

# UGS 303: FRI-Research Methods (Fall 2011)

Lecture M and W 9-10am in PHR 2.114 – Lab T 3:30-6:30pm OR T 6:30-9:30pm in BME 2.506

**Prof: Dr. Stuart Reichler**

**Office: Bio 6**

**E-mail: sreichler@mail.utexas.edu**

**Phone: 471-1074**

**Office Hours: anytime, contact for an appt.**

TA: Sonya (Tsan-Yu) Chiu

Bio 15

sonyachiu@mail.utexas.edu

471-1074

contact for an appointment

<b>Week</b>	<b>Lecture 1</b>	<b>Lecture 2</b>	<b>Lab T 3:<sup>30</sup>-6:<sup>30</sup> pm OR 6:<sup>30</sup>-9:<sup>30</sup> pm</b>
1. W 8/24		Introduction	<i>no lab</i>
2. 8/29	Strong Inference	What is an inquiry?	Journals, Database Searches, Strong Inference, Termites
3. 9/5	<i>no class (Labor Day)</i>	Statistics	<b>Inquiry 1 Proposals due</b>
4. 9/12	Statistics	Statistics	Statistics Practice
5. 9/19	Lab Safety and Inquiry 2	University Lecture Series	<b>Inquiry 1 Presentation</b>
6. 9/26	Authorship and Peer Review	Ethics	<b>Inquiry 2 Proposals due</b>
7. 10/3	Ethics	Presenting and Writing	Ethics Discussion
8. 10/10	Funding Research	Patents	Peer Review
9. 10/17	Research vs Education	If you can't say something nice... criticizing research about GM crop safety	<b>Inquiry 2 Presentations</b>
10. 10/24	University Research (Who are all these people?)	My Job	<b>Inquiry 3 Proposals due</b>
11. 10/31	Ethics	Ethics	Ethics Discussion
12. 11/7	My Job	Holism vs Reductionism	Peer Review
13. 11/14	What is success?	What happens after graduation?	<b>Inquiry 3 Presentations</b>
14. 11/21	My Job	<i>no class (Thanksgiving)</i>	<i>no lab... Thanksgiving</i>
15. 11/28	Why do we not solve more problems?	Wrap-up	Group Problem Solve

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

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

The class **webpage** is: [www.bio.utexas.edu/courses/stuart/class.html](http://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/or Blackboard. Check the webpage and Blackboard 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 make discoveries, and how to figure out what the next steps might be.

**Lecture:** M and W from 9-10am in PHR 2.114. Lectures will serve as a basis for your inquiries and other activities that we will do in lab. I will present guidelines for your inquiries and reports, information about deriving and analyzing data, as well as topics related to being a researcher. I expect you to take notes and to think and reflect on what we are discussing in lecture.

**Lab:** Labs will be held in BME 2.506. You are registered for one of two labs either unique #65035 on T 3:30-6:30pm or unique #65040 on T 6:30-9:30pm. Labs will be used for you to apply what you are learning in lecture. During some labs, we will practice principles from lecture while other labs will be used to prepare for or report on the experiments that you are doing. When you are working on your inquiries, there will be extra lab times scheduled for you to have access to the lab equipment.

### **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 on T 9/6 and the written and oral presentations are due in lab on T 9/20.

**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 T 9/27 and the written and oral presentations are due in lab on T 10/18.

**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 T 10/25 and the written and oral presentations are due in lab on T 11/15.

- 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 may be an assignment that we do in class or that you are asked to do outside of class. The outside class assignments will be announced in class and on the class webpage. The homework will be worth 25% of your grade.

Assignments can be turned in late for reduced credit, the penalty for late work is a 10% reduction in grade per day late.

Grade corrections will only be accepted for two weeks after a grade is posted on Blackboard.

**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. You must return them in a timely fashion, and you are financially responsible for any damage to the equipment. Failure to do so may result in financial bars.