WISCIENCE
UNIVERSITY OF WISCONSIN-MADISON

COLLEGE SCIENCE TEACHING

Spring Semester 2024 *IntegSci 650*

Time: Wednesdays, 9:00 – 11:00 a.m.
Modality: In person
Facilitators: Cara Theisen, Ph.D. (pronouns: she/her/hers)
chtheisen@wisc.edu
WISCIENCE; Scientific Teaching Fellows Program Director
Office hours: Wednesday 12:15-1 pm, or email to schedule a time.

Course Overview

The course covers the fundamentals of learning theory and practical strategies for teaching college-level science courses, while also developing community around this shared experience. The cohort will work together to learn the core themes of scientific teaching (active learning, assessment, and diversity) to make informed decisions about their teaching. The goal is for students to develop competence and confidence as teachers. This course is required for Scientific Teaching Fellows Program participants.

Course Learning Outcomes

Throughout and upon completion of this course, students will be able to:

- Explain the core components of Scientific Teaching and apply them to their future practice.
    - Implement evidence-based instructional practices in their teaching (e.g., active learning) and justify their usage.
    - Align assessments and learning activities with course/unit objectives.
    - Incorporate inclusive teaching strategies to support diverse learners in future course development.
    - Practice designing and implementing units based on scientific teaching principles
    - Approach teaching with the same creativity and rigor as research.
- Develop community with colleagues around interest and shared experience in teaching.
    - Give and receive constructive feedback on teaching materials and ideas.
    - Develop a learning community of colleagues in teaching that is grounded in problem solving, peer review, and mutual respect.
- Find and access resources to support their teaching.
    - Identify instructional resources, technology, and literature that can support the development of new active learning instructional materials.
    - Build a toolbox of resources to support their teaching.
- Build reflective process and metacognitive skills into teaching practice to inform personal teaching development.
    - Establish personal teaching and learning goals and document evidence of their progress towards achievement.
    - Reflect on experiences and incorporate these reflections into their teaching, teaching materials, teaching philosophies and portfolios.

Course Format

This course is designed in a seminar format and is heavily dependent on student participation, both during synchronous class sessions and asynchronous online activities and discussions. Primarily through in-class participation and practice, we will model, practice and examine a variety of instructional methods, including: small-group discussion, collaborative activities, and individual reflection. The goal is to create a functioning learning community where participants share experiences and offer perspectives. One goal of this seminar is to help you understand through experience, dialogue, and practice, which methods will be ideal for you as an instructor, and what will be optimal for your students as individual learners.

The course is based on the idea that instructor development happens through reflective practice over time. This means we will actually practice our teaching through mini-lessons. We will reflect on how the lesson went, for whom, and how it might go differently. We will also continue to reflect on topics discussed in class outside of class in online discussions and in a classroom observation, and will consider how these topics apply to our personal teaching. Finally, this course will start us on a trajectory of dedicating focused attention to teaching, guided by considering how diverse students learn. Continuing to focus and reflect on how students learn, and on our role in supporting their learning, will help us to teach in a more research-based way over time, even under circumstances that don't allow us to dedicate as much attention to teaching.

All participants will identify a course that they will teach in the future to focus on for many course activities and assignments. Focusing on this course will allow you to make the principles and practices that we are discussing concrete as you consider how they apply to the content, format, and students for your particular course.(Scientific Teaching Fellows participants will focus on their practicum course.)

Instructional modality: This course is scheduled to meet in person but will include online activities and assignments that students will complete outside of class. The course may move to a fully online format if needed at any time during the semester.

Technology, Course Site & Communication

Technology requirements: In the case that class needs to shift online, students will need access to a computer with a stable, high-speed internet connection. Dedicated on-campus spaces with high-speed internet are available for students to reserve for online coursework. Students will also need an internet browser that is compatible with Canvas such as Firefox, Chrome, or Safari. For synchronous meetings, access to a webcam and microphone will allow you to fully engage with materials and in discussions with your classmates.

Course Site - Canvas: We will be using Canvas to support this seminar. All course information and assignments will be organized by week under '**Modules'**. Be sure to check the modules list to see how to prepare before coming to class; pre-class preparation will be listed each week. We will also use the discussion forum feature in Canvas for online discussions. Discussions for each week will be linked under in the module for the week.

Course Meeting Platform - Zoom: We will use Zoom for office hours and for synchronous class meetings if they move online. You will be able to find the link to join class in the 'Course introduction' module under 'How to join class meetings.' You can also use your UW-Madison Zoom account to meet with your classmates for required assignment meetings.

Course Communication - Piazza: We will use Piazza as the primary means of communication for the course. Any questions or comments you have about the course, whether related to the weekly topic or assignments/course logistics, should be posted to Piazza. (Of course, feel free to email Cara directly for any personal questions.) If a classmate posts a question that you can answer, please do so! We will all benefit from asking and answering each other's questions. Cara will also answer questions on Piazza rather than via email, so that the answer will be visible to everyone. You can expect a response within 24 hours during the week. I also encourage you to also use Piazza to share useful resources that you find with one another (articles, events, etc.).

Course Requirements

1. **Prepare for and participate in each seminar.** Preparation may include brief readings and short participation assignments, which will contribute to the seminar discussions and be built upon for in-class activities. All information will be organized under the **Modules** in Canvas. You must participate in 13 of the 14 sessions to earn credit and/or a certificate of completion for the course, and let Cara know in advance if you need to miss one class so she can plan accordingly.

2. **Participate in online discussion of the seminar topics by responding to the prompts on Canvas.** This assignment provides a publishing venue for your reflections on teaching and contributes to the course goal of reflecting on teaching over time. Each week, Cara will post a prompt for discussion that is related to the pre-class preparation for the next week. You will have until **5 p.m. on the Tuesday before the next class** to respond to the prompt, and then you will be able to engage in follow up discussion with your classmates between Tuesday and class time on Wednesday. It is recommended that you post your initial response by Monday, if possible, to allow for greater follow up discussion time. Refer to the detailed description of this assignment (on Canvas) for online discussion guidelines.

3. Outside of class, you will create and practice a **short lesson plan on a topic related to your discipline (a "teachable tidbit")**. With your Teaching Groups (assigned by the instructor), you will teach and give feedback to your colleagues in small groups, incorporate feedback, and teach again to practice the improvements you have made. You will also give constructive feedback to the other members of your Teaching Groups. You will then submit a one- to two-page written personal reflection on the experience. Refer to the detailed description of this assignment (on Canvas) for more information and due dates.

4. **Complete a classroom observation and write a short reflection** on the experience**.** Observing our colleagues provides an opportunity to reflect on all of the things that make a course successful beyond the course design and content. Students are encouraged to select a course and request permission to observe early in the semester, and should not observe a course that they enrolled in as a student. Refer to the detailed description of this assignment (on Canvas) for more information and due dates.

A Note on Courtesy and Respect

To help us to benefit from our diversity, this course is purposefully designed as an open forum, and everyone is encouraged to contribute. Please do participate, both in class and online. I expect that there will be varying levels of readiness to explore some topics in this course and I courage you to be open to new ideas and experiences. It is essential that we all cultivate respect for the varying viewpoints and

opinions that will come up among us. Being open to each other's ideas will improve classroom community and help us all to grow as educators, scholars, and professionals. Please bring curiosity, interest in listening, and willingness to share. Students will also be able to provide input on community norms and guidelines for respectful discussion.

Credit and Grading

This is a 1-credit course. The credit standard for this course is met by an expectation of a total of at least 45 hours of student engagement with the course learning activities, which include regularly scheduled class meeting times, reading, writing, and other student work as described in the syllabus.

This course, as a graduate-level and optional course, will be graded based on a Satisfactory/ Unsatisfactory scale. We understand that you may have responsibilities outside of class (professional meetings, sick family members, teaching conflicts, time-inflexible employers, etc.) that may cause you occasionally to miss class. We ask that you email Cara as soon as you know that you will miss class, and when you return to class, propose make-up work to compensate for your absence from class. As we will all miss the benefit of your insights when you are not there, we request that your make-up work be something that contributes to learning of the class. Please discuss your ideas with Cara.

This course will potentially include both graduate students who are interested in exploring careers in STEM teaching, as well as graduate students and post-docs who are taking part in the Teaching Fellows program. All participants will be graded on the same scale (below); however, graduate students and post-docs in the Teaching Fellows program will be expected to begin to think about the development and planning of the course that they will be creating materials for use in IntegSci 750.

Grade Assignment

Satisfactory	Meets to exceeds expectations (see 'course requirements' above). Incorporates new ideas or connects course ideas in new ways. Well organized, clear, professional. Work demonstrates critical thought. Participation includes contributing clear, well-considered, creative ideas, promoting group discussion, asking thoughtful questions about others' ideas and responding well to questions.
Unsatisfactory	Does not meet expectations. Work was not turned in, or directions not followed. There was a lack of meaningful class participation and/or excessive absences.

Health and Personal Safety

While the university has returned to normal operations, illnesses including COVID-19 are still with us and some members of the campus community are especially susceptible to adverse and ongoing effects from illness.

- **Masking and personal safety in class:** Masks are not required indoors at UW-Madison. Please respect the decision of classmates and instructors who decide to continue wearing a mask. We will have masks available in class. We will also have cleaning materials that you are welcome to use to clean your personal area at the start of class.
- **Absences due to illness or quarantine:** We have designed this course to be flexible if you need to miss class for illness so that you can still learn and be successful. If you become ill (or a family member or close contact becomes ill and that impacts your participation in this course), please seek treatment and let me know as soon as possible. For the health and safety of your fellow classmates and instructors, please do not attend class if you are sick. This includes but is not

limited to: if you have a fever, have COVID or Flu symptoms or have been exposed, or you have tested positive for any respiratory viruses. We want you to be able to prioritize your health and recovery and will work with you to make alternate plans for how to proceed with the course. Students will also need to be flexible should a member of the instructional team become ill.

Readings and Texts

Our primary course text is **Scientific Teaching,** by Jo Handelsman, Sarah Miller & Christine Pfund, all of UW-Madison.

Handelsman, J., Miller, S., & Pfund, C. (2007). *Scientific Teaching*. Macmillan.

Other required readings will be posted/linked to Canvas in the weekly module that they are associated with.

If you are interested in reading further, I recommend the following (all are available either in the WISCIENCE library and/or as an e-book through the UW-Madison library or online resource). We will read selections of many of these for class:

Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., Norman, M. K., Mayer, R. E. (2010). *How Learning Works: Seven Research-Based Principles for Smart Teaching.* Jossey-Bass, Inc.
An introduction to key principles and theory about learning, with a good balance between research and practical strategies. Available via ProQuest with your UW-Madison NetID.

Bain, K. (2011). *What the Best College Teachers Do.* Harvard University Press.
A quick, engaging read about effective teaching practices, based on a study of college-level teachers from a wide range of disciplines and universities. Available via ProQuest with your UW-Madison NetID.

Boettcher, J. V., & Conrad, R. M. (2016). *The online teaching survival guide: Simple and practical pedagogical tips*. John Wiley & Sons.
Offers a wide array of theory-based techniques designed for online teaching and technology-enhanced courses. Available via ProQuest with your UW-Madison NetID.

Bransford, J. D., A. L. Brown, and R. R. Cocking, eds. (2000). *How People Learn: Brain, Mind, Experience, and School.* National Research Council. ISBN 0-309-07036-8.
A scientific exploration of effective teaching, drawing on research from cognitive psychology, neuroscience, and teaching within the disciplines. The entire text is available free online at the National Academies Press.

Davis, B. G. (2009). *Tools for Teaching (2nd edition).* Jossey-Bass, Inc.
A concise guide with bulleted lists of ideas for teaching effectively.

Fink, L. D. (2013). *Creating significant learning experiences: An integrated approach to designing college courses*. John Wiley & Sons.
Overview of taxonomy of significant learning and presents a framework for instructional design that engages students in meaningful, learner-centered educational experiences. Available via ProQuest with your UW-Madison NetID.

Nilson, L. B. (2010). *Teaching at its best: A research-based resource for college instructors*. John Wiley & Sons.
A teaching toolbox that applies to online and face-to-face teaching with practical guidance, proven techniques, and expert perspectives, all focused on improving student learning. Available via ProQuest with your UW-Madison NetID.

Weimer, M. (2013). *Learner-Centered Teaching: Five Key Changes to Practice.* Jossey-Bass, Inc.
A new edition of a classic book that frames teaching around what students learn, rather than around content delivery. Offers a helpful framework with specific approaches. Available via ProQuest with your UW-Madison NetID.

Respect for Diversity

WISCIENCE (as an organization) and I (as a human being, scientist, and instructor of this course) are committed to an inclusive learning environment. We value diversity as a source of strength, creativity, and innovation and strongly believe that the diversity within our learning community in this course is an asset to our learning experience. Our diversity will enhance our own growth and learning, and will enhance our ability to create learning experiences that are inclusive and equitable for our students as we learn about considerations for course design and facilitating student learning. I value each of your contributions and respect the ways that your identity, culture, background, experience, status, abilities, and opinions will enrich our learning community, the university community, and the broader STEM community. Through the design and teaching of this course, I strive to create a learning environment that supports a diversity of ideas and experiences, and honors your identities. I am very interested in and open to hearing from you if there are ways that I can improve this course for you personally or for others. You will also have the opportunity to provide anonymous feedback mid-semester and at the end of the course.

Students with Disabilities

UW-Madison is – and Cara is – committed to providing reasonable accommodations for all persons with disabilities. Your success in this class is important to me. If there are circumstances that may affect your performance, please let me know as soon as possible so that we can work together to develop strategies for meeting both your needs and the requirements of the course. The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform me of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. I will work either directly with you or in coordination with the McBurney Center (mcburney@studentlife.wisc.edu) to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

Hate & Bias Incidents

I value each member of our community. Hate and bias incidents distract from our classroom community and negatively affect your and your classmates' ability to learn, feel welcome, and feel safe. Hate and bias incidents will not be tolerated in this classroom. Please intervene in incidents of hate and bias when you can, and report incidents to me—if you feel comfortable—and/or to the UW-Madison hate and bias reporting system. The University and I are dedicated to addressing reports of hate and/or bias seriously, promptly, confidentially, and sensitively. Reports can include, but are not limited to, crimes such as vandalism or physical assault; non-academic misconduct such as online or verbal harassment or disruptive behavior; and/or microaggressions such as derogatory or demeaning speech from another student, TA, or faculty/staff member. The Bias Response and Advocacy Coordinator from the Dean of Students Office will respond to your report and provide you with options to meet your needs. You can also report anonymously.

Academic Integrity

By enrolling in this course, you assume the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, suspension, or expulsion. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to student resources for academic integrity. Please note that all assignments submitted for this course should have been created as part of this course.

AI Technology Usage

In this course, use of AI is permitted with limitations. It can be used in some cases to support your learning but should not replace your original thinking. We acknowledge that AI tools are available and can provide helpful information and assist with brainstorming ideas. However, they cannot provide correct citations or references to reliable data and should not be considered a credible source of information. Since AI can only use the information provided within its database, it often has outdated information, and more importantly, lacks any creativity you may bring with your own ideas and original thinking. During this course, you will be making your own connections with the course material and participate in activities that will help you to develop your skills as a scientific teacher. AI will be insufficient for you to make these connections and over-reliance on AI will hinder your own development as an instructor.

How to use AI appropriately in this class: It is permitted in this course to use AI tools such as ChatGPT on some assignments to help you investigate topics and brainstorm ideas, but it should not replace your original thinking and synthesis of course ideas and topics. Any information provided by AI should be checked using reliable sources and should not be assumed to be accurate. It is expected that all work submitted will be in your own words. If you choose to use AI technology on permitted assignments in ANY way (including to brainstorm ideas), you must include a section where you describe how you used it and cite it using APA format. If in doubt about permitted usage, please speak with your instructor prior to the assignment deadline.

When AI is not permitted in this class: It is not permitted to copy text directly from AI technology and submit it as your work, even with a citation. All work submitted should be in your own words. When the use of AI is NOT permitted or limited to certain uses on assignments, this usage will be clearly stated in the assignment description. Be sure to read each assignment description carefully for statements of AI limitations.

About WISCIENCE

This course is offered by WISCIENCE. WISCIENCE is the Wisconsin Institute for Science Education and Community Engagement. WISCIENCE offers courses and programs in STEM disciplines that develop knowledge and skills for success in STEM; build STEM identities and confidence; provide professional development and engagement opportunities in teaching, community engagement, leadership, and research in STEM. We foster inclusivity in STEM through initiatives and programs that support diverse populations at all stages of training and levels of exposure to STEM, including graduate students and postdocs, undergraduate students faculty and staff, and campus and community partners.

UW-Madison Land Acknowledgement Statement

The University of Wisconsin–Madison occupies ancestral Ho-Chunk land, a place their nation has called Teejop (day-JOPE) since time immemorial. In an 1832 treaty, the Ho-Chunk were forced to cede this territory. Decades of ethnic cleansing followed when both the federal and state government repeatedly, but unsuccessfully, sought to forcibly remove the Ho-Chunk from Wisconsin.

This history of colonization informs our shared future of collaboration and innovation. Today, UW–Madison respects the inherent sovereignty of the Ho-Chunk Nation, along with the eleven other First Nations of Wisconsin. We encourage you to visit the Our Shared Future website for more resources and to learn more about the First Nations in the state of Wisconsin by visiting their websites, linked on the First Nations of Wisconsin Library Research Guide.

College Science Teaching

Tentative Semester Schedule Spring 2024

Week	*Guiding questions*	*Topics*	*Complete outside of class*
Each week	We will explore a wide range of perspectives and topics important for teaching a college-level science course, focusing on the overarching question of **how can I best help my students learn**?	Throughout the semester we will also discuss and begin preparing for various aspects of your practicum teaching courses. *+Indicates topics focused on practicum. Additional details will be provided in class and in Canvas.*	• **Refer to the Canvas MODULE for the week for reading and activities** • **Prepare for class (see pre-class preparation in Canvas)** • **Comment in weekly online discussions – first post due by Tuesday**
Week 1 1/24 *Higher Education*	What are the objectives of higher education?	• Course overview & introductions • Goals of undergraduate education • Introduction to scientific teaching	• Log in to Canvas and explore the site • Become familiar with syllabus and seminar requirements
Week 2 1/31 *Scientific Teaching*	What does it mean to teach scientifically?	• Backward design • Teachable units • Taxonomy of significant learning • Reflecting on roles in group discussions	• Select topic and write objectives for your teachable tidbit • Schedule meetings with teaching group #1
Week 3 2/7 *Objectives*	What are my objectives for my students? How can I design objectives related to disciplinary ways of thinking?	• Learning objectives • Writing measurable learning objectives • Alignment of objectives across levels • +Disciplinary frameworks and connection with practicum teaching	• Identity core concepts and disciplinary knowledge in your research
Week 4 2/14 *How Learning Works*	How do people learn?	• Principles of learning • Bloom's taxonomy and levels of thinking • Alignment in backward design	• Continue to work on teachable tidbit
Week 5 2/21 *Designing learning experiences: Assessment*	How do I assess my students learning? How can I give effective feedback?	• Learning-oriented & authentic assessments • Formative and summative assessment • Intro to rubrics	• Classroom observation scheduled – submit in Canvas by 2/23
Week 6 2/28 *Designing learning experiences: Activities*	What kinds of teaching and learning activities can I use?	• Rubrics • Active learning research • Active learning activities – designing for in person and online • Types of interaction	

Week 7 3/6 *Inclusive teaching: instructors & students*	Who are my students? What identities do I bring to the classroom?	• Framework for diversity & equity in teaching • Social identities reflection • Characteristics of today's college student • Student experiences and microaggressions	• Meet with group #1; teach and give/receive feedback • Turn in your lesson plan in Canvas before you teach
Week 8 3/13 *Inclusive teaching: classroom climate & curriculum*	How do I create an inclusive learning environment for all students? How do I address diversity in the curriculum?	• Inclusive teaching principles • Designing inclusive curriculum in STEM • Online learning considerations • Classroom climate	• Meet with group #1; teach and give/receive feedback • Turn in your lesson plan in Canvas before you teach
Week 9 3/20 *Lesson planning*	How do I put all of this together in a single class or module?	• Lesson planning (purposes, process steps, tools) • Instructional models • Online and blended course learning modules	Revise teachable tidbit based on feedback and additional concepts from class
Week 10	**NO CLASS:** Spring Break		
Week 11 4/3 *Course design*	How do I put all of this together in a course?	• Integrated course design for significant-learning experiences • Learner-centered syllabi • Course mapping, alignment, rhythm • +Practicum course structure and flow	• Meet with group #2; teach and give/receive feedback • Turn in your lesson plan in Canvas; include what you changed & in-person ideas
Week 12 4/10 *Situational factors*	What are the unique characteristics of my class?	• Situational factors • Challenges & opportunities of online and face-to-face learning • +Evaluate and focus on situational factors influencing your practicum course	• Meet with group #2; teach and give/receive feedback • Turn in your lesson plan in Canvas; include what you changed & in-person ideas
Week 13 4/17 *Promoting community*	How can I support students working effectively in groups and building community?	• Group learning and inclusive teaching • Community and collaboration online • Social presence • +Group norms and expectations	
Week 14 4/24 *Creating content & practicum planning*	How can I apply this to my practicum teaching experience?	• Teachable tidbit debrief • Content delivery modes and effective lecturing • +Practicum planning: discuss course topics, and material design process	• Submit teachable tidbit reflection paper by 4/23, 5 pm
Week 15 5/1 *Facilitation*	How can I facilitate a meaningful learning experience for all students?	• Facilitation strategies • Classroom observation debrief • Classroom scenario discussion	• Submit classroom observation reflection by 4/30, 5 pm

Contact Information of Colleagues

Please record the contact information of at least two colleagues so you can reach them if you have questions about the course:

Name: Email or cell phone:

Name: Email or cell phone:

The Fine Print

This syllabus and course schedule (below) may change throughout the quarter depending on student learning needs, instructor judgment, and availability of guest speakers. Check the modules page on Canvas frequently; this will serve as a "living syllabus" that will be updated weekly with weekly activities, assignments, and readings. The most current version of the syllabus will always be available on Canvas under the "Course Introduction" module.