pts |
| Opinion pieces (due Feb. 3, 2011 & March 31, 2011 ; 50pts each) | 100pts |
| lab report #1 due March 3, 2011 | 100pts |
| lab report #2 due April 14, 2011 | 100pts |
| Written draft & mini oral presentation (due April 21) | 30pts |
| Peer review of mini-oral presentations (in class on April 21) | 20pts |
| Final oral presentation (due April 28) | 50pts |
| Final written presentation (due April 28) | 50pts |
| overall participation and attitude | 50pts |

total points

700pts

ADDITIONAL POLICIES

Attendance is mandatory. This is a laboratory class; each class will be comprised of short lectures followed by hands-on exercises. Therefore, you must be present to learn and understand the material and techniques. We do understand that absences from class cannot always be avoided. **One excused** absence is allowed for illnesses, family emergencies, or travel for graduate/professional school interviews. To receive an excused absence, the student is responsible for providing the appropriate documentation (e.g., Note from the Dean, doctor's note) AND emailing the course director (Dr. Levin) prior to the start of class. A "self-diagnosed" PDF-health form is NOT an acceptable form of documentation. In the event of an influenza or H1N1 outbreak, if you are ill and have already used your single excused absence, email the course director. We do not want anyone that is sick coming to class, especially because we will be sharing microscopes, pipettes and relatively confined spaces. Please keep in mind that if you miss class due to an excused absence, you are still responsible for the material covered during that class and any related assignments. (Make-up assignments for missed work at the discretion of the instructor). Homework must be turned in on time (dated/signed, and turned in via Dr. Levin's mailbox Dana120, as well as emailed to michael.levin@tufts.edu) unless express permission is granted from the instructor.

In the case of an unexcused absence, the student will receive no credit for any assignments due in class that day or any quizzes administered. **Missing more than 2 classes due to unexcused absences will result in failing the course.**

Come to class on time and plan to stay the entire block. (Thursday from 1:30-5:30pm). Do not schedule any commitments on Thursdays at/or before 5:30 p.m. **Note: Depending on the experiment, it is possible that you will need to check on some experiments outside of the normally scheduled lab period to monitor their progress.** Tardiness: missed work cannot be made up. Arrivals after 1:45 p.m. or students leaving before being dismissed by the instructor will be counted as an unexcused missed lab.

Come to class prepared. You will need to bring lined paper, a pen, lab handouts and a calculator to every class. You should also have a 3-ring binder to keep your assignments and notes from laboratory sessions. We will give you handouts designed to help you prepare for each lab one week before the lab. Write your name on the handouts, and bring them to lab. It is the student's responsibility to obtain copies of the handouts prior to the lab exercise. For this lab class you must use a lab notebook to record your results and observations made in the laboratory

Some of the laboratory exercises in this course use research animals. These kinds of experiments are a privilege and offer important learning experiences that cannot be obtained from reading alone. **We take animal welfare issues very seriously.** Experiments using vertebrate animals are approved by the Tufts IACUC animal care and use committee. Students will be given specific instructions on the proper use of research animals; these instructions must be followed at all times. If at any time a student does not follow these instructions, the student will be removed from class. No exceptions will be made. Because some experiments will utilize live animals that require care outside of class, you will need to come to the laboratory at additional times. Your TA will arrange times to be available on non-class days when animals need to be cleaned or fed.

ACADEMIC INTEGRITY INFORMATION

JUST TO REMIND YOU - A portion of Tufts University's policy on academic ethics is quoted below. We reserve the right at any time during the semester to request an electronic copy of any written work and subsequently use Turn-it-in (turnitin.com) to examine student assignments.

All students at Tufts University are expected to live up to the highest standards of academic honesty.

Academic Ethics

"A university is a community of students interested in the search for an understanding of knowledge. No less important to the true student is a high level of honesty and integrity. Absolute honesty on the part of every college student, therefore, is and always shall be an integral part of the plan of higher education at Tufts University. Examples of academic dishonesty include plagiarism, handing in one paper for two or more courses without the knowledge and consent of the instructors involved, dishonesty on examinations, and the purchase of papers to be submitted in a course.

The academic departments of the university have varying requirements for reporting the use of sources, but certain fundamental principles for the acknowledgement of sources apply to all fields and to all levels of work. The use of source materials of any kind (including the Internet) in the preparation of essays or laboratory reports must be fully and properly acknowledged. In a paper or laboratory report, a student is expected to acknowledge any expression or idea, which is not his/her own. In submitting the paper, the student is stating that the form and content of the essay or report, in whole and in part, represent his/her own work, except where clear and specific reference is made to other sources. Even where there is not conscious intention to deceive, the failure to make appropriate acknowledgement may constitute plagiarism. Any quotation--even of a phrase--must be placed in quotation marks and the precise source stated in a note or in the text; any material that is paraphrased or summarized and any ideas that are borrowed must be specifically acknowledged. A thorough rewording or rearrangement of an author's text does not release the student from these responsibilities. All sources that have been consulted in the preparation of the essay or report should be listed in the bibliography.

Allegations are reported Office of the Dean of Students. If a student agrees with the charge and/or the nature of the evidence makes it clear that academic dishonesty has taken place, the dean may take appropriate action. A decision made in this way may be appealed to the Committee on Student Life (CSL) according to the policies set forth in *Tufts University Student Disciplinary System*.

Working through the Office of the Dean of Students, it may be possible for the faculty member and the accused student(s) to reach a resolution through mediation. Note that both parties must be willing to use mediation as an alternative means of dispute resolution for this to work. The mediation process is described in *Tufts University Student Disciplinary System*. Disciplinary decisions resulting from hearings may be appealed to the CSL.

Consequences for academic dishonesty include disciplinary probation, suspension, or expulsion. **Instructors commonly assign an F for a course in which ethical practice is violated.** " (emphasis added) " For more information, please refer to *Academic Integrity @ Tufts.edu* , available online or in Dowling Hall."

The above is quoted from: <http://ase.tufts.edu/bulletin/gen-undergrad.html>