Syllabus

Help Center

This course will provide graduate students and post-doctoral fellows in the STEM disciplines (science, technology, engineering, and mathematics) who are planning college and university faculty careers with an introduction to evidence-based teaching practices. Participants will learn about effective teaching strategies and the research that supports them, and they will apply what they learn to the design of lessons and assignments they can use in future teaching opportunities. Those who complete the course will be more informed and confident teachers, equipped for greater success in the undergraduate classroom.

The course will draw on the expertise of experienced STEM faculty, educational researchers, and staff from university teaching centers, many of them affiliated with the Center for the Integration of Research, Teaching, and Learning (CIRTL), a network of 21 research universities collaborating in the preparation of STEM graduate students and post-docs as future faculty members. The eight -week course will be highly interactive, with many opportunities for peer-to-peer learning. Learning communities are at the heart of CIRTL's activities, and this open, online course is intended to foster a large, healthy learning community of those interested in undergraduate STEM teaching--including current STEM faculty.

"An Introduction to Evidence-Based Undergraduate STEM Teaching" has been developed by faculty, staff, and students at Vanderbilt University, Michigan State University, Boston University, the University of Wisconsin-Madison, and the University of Colorado-Boulder. The course is based on work supported by the National Science Foundation under Grant No. 1347605.

Course Topics:

Week 1 – Principles of Learning, Part 1
We start by exploring a few key learning principles that apply in all teaching contexts such as student's prior knowledge, mental models and knowledge organization. We'll consider the research supporting these principles and examples of how STEM faculty put them into practice.

Week 2 – Principles of Learning, Part 2
This week we continue our exploration of learning principles that apply in all teaching contexts. These include, effective ways of providing feedback to students and student motivations for learning. We'll consider the research supporting these principles and examples of how STEM faculty put them into practice.

Week 3 – Learning Objectives
Designing an effective learning experience for students means beginning with the end in mind. In this week, we will identify ways to craft meaningful learning objectives for one's students and discuss strategies for incorporating those objectives in your instruction.

Week 4 – Assessment of Learning
Once we have outlined and implemented our learning objectives we must consider the most effective way of assessing those learning objectives. This week we will discuss strategies for designing assessments that will align with your learning goals as well as how student mindset can influence their performance on these assessments.

Week 5 – Active Learning
The module begins with a description of the benefits of active learning and how it fits into the overall learning cycle. Then, the module outlines two key features of active learning, teamwork and critical thinking, by showcasing several manifestations of active learning.

Week 6 – Inclusive Teaching
This week we will discuss the importance of inclusive teaching and many of the issues instructors can face when teaching classes composed of students of varying ethnicities and genders. We provide you with examples of teaching practices and language that can isolate certain student populations along with strategies to avoid these practices.

Week 7 – Lesson Planning
Time to apply what you've learned in the course to a teaching context relevant to you. We'll ask you to draft and annotate a lesson plan for a class you might teach in the future. This will require you to think through learning objectives, assessment mechanisms, in-class and out-of-class activities, motivating students, and classroom climate.

Week 8 – Conclusion
During the final week of the course, you'll provide feedback to your peers on their draft lesson plans and, in turn, receive feedback on your lesson plan.

Recommended Background:

The course is intended for graduate students and post-docs in the STEM disciplines (science, technology, engineering, and mathematics) planning faculty careers who are interested in developing their teaching skills. We expect that current STEM faculty, particularly early-career faculty, will find the course useful, as well. Others interested in undergraduate STEM teaching are welcome to participate.

Course Format:

The course will feature **videos** of various types, including explanatory videos on evidence-based learning principles and teaching practices, case studies featuring interviews with faculty and students and scenes from classrooms, and discussion videos with small groups of faculty and graduate students discussing their teaching. These videos are designed to introduce concepts and techniques from the literature on teaching and learning and to show how STEM faculty have applied these ideas in

their own classrooms.

To help participants better understand these research-based teaching practices and start to apply them to their own teaching contexts, each week will also feature a number of questions for participants to consider and discuss in the **course forums**. Participants will be encouraged to reflect on their personal experiences in the classroom (as learners or as teachers) and to explore how teaching and learning plays out differently across disciplines and across various higher education institutional contexts. The peer-to-peer interactions on the discussion forums are a critical piece of the learning experience in this course.

Weekly quizzes will give participants an opportunity to check their understanding of the teaching concepts and practices introduced each week. There will also be several **peer-graded assignments** during the course, including the final lesson planning assignment, providing participants with a deeper level of practice and feedback. The quizzes will provide a fairly comprehensive assessment of your understanding of course material, while the peer-graded assignments will focus more on your ability to apply key skills from the course. Your grade in the course will be the higher of your quiz average and your peer-graded assignment average. You're welcome to do all the graded work--or focus on just one type, quizzes or peer-graded assignments.

Please note that, even though quizzes will be made available weekly, the deadline for quiz completion won't be until the final day of the course, so you can complete these on your own pace. The peer-graded assignments, on the other hand, will require you to stay "on schedule" since these assignments require their own deadlines for assignment submission and peer feedback.

As noted above, learning communities are at the heart of CIRTL's activities. We encourage course participants to find or create **local learning communities**, as well, meeting in person during the course to share and discuss what they are learning about STEM teaching. If you're interested in hosting a group of students or colleagues on your campus to participate in this course together, we would love to hear from you! We will provide suggested discussion questions and activities for local learning communities to use during weekly meetings, and the communities in turn will be asked to share their ideas and perspectives with the global learning community created by the course. See our page on facilitating a MOOC-supported learning community for more information and to sign up as a host.

Grading Policy:

For a detailed description of our the course grading policy, please go to this page.

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