Bio 370: Topics in Cell Biology  
Course Instructor: Vida Praitis  
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Office hours: by appointment. (Please e-mail me to schedule).

Course Description:  
What do cells do? How do they do it? What can go wrong?  
The course covers a select group of topics in cell biology, including cell division, cell architecture, protein folding, and others.  
The primary goal of the course is to gain an understanding of the experimental approaches used by cell biologists by reading the primary literature and performing experiments. Each topic we cover will include a discussion of the relevant background and an in-depth discussion of a classic, seminal or recent paper. For the laboratory portion of the class, we will use cell biology techniques to characterize a mutation in an unknown gene of *C. elegans*.

Structure of the course:  
A. Lecture/Discussion (room 2021): Every week, one or two students will lead a discussion of a specific topic in cell biology. The presenting students are expected to become "experts" in a field by reading relevant research papers, reviews, and textbook chapters. Non-presenting students will read a review or chapter from a textbook, and will be expected to contribute to the discussion of the topic. On Tuesday, we will cover the following:  
   - A brief description of the history of the topic.  
   - What has been established by previous work?  
   - What data supports the current hypotheses?  
   - What aspects of the topic are unknown?  
   - What about the topic is subject to debate?  
   - Include a description of techniques used in the paper.

B. On Thursday, we will read the research paper in depth, with a group discussion addressing the following:

   1. Paper introduction/background:  
      - What does the current paper attempt to do?  
      - How does that fit into previous ideas about the topic?
2. We will discuss each figure/experiment in detail
   - What techniques are used?
   - What are the experimental results?
   - What are the controls? Are they appropriate?
   - What are the findings of the experiment?
   - What are the limitations of the experiment?

3. Paper Discussion:
   - How does the paper change our ideas about the subject?
   - Is the model/conclusions supported by the data?

4. What are the next experiments to do?
   - How would you do them?
   - What are the unanswered questions?

C. Laboratory (room 1004):

We will be working on an independent research project for the laboratory. We will use several different cell biology techniques, (including animal manipulation, genomics, microscopy, antibody staining, molecular biology, genetic screens, use of expression constructs, etc), to characterize the ru5 mutation in C. elegans. The ru5 mutation is in an unknown gene. The mutation is temperature sensitive. At the "restrictive" temperature, the C. elegans pharynx (upper gastro-intestinal organ) is not attached to the mouth. The resultant hatchlings starve and die. Most of the experiments we perform have never been done before, and the outcome is unknown.

Participation/attendance in laboratory is mandatory. We will each keep a laboratory notebook, including detailed descriptions of the experiments we perform. Two laboratory report papers, organized in the form of research papers, will be due during the term.

D. Grading:

20% Class presentations (2): As described above.
20% Papers (2): Write a 5-page (double-spaced, 12-point font; normal margins) paper about your presentation topic. The paper should briefly address each of the questions outlined above. Include a few paragraphs about the relevant background of the subject, a discussion of the findings of the research paper, and a description of the next experiments to do.
10% Class participation
10% Final Exam
40% Laboratory (see lab handout for details)

E. Preparation for Class. Since this is a discussion class, it is imperative everyone come to class on time and well prepared.

Presenting students should have a well-organized, well-researched presentation prepared by Monday afternoon. I expect to meet with each presenting student at least once prior to Tuesday morning. (Typically, we will go over the presentation on Monday afternoon). I will also be happy to meet with you earlier to help you get started on research for your topics.

Note to presenters: The papers we are reading this semester can be quite difficult to read and understand. You are not expected to understand everything on the first reading. If there is anything about the paper or background you don’t understand, please come to me. We will go over it together.

Every student should read the background material and look over the paper before class on Tuesday. Before the Thursday class, you should re-read the paper. Details are important!! Some of the papers we will be reading are only a few pages long. These short papers will still take you an hour or more to read carefully and understand.

One of the most important skills you need to learn as a scientist is critical thinking about data. Everyone should come prepared with questions about the topic and the paper. I expect all of you to challenge the assumptions of the authors and your colleagues. Think about whether the data in each paper support the conclusion. Be ready with alternative hypotheses. Think about better ways to do the experiment.

If it is helpful, please feel free to get together to discuss the class papers.

Preparation for the laboratory:
Each student is expected to read the lab background material and specific laboratory details before coming to class. You should have an outline of the experiments written out in your lab notebook before coming to lab. Since each of you will do an independent project, you will probably need to go to the laboratory outside of normal class time.

F. Important Dates:
Presentations (2): Each student will do two presentations during the semester. Dates vary for each student.

Papers (2): Each student will write a paper about his/her presentation topic. The paper is due on Thursday 5pm one week after you finish your presentation. For example, if you present during week 1 your paper is due on Thursday of week 2.

Independent proposals for the lab: Due Tuesday 10/16 5pm (my office)
I will meet with each of you individually on Thursday 10/18 to discuss the proposals.

Lab Paper 1: Due Thursday 11/8 by 5pm (my office).
Lab Paper 2: Due 12/14 by 5 PM (my office).
Lab Notebook: Due 12/14 by 5 PM (my office).
Final Exam: 12/21.