Inclusive Practices in the Science Classroom

Self-Directed Course
30 Continuing Education Hours
Final Project Optional: 3 Graduate Credits + 15 Cont. Ed. Hours

Meet the Course Designer

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Allison Posey is an international leader for implementation of Universal Design for Learning (UDL). She works at CAST as a Senior Content Editor and Producer and collaborates with researchers and educators to integrate and apply current understandings from brain research into instructional practices. Prior to coming to CAST, Allison was a life science teacher in middle-high school classrooms and community and college settings. She received a degree in Mind, Brain, and Education from Harvard Graduate School of Education and is author of *Engage the Brain: How to design for learning that taps into the power of emotions (ASCD, 2018)* and *Unlearning: Change your beliefs and practice with UDL (CAST Publishing, 2020).*

Course Description

Science skills are foundational to our society, from developing solutions for the global pandemic, the climate crisis, food shortages, space exploration, and more. However, many students - and even many teachers- do not think of themselves as scientists. The design of the science curriculum can ensure that every student has the opportunity to engage in meaningful, rigorous science content.

This course has been created to share strategies and approaches for educators from K-12 to design for students to think and act like scientists. In this course, we will explore how to support scientific discourse, to use models to support the development of robust understandings of complex science concepts, to infuse assessments that are aligned to standards and to develop expert learning, and to integrate standards, such as the Next Generation Science Standards in lesson design.
We recognize there are barriers that challenge students to engage in science learning. In this course, we will provide opportunities to take a deep look at your science content and curriculum. We will integrate frameworks such as Universal Design for Learning (UDL) and Culturally Relevant Pedagogy (CRP) to provide rich learning opportunities for all students.

Course Objectives and Learning Outcomes

By the end of this course, students will:

- To **build background** on how to support students to develop critical habits of mind to think and act like scientists, including Universal Design for Learning (UDL) and Culturally Relevant Pedagogy (CRP).
- To **design lessons** that are inclusive of the full range of students in the K-12 science classroom.
- To **gain strategies** and resources, both high and low tech, to support student learning and participation in science.

Course Texts

All course readings and media will be freely linked and available within the course.

Optional texts:

- This is an amazing book that we'll explore concepts from. It is not required, but ~5 chapters align to this course, especially modules 2-4, and it is a fabulous science instruction book: Windschitl, M., Thompson, J., and Braaten, M. (2018) **Ambitious Science Teaching.** Harvard Education Press, Cambridge, MA.
- This book is most relevant for the implementation of UDL. We recommend it (as the authors!), especially if you find you want additional support in modules 5-6. Posey, A. and Novak, K. (2020). **Unlearning: Changing Your Beliefs and Practices**. CAST Publishing, Wakefield, MA.

Final Project

At the end of the course, learners have the opportunity to take everything they learned in the course and put it together to create a final project. We will encourage you to **create** an amazing product to share with your **network**! Take a **risk** and share your learning in a new way - lots of options and choices available! The final project should take approximately 15 hours to complete.

The **final project is required for students taking the course for 3 graduate-level continuing education credits**, but all are welcome to participate. It is a great opportunity to self-reflect and to implement the course learnings. Share your final project with colleagues, classmates, or on the discussion board! **However, please note you will only receive feedback or a grade from the course instructor unless you signed up for graduate credits.**

Final Project Assignment

The Goal: To demonstrate your mastery of creating inclusive practices in science lessons and assessments.

The Ask: Choose to create or revamp a course syllabus/outline, lesson, unit, or professional learning experience for your learners. Because this provides you with graduate credits, it is critical that the project

shows depth of knowledge and how the course impacted your design process. You should expect to spend approximately 15 hours on your final project.
You can start from scratch or use an existing syllabus/lesson plan/etc. and modify it using the best practices covered in this course, including the **four core practices** for developing inclusive science classrooms:

- Engage students in anchoring problems
- Make thinking visible
- Elicit student discourse
- Infuse flexible design
- Unlearn your "tried and true" techniques

This product will be evaluated using the holistic rubric below. Mastery must be met on all four standards to pass this class. Revisions will be allowed. Learn more about universally designed rubrics here.

Not There Yet	Met Expectations! Hooray!	Exceeded Expectations!
	Before Inclusive Science Practices - This section describes what you have done with this lesson, course, project, etc. (LCP) before you started using UDL or improved upon it because of this course. If you are starting from "scratch" without a previous LCP you can provide an explanation of what you want to do and the reasons why you want to do it.	
	Critical Analysis of the Barriers - This section provides the reasons identified as potential barriers in the "before" lesson or in your original concept if you are designing the project from scratch.of your final project. To see a sample Annotated Bibliography, click here.	
	After Inclusive Science Practices This section highlights the options and choices you embedded into the LCP as a result of the analysis of barriers.	
	Annotated Bibliography - You must cite at least 10 resources from the course to support what you have learned in the process of this course and the creation	

	of your final project. To see a sample Annotated Bibliography, click here.	
4 points **Meeting the standard, or going above and beyond, will earn you the full point value for the assignment.**		

Graduate Credits

You have the option to receive 3 continuing education graduate credits with the course. Register for the course + graduate credits or add on the graduate credit section at any time. Upon successful completion of the course and graduate final project, you will receive 3 accredited graduate credits from your choice of one of our university partners (Gordon College or Teachers College of San Joaquin).

Course Modules

MODULE	TOPICS
	**Module 1: Course Introduction**
	**Module 2: Engage students in anchoring problems** **Objectives. Participants will:** • Gain strategies to anchor science learning in meaningful, real-life phenomena and questions (context matters!) • Break down standards into subcomponent parts for different parts of a lesson to develop learning goals (or objectives) • Plan your science lessons, including developing anchoring questions **Essential Question** • How can you develop anchoring questions that are relevant to students and that spark interest and curiosity for the science concepts? **Activities** • Explore at least 2 to 4 resources • Optional: Participate in the community discussion board • Self-Reflection • Assessment
	**Module 3: Develop Models to Make Thinking Visible** **Objectives. Participants will:** • Develop strategies to encourage students to make their thinking visible • Gain strategies (such as "backpocket questions") for how students can share their models at the start, middle, and end of a lesson to help reveal what students know, what they are learning, and where there may be misunderstandings • Understand how constructing different representations of models is important to support the development of robust thinking about complex science concepts

	• Continue to develop their own science lessons to include opportunities for students to develop models that connect with their learning standards or goals **Essential Question** • How can you support students to construct models that reveal their understanding and that promote developing deeper levels of understanding? **Activities** • Explore at least 2 to 4 resources • Optional: Participate in the community discussion board • Self-Reflection • Assessment
	**Module 4: Elicit Student Discourse** **Objectives. Participants will:** • Gain strategies to elicit and encourage student discourse around challenging science concepts (including using claim, evidence, and reasoning) • Use mastery-oriented feedback and WISE feedback to guide discussions • Provide flexible opportunities for students to communicate • Continue to develop their own science lessons to include opportunities for students to engage in meaningful scientific discourse **Essential Question** • How can the design of a lesson elicit student discourse about science concepts? **Activities** • Explore at least 2 to 4 resources • Optional: Participate in the community discussion board • Self-Reflection • Assessment
	**Module 5: Infuse Flexible Design** **Objective. Participants will:** • Be able to use the UDL Guidelines to infuse options for Engagement, Representation, and Action and Expression into their science lessons to support inclusive science lessons

	• Use culturally relevant pedagogy to make sure students can see themselves in the materials, methods, and assessments of any science lesson **Essential Question** • How can the design of flexible, goal-driven science classrooms support inclusion of all students? **Activities** • Choose 2-4 resources to deepen your knowledge • Optional: Participate in the community discussion board • Self-Reflection • Assessment: Test your knowledge
	**Module 6: Unlearn Tried and True Practices** **Objectives. Participants will:** • Use the Unlearning cycle to reflect on their own teaching practices in order to work to reduce biases and design for more equitable learning experiences. • Discuss broad issues in the teaching of science, including equity for all students • Discuss some of the challenges you may face teaching science for all students • Develop strategies to design more equitably for all students **Essential Question** • How can we use the unlearning cycle to reduce our own biases and design for more equitable learning in our STEM classes? **Activities** • Choose 2-4 resources to deepen your knowledge • Optional: Participate in the community discussion board • Self-Reflection • Assessment