Teaching College-Level Science and Engineering

Course Number: 5.95J, 6.982J, 7.59J, 8.395J, 18.074J, 2.879J
Fall 2012

TIME AND PLACE
Tuesdays 9-11, Room _____

INSTRUCTOR
Instructor name, room number, telephone number, email address
Office Hours: By appointment

COURSE DESCRIPTION
This course meets once a week, for 2 hours.

This participatory course focuses on the knowledge and skills necessary for teaching science and engineering in higher education. This course was created in response to an appeal by science and engineering graduate students planning to pursue careers as academics who wanted to complement their research training with opportunities to improve their teaching. Thus, this course was designed to demonstrate how we can (1) use the latest research in student learning to improve teaching, (2) develop a course, (3) promote learning through active learning techniques, (4) promote problem solving and critical thinking by designing appropriate exams and assignments, and (5) address problems and pitfalls in teaching. The course will focus on teaching science, technology, engineering, and mathematics at the college level.

One of the most important findings in educational research is that students learn best by doing. Each class session will include opportunities for you to engage in active learning, small group activities. In-class and out-of-class assignments and readings will help you develop your own teaching practice. This course will also aid you in developing your professional identity as a teacher by giving you insights into how things work in the academy.

PREREQUISITES
There are no prerequisites for this course except passion for teaching and curiosity about the learning process.

INTENDED LEARNING OBJECTIVES
If I have done a good job as the instructor and you have put effort into the course, by the end of the semester, you should be able to:

1. Describe and summarize the latest research findings in science, technology, engineering, and mathematics learning in higher education, including research on diversity.
2. Illustrate how to apply the learning sciences research findings in your own teaching.
3. Construct intended learning objectives for a course.
4. Plan and implement active learning techniques that are aligned with learning objectives.
5. Write homework and exam questions that assess if learning objectives have been met.

6. Use student feedback to improve your teaching.
7. Describe resources and skills that can be used to address some of the challenges that come with teaching college students.
8. Write a teaching philosophy statement.
9. Plan and present an effective 6-10 minute class session.

EXPECTATIONS

Because I hope this is a class in which you will learn from one another as well as from me, my expectations about our work together this semester include:

- That you are willing to share your knowledge, opinions, and ideas in class.
- That you are open to the ideas and knowledge of your peers.
- That you provide clear, honest, concrete, and sensitive feedback to peers in the course about their work.
- That any concept that is unclear or confusing will be explored and examined.

CLASS FORMAT

At the beginning of each class, I will answer questions from the feedback forms from the previous lesson. This activity helps me connect what you know with what you found confusing before starting on the next lesson. During the lesson, you will have the chance to participate by asking questions at any moment and through small group activities. At the end of the lesson, I will ask you to complete feedback forms for that day's session.

TEXTS & MATERIALS

You are expected to complete the relevant reading *before* each class session. The readings for each class are listed on the Stellar Course Management website under "Materials" and under "Homework".

Some of the readings have been taken from the following 3 books. You may wish to purchase some or all of them (if not for this course – sometime in the future).

Wilbert J. McKeachie, et al., *Teaching Tips*, 9th edition, D.C. Health & Co., 1994.

Phillip C. Wankat and Frank S. Oreovicz, *Teaching Engineering,* McGraw-Hill, 1993. Also available at: https://engineering.purdue.edu/ChE/AboutUs/Publications/TeachingEng/index.html

Barbara Gross Davis, *Tools for Teaching,* Jossey-Bass Publishers, 1993.

ASSIGNMENTS

There are 8 post-class homework assignments. A description of each of these homework assignments is provided in the homework section of this course's Stellar Course Management website. The due dates for these assignments are posted on the class schedule. Homework is due at the end of class.

In addition, each class will have at least one small-group, active learning assignment.

Finally, each student will participate in a microteaching session, wherein she/he will give a 6-10 minute presentation to her/his peers (the rest of the class). Microteaching guidelines (for presenters and observers) will be distributed via the Stellar Course Management site. Microteachings will be scheduled later in the course.

GRADING

The class is mandatory Pass-No Pass record. However, you must satisfactorily complete all of the post-class homework assignments and participate in the in-class discussions and activities to pass the class.

COURSE SCHEDULE

Session #	Date	Topic	Deadlines
1	February 3	General principles of teaching	Homework 1 out
2	February 10	Findings from the learning sciences: how students learn best	Homework 1 due Homework 2 out
3	February 24	Taking account of misconceptions; avoiding rote learning	
4	March 3	Designing a course and constructing a syllabus	Homework 2 due Homework 3 out
5	March 10	Designing homework and exam questions	Homework 3 due Homework 4 out
6	March 17	Teaching interactively in large and small groups	Homework 4 due Homework 5 out
7	April 7	Lecture planning and performing	Homework 5 due Homework 6 out
8	April 14	Teaching with blackboards and slides	Homework 6 due Homework 7 out
9	April 28 - May 4	Microteaching Sessions	
9	May 5	Political barriers to educational change	Homework 7 due Homework 8 out
10	May 12	Course summary and your questions	Homework 8 due