Syllabus: E 110, Principles of University Teaching and Learning in STEM
Spring Quarter 2023. 3 units (2-0-1)

Instructor:	Melissa Dabiri, Ed.D. Pronouns: she/her/hers
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Class Time:	**Wednesdays 1pm – 3pm Moore B270 (subbasement)**
	*in-person meetings
Office Hours:	Flexible; please e-mail to make an appointment.
Website:	Class materials will be in Canvas.

Course Description:

This graduate course examines the research on university-level STEM (science, technology, engineering, and mathematics) teaching and learning, which has been used to inform a well-established body of evidence-based teaching practices. Increasingly, future PIs and faculty are called upon to demonstrate knowledge of and ability to apply established pedagogical and assessment practices, as well as to analyze the efficacy of new approaches. Weekly interactive meetings will provide focused overviews and guided application of key pedagogical research, such as prior knowledge and misconceptions, novice-expert differences, and cognitive development as applied to university teaching. We will explore the roles of active learning, student engagement, and inclusive teaching practices in designing classes where all students have an equal opportunity to be successful and feel a sense of belonging, both in the course and as scientists. Readings will inform in-class work and students will apply principles to a project of their choice.

Welcome to E110!
This course is designed to enable you to achieve the following **learning outcomes**:
- *Identify* and *explain* central research findings on university STEM teaching and learning.
- *Apply* those findings to teaching practices in courses and disciplines relevant to you.
- *Construct* a comprehensive, current, and individually meaningful philosophy of university-level STEM teaching and learning.
- *Value* and *practice* evidence-based, inclusive, and equitable approaches to teaching.

In addition, E110 will address your **individual interests and outcomes** through an independent project and an "Emerging Topics" class session. I hope that the class will **prepare you to be an effective, articulate, and self-directed university instructor and advanced life-long learner**, whether in academia or elsewhere.

Course Components:

1. **Weekly Coursework & Engagement:** As a 3-unit pass-fail course, shaped in large part by your participation, **your contributions in class are essential**. Weekly coursework and participation are largely how you will learn, and this work will build toward the main assignments described below. As such, this work will contribute 50% of your course grade. Weekly coursework and engagement include pre-class preparation through readings or other assigned reflection and informal writing, engagement during class (we will have a variety of modes of participation), and short written follow-ups to be submitted in Canvas for feedback (e.g., writing up your individual learning objectives, project ideas, etc.).

2. **Main Assignments:** E110 has two major assignments, which together **contribute 50% of your course grade.** Completion of **both assignments** is required **to pass the course**.

   a) **Teaching statement / teaching philosophy**: a 1.5-to-2-page written statement synthesizing your thoughts about teaching concepts and principles, illustrated through examples and applications relevant to your goals and career. For those who are expecting to apply for academic positions, your teaching statement may be a draft of a document you'll need for the job market. For others, it will serve to clarify your thoughts about principles of university teaching in STEM such that you can more readily apply them in the future.

   b) **Individual project:** The project is your opportunity to design and carry out something meaningful to you that applies key ideas from E110. Your project should be shaped significantly by your specific interests and learning objectives. Examples of past E110 projects include designing a course you may teach in the future, resulting in a syllabus and notes/annotations about your pedagogical reasoning; designing or revising assignments for a real or hypothetical course so that they are transparent and effective; researching and synthesizing insights on a teaching topic not discussed in E110. Many other project formats are possible; please don't let these suggestions limit your imagination!

Grades:

E110 is a pass-fail class and grades are not the focus. Formally, passing requires a minimum grade of 60% overall AND must include BOTH of the following: (1) weekly participation and engagement as described above, and (2) completion of both main assignments. Regarding weekly participation, unexpected situations may come up! If you must miss class, please let the instructor know (ahead of time whenever possible); within one week of the missed class, complete any in-class activities on your own, and email a short summary to the instructor. If you expect to miss more than a couple of class sessions, please consult with the instructor, as this may not be the best term for you to take E110.

Texts: In addition to articles and excerpts assigned weekly, we will draw from two main texts, which **are available as online books through the Caltech Library** and/or the publisher

> **(1)** *How Learning Works*: *7 Research-Based Principles…* by Susan Ambrose et al., 2010.
> **(2)** *Reaching Students:* *What Research Says About Effective Instruction in Undergraduate Science and Engineering* by Nancy Kober, 2015.

Accommodations: I would very much like to help with any concerns or needs related to accessibility and will work to ensure that class materials are as accessible as possible for all students. Students who may need an academic accommodation based on the impact of a disability, please initiate a request with Caltech Accessibility Services for Students (CASS) as soon as possible so that professional staff can evaluate the request and documentation, recommend reasonable accommodations, and prepare an Accommodation Letter. For more information: http://cass.caltech.edu/, cass@caltech.edu.

Course Schedule:
*see Module 1 in Canvas