

INSTRUCTOR: Professor Barbara Jones
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Office Hours: TBA by mutual agreement

CLASS SCHEDULE: Meet first day Tues Jan 10th at SERF 329 at 2pm
Tu 2:00 – 3:20 p.m. SERF 329 or WLH 2123
Thurs 2:00 – 3:20 p.m. SERF 329 or WLH 2123

Physics 180/280 is a class devoted to studying how people learn and understand concepts in undergraduate physics and some approaches to teaching physics. Readings in physics, physics education, and cognitive science will be used. Fieldwork in a physics teaching environment is a requirement of the class. This is a four-unit class. It may substitute for TEP 105.

TEXTS: You should have your own copy of “Teaching Physics” by Edward Redish, pub Wiley. There will be required readings from published literature each week. These papers will be made available as pdf files on the class web page.

PREREQUISITES: Completion a lower division physics sequence, or consent of instructor.

REQUIREMENTS: It is important that you attend class and participate in discussions. This is a 4-unit class so you should anticipate approximately 6-10 hours of time per week outside of class. You will be expected to read and comment on assigned papers, analyze physics problems, devise, pursue, and report on a project involving fieldwork, and write a final paper on your research.

CLASSWORK: We will meet on Tuesdays and Thursdays. Most of the Tuesday classes will be devoted to discussion of the Redish text and papers from physics education literature (available by hard copy or on line). The Thursday classes will examine the teaching of a variety of topics in physics.

You will be expected to read the papers assigned for the Tuesday classes ahead of time, and make your own notes. You should turn in, before the Tuesday class, typed comments on at least three points you found interesting or controversial. This should ensure that you have both read and thought about the material before coming to class. Each week one or two students will be asked to present the paper and lead discussion (arranged in advance). I will be available in and out of class hours to support students making presentations.

You will also be expected to hand in solutions to a few assigned physics problems at different levels. Your work should include your own solution to the problem, your assessment of the main point of the problem and your comments on the knowledge required of the student to complete the solution (math, physics, general background etc). You should also include a description of the strategies you used to reach your solution and comments on the appropriateness of the problem and any improvements you would recommend. This should be handed in at class on Thursdays.

FIELDWORK: You are in a university where, at any time >2,000 students are taking a variety of physics classes. You are one of them. Maybe you are also a TA for one of these classes. Around us, in the community, physics is being taught in the high schools, community colleges, state colleges etc. Your fieldwork should give you an experience in “hands-on” teaching. It should allow you to observe and collect data, evaluate and reflect on the teaching, and to explore your ideas or test ideas presented in the readings. If you are working as a TA it may be possible to craft your fieldwork around your TA work. Each person’s fieldwork experience will be different. I would prefer that you each conceive your own projects, but I am happy to help with suggestions. Collaborative projects are welcome. We should start to discuss ideas seriously by the end of second week. You should keep field notes on each teaching session to help you record and develop your project. I will review these with you so we can discuss your activities and plans, with the goal that everyone is able to write a good final paper.

GRADUATE STUDENTS: For this class to count as a graduate class some additional work is required. I am planning to hold a weekly reading group on PER issues. Participation in this group would satisfy the extra graduate requirement. Undergrads are also invited to attend if they wish. I am open to other proposals from the grads about ways to fulfill the graduate nature of the class.

Physics 180/280: Final Project Overview

Purpose: to have you explore in depth a topic of your choosing, relating to teaching and learning in physics (which, hopefully, just maybe, has something to do with your field-site work).

Length: 8-10 pages (double spaced). Your work must be **typed**. This may be the only inflexible rule. Don't forget a **spell checker** please.

Due date: Approx March 17th 2006, in my office or mail box SERF 338, details to be negotiated. I will happily review and comment on plans, drafts, etc with no jeopardy to your grade. I work with you on analysis etc. Advice – get started early.

Structure: Your projects will vary, but here are some general guidelines:

Introduction: - states the problem or area of exploration

- list your research questions and hypothesis **

**(PURPOSE OF DATA COLLECTION)

- gives a summary of your paper

Background: - locates your topic in relevant literature

- gives a history of your field-site / working environment

Body: Data: - how was your data collected

- what difficulties were there in your data collection (why / when was it possible to collect data and why/when not) - were you able to prove your hypothesis?

- presentation of collected data -- e.g. fieldnote excerpts, taped conversation pre-post test data, etc. Make sure this is an orderly presentation. For bulk data, include an appendix, rather than inserting volumes of data into the body. (e.g. if you developed sample homework problems it is okay to put one or two into the paper, but include the 50 or so used in an appendix)

Analysis/Results/Discussion:

- what results do your data suggest

- how does this prove/ disprove your hypothesis

- how does this support or refute alternative theories

Conclusion/ Summary:

- summarize your paper / work

- what future directions does this research point to --- if you were to continue the project what would you do next / recommend to others

As we will discuss in class, there are many ways to approach the final project. I expect you will have questions. Please feel free to contact me. I'll try my best to help you devise and enjoy a good fieldwork experience and write a good paper.