

NSC 301C: FRI-Research Methods (Fall 2009)

Lecture T and Th 9:³⁰-10:³⁰am in BUR 220 – Lab M 3-6pm or Th 3:³⁰-6:³⁰pm in PAI 4.14

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<u>Week</u>	<u>Lecture 1</u>	<u>Lecture 2</u>	<u>Lab</u> (Th or M)
1. W 8/26		Introduction	<i>no lab</i>
2. 8/31	Strong Inference	What is an inquiry?	Journals, Database Searches, Strong Inference
3. 9/7	<i>no class (Labor Day)</i>	Peer Review	(Labs start Th 9/10) Inquiry 1 Proposals
4. 9/14	Statistics	Statistics	Statistics Practice
5. 9/21	Statistics	Lab Safety and Inquiry 2	Inquiry 1 Presentations
6. 9/28	Ethics	Ethics	Inquiry 2 Proposals
7. 10/5	The Art of Presenting	My Job	Ethics Discussion
8. 10/12	Funding Research	Patents	Peer Review
9. 10/19	Writing	Writing	Inquiry 2 Presentations
10. 10/26	University Research (Who are all these people?)	My Job	Inquiry 3 Proposals
11. 11/2	Ethics	Ethics	Ethics Discussion
12. 11/9	Conflicting Data: human evolution and mtDNA	Holism vs Reductionism	Peer Review
13. 11/16	What is success?	What happens after graduation?	Inquiry 3 Presentations
14. 11/23	My Job	<i>no class (Thanksgiving)</i>	Lab on M, <i>but not Th (Thanksgiving)</i>
15. 11/30	What is a scientific meeting?	Wrap-up	Group Experiment

The lecture schedule will likely change, so check the class webpage for updates.

The lab schedule, proposal, and report due dates will not change.

The lab schedule is a little confusing. For the week of 8/31, labs will meet M and Th. Because of Labor day, we will not have labs on M 9/7, but we will have labs on Th 9/10. For most of the semester the lab schedule will be from Thursday to Monday. In other words, the Th labs will be first followed by the labs on M, and then a new lab the next Th. The exception will be the last week of the semester when we will have labs on M and then Th. A more detailed schedule is on the webpage.

The class **webpage** is: www.bio.utexas.edu/courses/stuart/class.html Lecture slides will be posted on the class webpage after each lecture. Updates, changes, and other critical information regarding the class will be posted on the webpage and sent via email. Check the webpage regularly and be certain that UT has your correct email address.

Course Description: The job of a scientist is to explore the unknown. Done correctly each experiment adds to what we know about how the universe works. Being involved in this endeavor is exciting and challenging. No one can teach you how to think, but by seeing what others have done and how they arrived at their successes or failures can give us information about what is, and is not, likely to succeed. We will look at some basic information about designing experiments and analyzing data, as well as about how science is done. The central component of this class will be experiments that you design and carry out. My overall goals are that you begin to develop a sense for how science works, how it fails, how we know things, and how to figure out what the next steps might be.

Lecture: T and Th 9:³⁰-10:³⁰am in BUR 220. During lecture I will introduce some specific, and other times general, information about deriving and analyzing data. We will also learn about other aspects about research like ethics, journals, and research funding. I expect you to take notes and to think and reflect on what we are discussing in lecture. Lectures will serve as a basis for experiments and other activities that we will do in lab.

Lab: You are registered for one of two labs either unique #49200 on M 3-6pm in PAI 4.14 or unique #49205 on W 3:³⁰-6:³⁰pm in PAI 4.14. Lab will be used for you to apply what you are learning in lecture. Sometimes we will practice principles from lecture. Other labs will be used to prepare for or report on the experiments that you are doing.

Inquiry Descriptions:

Inquiry 1: observational only, no chemicals etc. (2 weeks) For this inquiry you will work by yourself to develop, carry out, and analyze an experiment. Your experiment should not involve the use of any chemicals or advanced data collecting equipment. You should be able to collect your data through observation. Other than that, you are free to design an experiment to your liking. The proposal is due in lab Th 9/10 or M 9/14 and the written and oral presentations are due in lab on Th 9/24 or M 9/28.

Inquiry 2: open design (3 weeks) For this experiment you will work in groups of 3-5 students. Your group will develop, carry out, and analyze an experiment. You will need to decide what your experiment will be about, and what chemicals and/or data collecting material you will need to order. Each member of your group should have specific jobs, and the work should be divided evenly between all of the members. The proposal is due in lab on Th 10/1 or M 10/5 and the written and oral presentations are due in lab on Th 10/22 or M 10/26.

Inquiry 3: open design (3 weeks) For this experiment you will work in groups of 3-5 students. Your group will develop, carry out, and analyze an experiment. You can optimize experiments you did for inquiry #2, or you can design a new experiment. You will need to decide what chemicals and/or data collecting material you will need to order. Each member of your group should have specific jobs, and the work should be divided evenly between all of the members. The proposal is due in lab on Th 10/29 or M 11/2 and the written and oral presentations are due in lab on Th 11/19 or M 11/23.

Group experiment: (1 lab session) Everyone will do the same experiment, and we will analyze the results together. This will be done in lab during the week of 11/30.

- While some preparation of inquiries will occur during lab, most of the work on inquiries will occur outside of the assigned lab times.
- You will need a lab notebook to keep track of your hypotheses and data. This should be a bound type of lab notebook with non-removable pages. It does not need to have carbon paper.

Assignments and Grading: Differently from most courses at UT, the intent of this course is not to assign a grade, but to prepare you to be productive researchers. The assignments and grading scheme are designed to help you attain this goal.

Before you carry out any of your experiments, you will need to get approval. This approval will be based on the experimental proposal that you will write for each inquiry. These three proposals will be worth 25% of your grade.

After the completion of each lab, you will submit a written report as well as take part in an oral presentation. These will be worth 50% of your grade.

For some of the lectures, homework will be assigned. This will be announced in class and on the class webpage. The homework will be worth 25% of your grade.

Equipment: During your inquiries you will be able to check out items for use outside of the classroom from UTeach, FRI, and the Chemistry Department. You are responsible for all items in your care and must return them in a timely fashion. Failure to do so may result in financial bars.