Professional Preparation: Teaching Chemical Engineering

Course Description:

This course introduces new graduate student instructors to the theory and practice of teaching and learning within the discipline of Chemical Engineering. The course is designed to allow new teachers to integrate their experience with insights from cognitive and applied research in teaching and learning. The course also provides context for the expectations and practice of GSI-ship in the Chemical and Biomolecular Engineering Department at the University of California, Berkeley.

Instructor:

Dr. Shannon Ciston   sciston@berkeley.edu   101-A Gilman   510-643-8544

Office Hours: Mondays 2:00-4:00 pm, Tuesdays 10:00-11:00 am, and by appointment

Class Meeting Schedule:

Mondays   1:00-2:00 pm   Cory 289

Learning Objectives:

Transfer: Students will be able to independently use their learning to:

- Develop effective homework assignments, exam problems, and discussion section activities in current and future GSI assignments
- Apply notions of student learning to their own roles as students and scholars

Understandings: Students will understand that:

- There is a difference between surficial learning and deep learning
- Active engagement strategies and student-centered course design are more effective at achieving deep learning compared to traditional instructor-centered or coverage-based course design
- GSIs are an important instructional and mentoring resource for undergraduate students, including students at risk
- Effective instructors can develop their own teaching style

Course Structure

This course blends theory and application through a combination of seminar-style discussions on assigned readings and sessions focused on the practical aspects of GSI-ship in the CBE Department. On some weeks, you will complete a reading prior to class, and come prepared to discuss your insights from the readings and their relationship to your experience as a student and instructor. Other weeks will have a more variable structure featuring information to help you get oriented to the culture and resources at UC Berkeley CBE, workshop sessions with content you create, and opportunities to discuss your GSI challenges and joys.

Topics Outline:

1. Student-Centered, Objectives-Based Course Design
   a. Bloom's Taxonomy
   b. Understanding by Design
2. Assessing Student Learning
3. Evaluation of Teaching Effectiveness
4. Teaching Methods
5. Facilitating Group Work
6. Mentoring
7. Troubleshooting

Assignments:

The assignments for this course are grounded in your chosen "Project Course", which can be any course selected from the undergraduate chemical engineering courses offered at UC Berkeley. This should be a course that you are teaching, or that you wish to teach.

- **Discussion Lesson Plan** due September 24
  - Choose a "Project Course" from among the required undergraduate courses (Chem Eng 40, 140, 141, 142, 150A, 150B, 154, 160, or 162). These have course descriptions and prerequisites here: guide.berkeley.edu/courses/chm_eng. Use this "Project Course" as a basis for your content-development assignments in 375.
    - Review the syllabus and learning outcomes for that course, and speak to someone familiar with the course, such as the faculty instructor or a previous GSI.
    - You may also wish to review materials available on alternate teaching modes and national standards for similar courses, available on the bCourses Files section.
  - Develop a lesson plan and associated materials for one discussion section meeting, to support students in achieving one or two student learning outcomes, based on the Bloom's taxonomy structure.
  - In your assignment submission, identify which course your discussion lesson plan supports, and articulate the student learning outcome(s) you are targeting.
  - Provide details regarding student preparation (any readings, problems that should be done ahead of time, or lecture topics that directly precede your discussion).

- o Describe how you will use your time, indicating probing questions that you will ask, points you intend to emphasize, examples that you will demonstrate, activities the students will complete, etc.
- o Upload your assignment to the bCourses website by 1:00 pm.
- o Include your name and the word "discussion" in your file name, such as Ciston_discussion.pdf

- **Critique Essay**   due October 22

  - o Choose one topical subfolder from within the "Topical Reading Options for Assignment Two" folder. Your options are: Course Design, Assessing Student Learning, Evaluating Teaching Effectiveness, Methods, Facilitating Groupwork, Mentoring, and Troubleshooting.
  - o Delve deeper with a critique of at least three readings in this area. You may add additional readings on the subject to your analysis if you like. Your essay should be shaped by the type of readings you choose and the way it resonates or challenges you.
  - o Some *sample* (not limiting) questions to consider:
    - ▪ Are the authors' perspectives supported by my experience as a teacher/learner?
    - ▪ What is the quality of the evidence the authors present?
    - ▪ Is the advice presented in the readings applicable to classroom practice in our discipline?
    - ▪ What would be a typical response of a critic or "devil's advocate", and how could the authors respond to defend their position against this response?
  - o Upload your essay to the bCourses website by 1:00 pm.
  - o Essays should be two to four pages, single-spaced, 11-12 point font.
  - o Your file name should include your name and the word "critique", such as: Ciston_critique.pdf
- **Peer Observation and Reflection**   due November 5
  - o At least once during this semester, invite a peer to observe your teaching and provide feedback.
    - ▪ If you are not a GSI this semester, Dr. Ciston can assist you in reserving a classroom space and time for you to practice teaching; your material from the Discussion Lesson Plan assignment would be a fine choice.
  - o Please choose your peer observer from your 375 classmates.
    - ▪ If all of your 375 classmates have conflicts during your teaching time, please ask Dr. Ciston, another graduate student peer, or someone from the Berkeley Center for Teaching and Learning to observe your teaching.
  - o Your observer should provide constructive notes that identify your strengths and areas for growth, in a written format.
  - o After reviewing these notes, write a one to two page reflection, single-spaced 11-12 point font, summarizing how you think the session went, and how you can use the peer observer's notes for improvement.
  - o Upload the observers notes plus your reflection to the bCourses website by 1:00 pm. One combined file or two separate files are both accepted.

- o   Your file name(s) should include your name and the word "review and/or reflection", such as: Ciston_review.pdf and Ciston_reflection.pdf

- **Content Creation: Develop Your Own Assignment**   due November 19
  - o   For your chosen "Project Course", develop one assignment.
  - o   Articulate the learning objectives for the assignment and identify the targeted level for each of the objectives.
  - o   Include the full assignment statement or problem statements.
  - o   Include the solution or grading rubric for the assignment.
  - o   Upload your essay to the bCourses website by 1:00 pm.
  - o   Submissions should be one to three pages, single-spaced, 11-12 point font.
  - o   Your file name should include your name and the word "creation", such as: Ciston_creation.pdf
- **Teaching Philosophy Evolution Essay**   due November 26
  - o   A teaching philosophy is a statement of your philosophy about, approach to, or beliefs about effective teaching. Some prompts to think about your teaching philosophy are: "What kind of teaching do you think promotes deep and lasting learning?" "Why is teaching important to you?" "What metaphor describes your idea of teaching and learning?"
  - o   This essay should focus on how your teaching philosophy **changed** or **evolved** during this semester. How did the readings and discussions shape your vision of effective teaching? What did the experience of teaching as a GSI in our department teach you about learning?
  - o   Upload your essay to the bCourses website by 1:00 pm.
  - o   Essays should be one to three pages, single-spaced, 11-12 point font.
  - o   Your file name should include your name and the word "philosophy", such as: Ciston_philosophy.pdf

These assignments will be evaluated for completion and quality. You will receive feedback on each assignment from the instructor.

Course Grading

This course has pass/no pass grading. I expect that you will make an honest effort in each assignment and will attend all the course meetings. In order to pass the course, you must complete each of the five assignments with a passing quality, attend at least nine of the course meetings, and abide by the community guidelines for civil discussion.

Expectations of Conduct:

We are privileged to participate in the pursuit of knowledge and truth in higher education, and students and instructors are expected to maintain an environment of respect for the course of study and one another at all times. Our classroom is a safe space for people diverse in traits and ideology to exchange ideas and grow in experience and knowledge. All students are welcome in our course, and we will respect our differences including those in gender, race, ethnicity, nationality, religion, sexual orientation, gender identity, age, culture, experience, and socio-economic background. No form of excessive teasing, discrimination, or bullying shall be tolerated at any time. Concerns about classroom environment should be addressed immediately to the instructor.

Please see the Guidelines for Respectful, Constructive, and Inclusive Discussion.

Expectations of Academic Integrity

We must respect one another's ideas by giving credit where it is due, avoiding all forms of plagiarism and cheating. Any item submitted by you and that bears your name is presumed to be your own original work that has not previously been submitted for credit in another course.

You may use words or ideas of other individuals from publications, web sites, or other sources, but **only with proper attribution**. "Proper attribution" means that you have fully identified the original source and extent of your use of the words or ideas of others that you reproduce in your work for this course, usually in the form of an endnote.

If you are not clear about the expectations for completing an assignment, be sure to seek clarification from the instructors beforehand.

Finally, you should keep in mind that as a member of the campus community, you are expected to demonstrate integrity in all of your academic endeavors and will be evaluated on your own merits. So be proud of your academic accomplishments and help to protect and promote academic integrity at Berkeley.

--Modified from *Report of the Academic Dishonesty and Plagiarism Subcommittee, June 18, 2004.*

Accommodation of Special Situations and Needs

If you need accommodations related to physical, psychological, or learning abilities, please speak to Dr. Ciston after class or during office hours.

If you must miss class because of religious observation, holy day, or off-site interview please speak to Dr. Ciston after class or during office hours, at least one week prior to the absence, in order to make arrangements to submit work early. It is your responsibility to review materials outside of class on your own to make up for class time missed.

(UC Berkeley's policy: http://opa.berkeley.edu/religiouscreedpolicy.htm)

Tentative Class Schedule: (subject to modification)

Date	Topic	Homework Due
27-Aug	Course Introduction, Objectives-Based Design	**Read:** *What the Best College Teachers Do*, Chapter 2: What Do They Know about How We Learn? Ken Bain, Harvard University Press, edition 1, 2004.
10-Sep	Objectives-Based Design (cont.) Understanding by Design Framework	**Read:** Excerpt from The Understanding by Design Guide to Creating High Quality Units
17-Sep	Assessing Student Learning	**Read:** Designing Tests to Maximize Learning, Richard M. Felder, *J. Prof. Issues in Engr. Education & Practice*, 128 (1), 1–3 (2002).
24-Sep	Evaluation of Teaching Effectiveness	**Read:** *Improving Your Classroom Teaching*, Chapter 1: Developing Effective Teaching Skills, Maryellen Weimer, SAGE Publications, 1993. **Due:** Discussion Lesson Plan
1-Oct	ABET: GSIs' responsibilities	**Read:** Standards of Practice, Beryl Lieff Benderly, *ASEE Prism,* May 2016.
8-Oct	Teaching Methods: Active Learning	**Read:** Does Active Learning Work? A Review of the Research, Michael Prince, *J. Engr. Education,* 93(3) 223-231 (2004).
15-Oct	Teaching Methods: Lecture	**Read:** *McKeachie's Teaching Tips,* Chapter 6: How to Make Lectures More Effective, Wilbert J. McKeachie and Marilla Svinicki, Cengage Learning, edition 14, 2013.
22-Oct	Facilitating Group Work	**Read:** *Tools for Teaching* , Collaborative Learning: Group Work and Study Teams, Barbara Gross Davis, Jossey-Bass Publishers, 1993. **Due:** Critique Essay
29-Oct	No Formal Class Meeting (AIChE)	Students who are not presently GSIs should use this time for peer review of teaching.
5-Nov	Mentoring	**Read:** *Adviser, Teacher, Role Model, Friend*, Chapter 1: What is a Mentor? National Academy of Sciences, National Academy of Engineering, Institutes of Medicine, National Academy Press, 1997. **Due:** Peer Observation and Reflection
19-Nov	Workshop sample problems Discussion on GSI experience	**Due:** Content Creation: Develop Your Own Assignment

26-Nov	Troubleshooting: Cheating, Challenges, Conflicts, Emergencies	**Due:** Teaching Philosophy Evolution Essay **Read:** Engineering Students' Perceptions of and Attitudes Towards Cheating, Donald D. Carpenter, Trevor S. Harding, Cynthia J. Finelli, Susan M. Montgomery, Honor J. Passow, *J. Engr. Education,* 95(3), 181-194 (2006).

Workshops on Teaching

The GSI Center's Workshops on Teaching for GSIs cover a wide variety of topics related to university teaching and the GSI experience. The purpose of the series is to offer GSIs, and other graduate students interested in teaching, opportunities for hands-on learning and practical discussion about pedagogy.

To assist in planning, pre-registration is required.

If you intend your participation in a workshop to count toward the **Certificate in Teaching and Learning in Higher Education**, you must stay for the entire workshop. Workshops marked with an asterisk fulfill a requirement of the **Certificate in Teaching and Learning in Higher Education.**

Feel free to **email the GSI Center** if you would like to request a workshop on a particular topic.

Handouts and videos from selected workshops are available online.

All workshops will be held in **309 Sproul Hall**. Please bring your student ID to sign in.

Upcoming Workshops
Developing a Statement of Teaching Philosophy and Teaching Portfolio*
Thursday, August 30, 2:00 – 3:30

Peer Exchange and Feedback on Statements of Teaching Philosophy*
Wednesday, September 12, 1:00 – 2:30

Assessing Teaching and Learning*
Monday, September 24, 3:00 – 4:30

Syllabus and Course Design*
Tuesday, October 9, 10:30 – 12:00

Creating Inclusive Classrooms: Microaggressions and the Learning Environment*
Wednesday, October 24, 10:00 – 11:30

Working with Student Writing*
Thursday, November 1, 1:00-2:30

How Students Learn*
Tuesday, November 6, 1:00 – 2:30