

Instructors: Mary Harrington and Alexis Ziemba

Lab Instructor: Narendra Pathak

Text: Harrington, M (2020) The Design of Experiments in Neuroscience. Cambridge. (you will get a copy from our library to use for the semester if you wish. Go to the Central Service Point in Neilson Library. They are on our Reserves shelves in the "Semester Loan" section.)

Academic Accommodations: If you have a disability and would like accommodations in this course, please contact the Office of Disability Services in College Hall 104 or at ods@smith.edu as soon as possible to ensure that we can implement accommodations in a timely manner.

We strive for Universal Design for Learning in this course. This is a process, we are learning more as we go, and we will aim to improve our efforts throughout the semester. Please come talk to us during office hours if you have suggestions for how we might better help you learn, or how we might better help other students.

GOALS

There are several **goals** in NSC 230. By actively participating in this course, you will:

- 1) **READ:** Gain understanding of how to read, interpret and critique reports from other scientists,
- 2) **RESEARCH:** Learn to design, conduct and analyze your own scientific experiments,
- 3) **USE YOUR HANDS:** Become familiar with a variety of laboratory techniques used in the field of neuroscience,
- 4) **DOCUMENT:** Learn how to keep an excellent lab notebook and
- 5) **COMMUNICATE:** Improve your skills in reporting your research through posters and writing scientific papers.

We will also spend some time talking with you about career options, and life as a scientist. It is our goal that participation in this course will help you choose your career path and will give you skills to succeed in the scientific workplace.

What are YOUR goals for this course?

Week 1 – Sep 7 – 9.

W Sep 7: Introductions. Complete Health forms. Advice about learning Zotero software and coding in R.

F Sep 9: Orientation to the JYI assignments. Getting to know each other. Complete CITI training.

Week 2 – Sep 12-16: Descriptive studies

- ✓ Readings for this week: pages 233-266 from “Ethical Issues in Scientific Research” (on Moodle), “Design of Experiments in Neuroscience” Chapter 1 and 2

M: Discussion – the BBB!

W: Discuss reading from “Ethical Issues in Scientific Research” and Chs 1 and 2.

F: Select date for class dinner. Animal use training. What is a “weekend reading”?

Week 3 – Sep 19-23: Descriptive studies

- ✓ Readings for this week: “Design of Experiments in Neuroscience” Chapter 3 and 4, and example article critique on Moodle. Personal strengths materials posted on Moodle.

M: Discuss weekend reading 1.

W: Discuss textbook readings for the week (Chs 3 and 4, sample article critique). Article for the critique due next week will be posted after class.

F: Team time: Meet with your team to finalize ground rules and discuss personal strengths. Complete worksheet. Draft as a team a 2 paragraph background on the BBB. Distill this to 5-6 bullet points. Post on your Google doc and share with instructors. Brainstorm ideas for your final zebrafish experiment.

Week 4 – Sep 26-30: Descriptive studies

M: Team time: Develop ideas for your final zebrafish experiment. Introduction to database search tools

W: Mountain Day! Get outside!!!

F: Discuss weekend reading 2.

Week 5 – Oct 3-7: Experimental variables

✓ Reading for this week: Design of Experiments in Neuroscience, Ch 6

M: Discuss Ch 6 textbook. Review identifying variables in an experiment. Review experimental designs.

W: Discuss weekend reading.

F: No class – get some sleep!

Week 6 – Fall break! Oct 12-14: Statistical analysis

✓ Reading for this week: In “Design of Experiments in Neuroscience” Ch 5 and 8

W: Discuss Chs 5 and 8 textbook. Article critique due.

F: Discuss article critique 2.

Week 7 – Oct 17-21: Writing Methods and Results

✓ Reading for this week: In “Design of Experiments in Neuroscience” Ch 9

M: Orientation to mid-term Methods and Results write-up.

W: Data analysis

F: Data analysis. Working on the IACUC approval forms for the Lab research

Week 8 – Oct 24-28: Writing Methods and Results

✓ Reading for this week: In “Design of Experiments in Neuroscience” Ch 10

M : Work on preparation of reports and experiment plans.

W : Writing up the methods sections. Animal approval plans are due in lab.

F : Writing the results section. Making graphs using Prism and R. **Draft Methods due in class.**

Week 9 – Oct 31 – Nov 4: more on Writing Methods and Results

M: Data analysis using R

W: Data analysis. The ANOVA.

F: Work on projects

Week 10 – Nov 7 - 11: Independent Research Projects

M: Discuss weekend reading.

W : Time for team projects.

F : Discuss weekend readings graphs, studying graphs.

Week 11 – Nov 14 - 18 : Independent Research Projects

M-F: Team time

Week 12 – Nov 21: Independent Research Projects

M Discuss weekend readings with teams. This class can be held on Zoom, just let the instructors know what you plan.

Week 13 – Nov 28-Dec 2: Independent Research Projects

M: Working on the Posters

W: Discuss stereotaxic surgery, AAV viral vectors, ABA connectivity atlas

F: Final article critique (in class) - we will come early and also stay after class to allow you time.

Week 14– Dec 5-9: Reflection

M: Guest: Dr. Davis. Post questions by Friday (2nd) 5 PM

MONDAY DEC 5 5-8pm CLASS DINNER

W: Discuss writing the intro and discussion. Review

F: Guest: Dr. Zhang. Post questions by Monday 5pm.

Dec 12 Go out to a bakery together or sleep in!

Assessment:

25% of your grade: critical reading of original articles (all individual work)

- Article Critique 1 (Sep 26): 5%
- Article Critique 2 (Oct 12): 5%
- *Optional AC3 (Nov 27), can replace lowest grade AC1 or AC2*
- Final Article Critique (Dec 2): 15%

50% of your grade: writing scientific posters and articles, designing and interpreting an experiment

25% - Lab grade (Dr. Pathak): see Lab syllabus. Final project methods and results, group authored.

25% - Class grade (Drs. Harrington and Ziemba):

- Experimental Report 1 (Zebrafish study – draft Nov2, final Nov 18 - individual work): 15%
- Experimental Report 2 (Final project; abstract, intro and discussion-individual work): 10%

25% Other Stuff

- 10% Class Involvement: for resourceful and responsible conduct in the lab (5%), high quality participation in the discussion of readings and strong efforts in reading responses (4%) and participation in extra-class events (1%). Self-assessed and instructor-assessed.
- 10% Teamwork - assessed by peer evaluation forms Week 8 and Week 15
- 5% “Journal of a Young Investigator” – Journal style writing throughout the semester with your personal reactions, thoughts, ambitions, etc.

Special rules: Late assignments will be marked down 5% for every day late, unless otherwise noted. No late article critiques will be accepted.

- ✓ **Each student can take a 48 h extension on any graded assignment. Just email an instructor with the message “taking 48h free extension” to claim this. No need to explain reasons. This must be requested 24 h prior to the due date by an email to your instructor.**