PHY 341, BIO 337, and CH 368, Research Methods for UTeach, Spring 2014

Date	Topic	Project in Progress	Reading	Homework	Due by midnight day before
Jan 13	Course overview and policies				
Jan 15	Balloons: Inquiry I Preparation	Inquiry I	Feynman, part II		
Jan 20	Martin Luther King holiday				
Jan 22	Safety, Inquiry II		Text, *RM.fS* Ch 1		Inquiry I
Jan 27	Falling objects; Experimental design I&II	Inquiry II	Text, *RMfS* Ch 2	1 (Inquiry Grading)	
Jan 29	Homework 1 Grading Discussion+Inquiry II		Text, *RMfS*, Appx A	2 (Excel)	Homework 1
Feb 3	Statistics: Motivation, Overview, Sampling and Averaging		Sample Inquiries	3 (Human Subjects)	Inquiry II Proposal
Feb 5	Inquiry II				Homework 2
Feb 10	Statistics: Standard Deviation, Standard Error		Text, *RMfS*, Ch 3	4 (Statistics)	Homework 3
Feb 12	Inquiry II				
Feb 17	Statistics: Distributions, Central Limit Theorem and Z tests				Homework 4
Feb 19	Inquiry III	Inquiry III		5 (Inquiry grading)	Inquiry II draft
Feb 24	Statistics: *t* tests and Inquiry II partner grading				Homework 5
Feb 26	Inquiry III+χ^2			6 (χ^2)	
Mar 3	Scientific Literature		Text, *RMfS*, Ch 5	7 (Literature Search)	Homework 6
Mar 5	Inquiry IV planning	Inquiry IV			Inquiry III
Mar 10	Spring Break				
Mar 12	Spring Break				
Mar 17	Inquiry II presentations				Inq IV Proposal 1
Mar 19	Inquiry IV; proposal review				Homework 7
Mar 24	Modeling: Order of magnitude		Text, *RMfS*, Ch 4	8 (Estimation)	Inq IV Proposal 2
Mar 26	Inquiry IV				Inquiry II final
Mar 31	Modeling: M&Ms + Temperature			9 (M&Ms)	Homework 8
Apr 2	Inquiry IV				
Apr 7	Numerical Modeling: Equations in Excel	Presentations	Presentation articles	11 (Position paper)	Homework 9
Apr 9	Inquiry IV				
Apr 14	Presentation Preparation			10 (Inquiry Grading)	Inquiry IV draft
Apr 16	Inquiry IV				Homework 10
Apr 21	Presentations				Homework 11
Apr 23	Inquiry IV				
Apr 28	Presentations		Feynman, Cargo Cult Science		
Apr 30	Inquiry discussions with partners				
Final Exam Periods: Final Presentations (Marder, Sat May 10, 2-5; Kumar, Wed May 7, 7-10)					Inquiry IV final

Research Methods Learning Objectives

- Pose scientific questions and design experiments to answer scientific questions.
- Design experiments to reduce systematic and random errors.
- 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