BIOL-UA 995 “Becoming a Scientist”

Syllabus:
Fall (yearly)
Wed: 3:30-4:45

Instructor: Gloria M. Coruzzi
gc2@nyu.edu
Office: 12 Waverly Place, Room 505
Office Hours: Fridays (3:00-5:00 PM)

Course Overview: Pursuing a scientific career is intellectually exciting and practically important to society. Succeeding in a scientific career is both an art and a science. Being successful requires intelligence and expertise in the laboratory, but equally important, it requires skills in scientific writing, oral communication, and ethics. In this course, “Becoming a Scientist”, undergraduate Biology majors who are conducting independent laboratory-based research projects will perform project-based learning through reading scientific papers, and through writing and oral communication of scientific results, while also gaining exposure to issues in scientific ethics and career paths. Each student will develop these skills using their honors thesis research project as a springboard. The course is divided into 5 modules: 1. Inspiring science and scientists, 2. Choosing your scientific problem, 3. Defining your scientific strategy (grant writing), 4. Honing your scientific communication skills, 5. Scientific ethics and career paths. The course is a mix of lecture, reading, writing, presentation and workshops.

REQUIRED BOOKS:


Writing: There is a writing assignment for each of the 5 modules. (5 pages of writing)

Presentations: 5 of the 5 modules also involves a student presentation (5 presentations)

Workshops: Students will work in groups to evaluate and modify the specific aims of their project.

Evaluations: Students will submit written summaries and constructive critiques of classmates’ scientific presentations.

Class participation: Peer feedback is an essential part of science and of this course. Students are expected to attend and contribute to all class sessions, which will be highly interactive. The class participation grade will be based on the frequency and quality of contributions to class discussions.

Grading
5 Writing Assignments: = 50%
5 Presentations:
5 written critiques/responses: = 10%
Class participation = 10%
BIOL-UA 995 “Becoming a Scientist”

Module 1. Inspiring Science and Scientists (Weeks 1-3)
In this module, students will select a scientist interview from the book “Speaking of Genetics” and select an associated paper. Each student will address the three points below in a one-page report and make a class presentation on:

1. **Inspiration that led to discovery**: Describe what was the inspiration for the discovery
2. **Inspirational Paper**: Describe the seminal discovery and show/describe the most significant figure
3. **Broader Impact**: Describe the implications or applications of the discovery.

**Week 1. Instructor (Coruzzi).**

*Scientist Interview*: H. Boyer (Field: Recombinant DNA). In “Speaking Geretics”: p. 31-41.


**Weeks 2 - 3. Student Presentations** - Follow above format (4 -5 students/week, 10-15 min each)


**Note**: Do not pick the following scientist who will be covered in Module 5: Alternate Science Careers Nicolas Wade; Elaine Strass; Judge John E. Jones III; Shirley Tilghman; Soraya de Chadarevian.

**Assignments:**

**Assignment**: Student selected Interview from “Speaking Genetics” and associated publication (see list of publications in “Further Reading p. 243-246).

**Presentation**: PowerPoint presentation addressing 3 points (One slide per point).

**Writing**: One page report on Inspiring Scientist and Paper addressing the 3 points above

Short response/constructive critique of a classmates’ presentation.

**Reading:**

A. “The Art of Being a Scientist”, by Snieder & Larner; Chapter 1: “What is Science”, p. 11-26
C. Yewdell (2008) *Taking the plunge* (p. 413-416); Part II; making discoveries (p. 491-494).
BIOL-UA 995 “Becoming a Scientist”

Module 2. Identifying Your Scientific Inspiration and Question. (Weeks 4-6)
In this module, students will read and present a paper that has inspired their senior thesis research. Each student will write a one-page report and make a 10-15 min presentation to the class on 3 points:

1. **Inspiring Paper**: What is the big question the paper addresses? Present & describe key figure.
2. **Thesis Research**: How did this discovery inspire your scientific question and approach? Include key figure
3. **Broader Implications**: Describe the potential implications or applications of your thesis work.

Week 4: Instructor (Coruzzi): Example


Weeks 5 - 6: Student Presentations: 4-5 students/week (10-15 min presentations each)

**Assignments:**

**Assigned paper**: Student selected scientific article that inspired their thesis research.

**Writing:**

1. One page report on the 3 points for “Defining your scientific Question”; 3 figs separate
2. Short response/constructive critique of a classmates’ presentation

**Presentation**: Student ppt presentation to class. One powerpoint slide per point with 3 figures.

**Readings:**


Module 3. Defining your Scientific Strategy: Grant Writing (Weeks 7 - 9)
In this module, students will – based on their research project – write the Specific Aims of their thesis research in NIH format. Their Specific Aims will include points below:
  - Specific Aims (One page):
    - Big picture relevance of your research
    - The problem/gap you are addressing.
    - Focus of project/what you hope to accomplish
    - Overall hypothesis
    - Experimental Approach/Rationale
    - List of THREE SPECIFIC AIMS with titles and short description.
    - Feedback of results to original question
    - Broader significance

Week 7. Instructor (Coruzzi): “Writing a Grant Application” (SEE PPT).

Week 8-9: Student Writing/Editing of Specific Aims

Assignments:
Writing: Specific Aims in NIH format (One page);
Short response/constructive critique of a classmates’ presentation
Presentation: Powerpoint presentation of Specific Aims (Intro slide plus, one slide per Aim).
Readings:
1. “Art of Being a Scientist”, Chapter 13. Writing Proposals (p. 196-205)
2. Sample of NIH Specific Aims and Grant
   a. NIH Grant strategy guideline
   b. Examples of Specific Aims/Grants: Eichenberger, Stripen, Stanford
   c. Nature “How to construct a summary abstract"
Module 4: Honing your Scientific Communication Skills. (Weeks 10-12)
In this module, students will present a powerpoint presentation on their thesis research. Their presentation (10 min) will include 4 points:
1. Overall Relevance
2. Specific Aims
3. Preliminary Results
4. Future Plans

Week 10. Coruzzi- Giving a scientific presentation (SEE PPT example)

Weeks 11-12: Student Presentations: 4-5 students/week (10 min each)

Assignments:
Writing: One page report on above topics related to Thesis work
Presentation: Powerpoint presentation (4 slides maximum).

Reading:

Video: Susan McConnell, Prof. Stanford Biology
“How to give an effective Scientific Presentation.

http://www.youtube.com/watch?v=Hp7Id3Yb9XQ
In this module, students will learn about Ethics and Scientific Career Paths.

Week 13. Ethics. Instructor will lead Class discussion of Fang et al 2012 article and implications.
Readings:


3. What is Ethics in Research (2011), by David Resnik, NIH
http://www.niehs.nih.gov/research/resources/bioethics/whatis/

PNAS vol. 109. No 42. P.17028-17033.

In this module, students will read and explore about different career paths in Science. Students will select an interview of a career path in “Speaking of Genetics” from amongst scientists who have entered into publishing, law, scientific writing, and administration.

Assignments:
Writing: Students will write a one-page essay on “My scientific career path”, with a discussion of how their vision of a career path may have been influenced by their laboratory experience at NYU, and by the course “Becoming a scientist”.

Presentation: Each student will present a synopsis of how one of the interviews on alternate career paths in Speaking of Genetics may have influenced their vision for a future career in science.

Readings:

4. “Speaking of Genetics” by Gitschier. Select an interview for:
   Science and Law: Judge John E. Jones III. p. 127-140.
   Science and Administration: The Making of a President (Shirley Tilghman), p. 211-220.