

# BI610 Scientific Reasoning Syllabus

**Class discussions/lectures:**

**Room – Novick Room, Streisinger**

**Tues/Thurs, 2-320p**

**Instructor**

**Dr. Adam Miller - [email](#)**

**Office hours: by request**

***Tentative Syllabus*** - any updates will be noted on Canvas.

The overarching goals of this course are to build skills in scientific literacy, critical reading, thesis development, and thesis presentation. This will be achieved by focusing on each student's thesis project, using peer review to help build an understanding of the structure of each step of the thesis, and by developing feedback relationships with the lab mentors of each student. The course will be based on primary research literature within each student's thesis focus, and will emphasize critical reading of the literature, critical thinking, and logical presentation of developing projects. Students will be required to present papers relating to the basis of their thesis, write a proposal demonstrating mastery literature relating to their thesis, and generate hypothesis and experiments to test their ideas. Extensive time in class will be provided to collaboratively work on each individual project, provide feedback to classmates, and receive feedback from colleagues. Independent work in developing the written and presented portions will also be required, and students will present the developed proposals orally and submit them as a final written research project.

## **Learning objectives for all students:**

- Become proficient at reading, discussing, and presenting primary research literature and critically evaluating data;
- Develop the ability to formulate hypotheses about the mechanistic bases for biological phenomena;
- Become proficient at designing experimental strategies to test hypotheses about the mechanistic bases for biological phenomena;
- Learn to give an oral presentation and to discuss primary research literature critically;
- Learn to give a concise and compelling oral presentation that identifies a scientific question, proposes a hypothetical answer to this question, and describes a novel experimental strategy to test this hypothesis;
- Learn to write a concise and compelling research proposal that identifies a scientific question, proposes a hypothetical answer to this question, and describes a novel experimental strategy to test this hypothesis.

**Course format:** The course will be a combination of lectures, class exercises, discussions, and student presentations and projects. This class is built around the concept of colleagues working together to better understand science and the scientific process.

**Material:** Assigned material for each class session are available in the Modules for that meeting date. It is required that material is read/watched ahead of class meetings.

The syllabus is “tentative” because we will work as a group to define our needs and goals in the course, therefore we will adapt as we go through the term. Updates will be made available ASAP in Canvas.

### **Grading Policy:**

#### **Participation (30% total)**

**Active Participation:** The goal of this course is to help you develop your thesis. This takes a lot of time and effort, while maintaining our other time obligations. Ultimately, your thesis is your own to make – this class is aimed at showing you pragmatic ways to approach developing your thesis – yet in the end it is up to you to bring it to fruition.

With that in mind, there will be reading/viewing material assigned, and ‘homeworks’ in which you develop your thesis research project. You have to come prepared to class. You will be working on your project in pieces, taking step by step dives into understanding your project, communicating it to your colleagues, and receiving feedback to improve it. You have to come to class prepared and actively participate.

#### **Research proposal development (30% total)**

**Proposal assignments, presentation, and written proposal:** Each student will be required to write and to present an original research proposal focused on their thesis topic. This process will be broken down into individual steps and ‘pieces’ of the proposal will be sequentially developed as the course progresses. At each step, written or presented material will be communicated to the class, as indicated on the course schedule.

#### **Final project (40% total)**

**Fellowship proposal:** Each student will develop an NIH F31 fellowship proposal and this will constitute their final project. This will be evaluated by each working group, by the instructor, and by the mentor of each student.