PHY 341, BIO 337, and CH 368, Research Methods for UTeach, Fall 2016

Date	Topic	Project in Progress	Reading	Homework Start	Due
Aug 24	Curiosity and Scientific Inquiry Balloons: Inquiry I Preparation	Inquiry I	Feynman, part II		
Aug 29	Falling objects; Experimental design I Rolling objects, Experimental design II		Text RMfS, Chapter 1		
Aug 31	Safety, Inquiry II	Inquiry II	Text RMfS, Chapter 2	1 (Inquiry Grading)	Inquiry I
Sep 5	Labor Day				
Lab	Homework 1 Grading Discussion+Inquiry II		Text RMfS, Appendix A	2 (Excel)	Homework 1
Sep 12	Dissecting a Paper Statistics: Motivation, Overview		Sample Inquiries	3 (Human Subjects)	Inquiry II Proposal
Sep 14	Graphing and Calibration, Inquiry II				Homework 2
Sep 19	Statistics: Standard Deviation, Uncertainty		Text RMfS, Chapter 3	4 (Statistics)	Homework 3
Sep 21	Inquiry II				
Sep 26	Statistics: Distributions, Central Limit Theorem and Z tests				Homework 4
Sep 28	Inquiry III	Inquiry III		5 (Inquiry grading)	Inquiry II draft
Oct 3	Statistics: *t* tests and Inquiry II partner grading				Homework 5
Oct 5	Inquiry III+χ^2			6 (χ^2)	
Oct 10	Scientific Literature: Existence&Searching		Text RMfS, Chapter 5	7 (Literature Search)	Homework 6
Oct 12	Inquiry IV planning	Inquiry IV	Presentation articles	9 (Position Paper)	Homework 7
Oct 17	Inquiry II presentations				Inquiry II Final
Oct 19	Inquiry IV; proposal review				Inq IV Proposal 1,
Oct 24	Modeling: Order of magnitude		Text RMfS, Chapter 4	8 (Estimation)	Inq IV Proposal 2
Oct 26	Inquiry IV				Inquiry III final
Oct 31	Modeling: M&Ms + Temperature				Homework 8
Nov 2	Inquiry IV			10 (M&Ms)	
Nov 7	Numerical Modeling: Equations in Excel	Presentations			Homework 9
Nov 9	Inquiry IV				Homework 10
Nov 14	Modeling Conclusion and Work Time			11 (Inquiry Grading)	Inquiry IV draft
Nov 16	Inquiry IV				
Nov 21	Presentation Preparation and Inquiry discussions with partners				Homework 11
Nov 23	Thanksgiving				
Nov 28	Presentations		Feynman, Cargo Cult...		
Nov 30	Inquiry IV				
Dec 5	Presentations				
Final Exam Periods: Final Presentations (9-11, Sat Dec 10,2-5: 11-1, Fri Dec 9, 2-5)					Inquiry IV final

Research Methods Learning Objectives

- Pose scientific questions and design experiments to answer scientific questions.
- Design experiments to reduce systematic and random uncertainty.
- Use statistics to interpret experimental results.
- Use probes and computers to gather and analyze data.
- Treat human subjects in an ethical fashion.
- Apply safe laboratory procedures.
- Create mathematical models of scientific phenomena.
- Find and read articles in the scientific literature.
- Apply scientific arguments in matters of social importance.
- Write scientific papers.
- Review scientific papers.
- Give oral presentations of scientific work

Course Information, Research Methods, Fall 2016

BIO 337, CH 368, PHY 341

Lessons: M 9–11, M 11-1; **Lab**: W 9-11, W 11-1

Web page: `Canvas`

Instructors

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Course Requirements and Grading Policy:

All assignments for this course will be submitted to Canvas. Therefore we suggest that you consider increasing your bandwidth, say to 10GB or 50 GB/week. See http://www.utexas.edu/its/help/network/403.

You must purchase the book *Surely You are Joking, Mr. Feynman* and a laboratory notebook that can make duplicate copies of pages. The course text is *Research Methods for Science* (Cambridge University Press, 2011). You can purchase this text at university bookstores or online. In addition, you can access an electronic copy of this text for free on Blackboard under Course Documents, in the file *RMC.pdf*. This copy is for your personal use and is not to be sent to others or shared electronically.

The course grade will be based upon 13 elements. These are:

10 pts Class and laboratory attendance, as determined by checks of active participation and submission of in–class assignments.

27 pts Homework assignments

5 pts Inquiry 1

2 pts Inquiry 2 proposal

3 pts Inquiry 2 draft. The draft need not be accepted if the proposal was not turned in on time.

3 pts Inquiry 2 oral presentation

10 pts Inquiry 2 final writeup. The final writeup need not be accepted unless the first draft was turned in on time, the presentation was delivered, and the student participated in partner grading.

10 pts Inquiry 3 writeup

3 pts Inquiry 4 proposals

2 pts Open question presentation

5 pts Inquiry 4 draft. The draft need not be accepted if the proposal was not turned in on time.

5 pts Inquiry 4 oral presentation

15 pts Inquiry 4 final writeup. The final writeup need not be accepted unless the first draft was turned in on time, the presentation was delivered, and the student participated in partner grading.

Some course topics will be covered only in class, and **you must be present** to receive credit. If you turn assignments in late without approval, you will lose 10% of the value of the assignment for each day it is late. Your final inquiries writeups will be graded according to a rubric you will find in your course text and checklists you can find on the course website. Inquiry drafts will be graded by checking off whether the major sections of the report have been completed (Abstract, Introduction, Design, Analysis, Conclusions).

Rewrite policy: Final drafts of Inquiries 1, 2, and 3 that have been turned in on time can be **rewritten** for additional credit. Contact your lecture instructor for details of the policy.

Please note that the final inquiry must be related to the **subject** for which you have signed up for the class. For example, if you are registered in biology, your final inquiry must be a biology inquiry.

Research Methods carries the **Independent Inquiry flag**. Independent Inquiry courses are designed to engage you in the process of inquiry over the course of a semester, providing you with the opportunity for independent investigation of a question, problem, or project related to your major. You should therefore expect a substantial portion of your grade to come from the independent investigation and presentation of your own work.

Research Methods carries the **Quantitative Reasoning flag**. Quantitative Reasoning courses are designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your adult and professional life. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real-world problems.

Research Methods carries the **Writing flag**. Writing flag courses are designed to give students experience with writing in an academic discipline. In this class, you can expect to write regularly during the semester, complete substantial writing projects, and receive feedback from your instructor to help you improve your writing. You will also have the opportunity to revise one or more assignments, and to read and discuss your peers' work. You should therefore expect a substantial portion of your grade to come from your written work.

If you ever lose a substantial number of points on any assignment because it is not written well please use the **Undergraduate Writing Center**, FAC 211, 471-6222: http://www.uwc.utexas.edu/). The Undergraduate Writing Center offers free, individualized, expert help with writing for any UT undergraduate, by appointment or on a drop-in basis. Any undergraduate enrolled in a course at UT can visit the Center for assistance with any writing project. Writing Center consultants work with students from every department on campus, for both academic and non-academic writing. Getting feedback from an informed audience is a normal part of a successful writing project. Consultants help students develop strategies to improve their writing. The assistance they provide is intended to foster independence. Each student determines how to use the consultant's advice. The consultants are trained to help you work on your writing in ways that preserve the integrity of your work.

Final grades will be determined from 92–100, A; 90–92 A-; 88–90 B+; 82–88, B; 80-82, B-; 78–80; C+; 72–78, C; 70–72, C- 68–70 D+; 62-68, D; 60–62, D-; 0–60, F.

Research Methods will require you to use **equipment** provided by UTeach. In many cases you will check materials out for use outside the classroom. 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.

The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471- 6441 TTY.