SUU SOUTHERN UTAH UNIVERSITY

Beverly Taylor Sorensen College of Education and Human Development

Matter and Energy In Science

EDPD 5703 [USBE|MC] - 3 credits

Course Instructor:

Email: **Phone:**

Welcome! In this course, students will develop a conceptual understanding of how energy and matter flows into, out of, and within systems. Students will develop and use models to explain how energy and matter move throughout and are conserved within systems to explain phenomena as well as participate in science discourse on these concepts by critiquing and revising models of energy and matter. Students will analyze examples of student models and critique assessments to help them support their students' conceptual understanding and scientific literacy related to energy and matter. Students will also consider ways to promote effective and equitable science instruction both in personal practice and in science.

Course Objectives:

By the end of this course students will be able to:

Objective #1: Developing Science Content Knowledge through Experience

Develop and use models of how energy and matter move throughout and are conserved within systems to explain phenomena.

Objective #2: Preparing and Enacting Three-Dimensional Instruction

Prepare and enact three-dimensional science instruction that is based on authentic phenomena and problems and supports the development of students' conceptual science understanding and scientific literacy.

Objective #3: Becoming a Community of Practitioners, Leaders, and Advocates

Promote effective and equitable science instruction both in personal practice and in the science education community.

Course Format

The Matter and Energy course is an online, asynchronous course. Modules will be posted weekly, and it is expected that each module will take approximately 6 hours to complete. In addition to asynchronous work, there will be three Zoom meetings for this course. Zoom meeting dates and times will be selected by the instructor.

Course Schedule and Assignments

Each week will be divided into three sections: phenomenon-based learning experiences that help you deepen your understanding of matter and energy core ideas, instructional strategies that promote student sense-making and three-dimensional science, and weekly assignments that allow you to apply learning to your classroom.

Module	Module Topic	Assignments
Module 1	Introduction to Matter Developing and Using Models	Reflection on Modeling Describe your understanding of the SEP: developing and using models. Explain strategies that you use (or plan to use) to support your students in this practice. This assignment can be turned in as a paper, infographic, or video submission.
Module 2	Changing Matter Sense-making Discussions	Student Ideas About Matter Develop question prompts to ask during a class sensemaking discussion or to use with 2 - 3 students about their ideas about matter. Gather responses, reflect on students' current thinking, and develop strategies for helping students build more scientifically accurate understandings.
Module 3	Properties of Matter Student Models	Analyzing Student Models Explain expectations for student models, then analyze 3 - 4 student models (your own students or a provided set). Reflect on what students understand based on their models. Provide students feedback for improving their models.
Module 4	Thermal Energy and Matter 3D Assessment	3D Assessment Analyze a 3D assessment that you plan to use with your students. Identify how each dimension is or is/not addressed in the assessment. Explain how you might modify the assessment to improve it or scaffold the use of the assessment with your students.
Module 5	Forms of Energy Formative Assessment Learning Progressions	Reflections on Learning Progressions Analyze the learning progressions for the DCIs related to matter and energy as well as matter and energy as a crosscutting concept. Explain how you can integrate concepts about matter and energy into the topics that you teach in your grade level core.
Module 6	Sound and Light Energy Lesson Planning for Sensemaking	Energy or Matter 3D Lesson Create a lesson for a matter or energy standard that includes a phenomenon and a coherent set of learning tasks designed to engage students in the practices and build conceptual understandings over time. Note: You do not need to start from scratch. You can utilize existing resources and adapt them for your students.
Module 7	Matter and Energy in Living Systems Computer Simulations as Models	Model of Matter Cycling and Energy Flow Select a standard related to the DCIs in this course. Choose a phenomenon that aligns to the standard and DCI. Create a model that explains the phenomenon and demonstrates your understanding of the cycling of matter and flow of energy through a system.

Grading

Grades will reflect the effort that you put into learning science core ideas and classroom strategies and apply this learning to your classroom. Please consult the course instructor if you have questions about expectations for assignments and grades received on assignments.

Discussions - 15%

Each week you will be responsible for completing a series of tasks that include doing phenomenon-based learning activities, reading articles, exploring websites, and watching videos. In each module, you will also participate in a discussion to share ideas with peers. Fifteen percent of your grade will be based on your participation in the discussions in the weekly modules.

Quick Checks: Quizzes and Mini-Assignments - 15%

Quick checks are designed to keep you on track and allow the instructor to provide feedback on your understanding of the online learning tasks. Quick checks may be short Canvas quizzes or a quick assignment submission, like an answer to a prompt, a picture of your investigation set up or a page from your science notebook.

Weekly Assignments - 70% (10% for each assignment)

Each week of the course you will have an assignment due after participating in the module. These assignments are designed for you to reflect on your learning and prepare for teaching science to your students. Assignments are listed in the course overview section above.

Science Notebooks

Science notebooks are a great way to have students keep track of their learning over time. Students record observation, investigations, and other learning activities in a notebook, essentially making their own science "textbook" throughout the school year. I encourage you to keep a science notebook for this course. As you work through learning activities in the modules, you will find suggestions for recording ideas and reflections in your science notebook.

Policies and Procedures

Norms for An Online Class

As you work through each week's module, it is expected that you fully participate in all of the learning activities. Please take the time to explore, investigate, and reflect on how the learning activities relate to your teaching position. Fully participate in discussions by providing thoughtful answers and considering your peers' ideas. It is okay to question and challenge each other, but be considerate of others' perspectives and experiences as you respond to discussion posts. Finally, communication is an important part of learning, please email me if you have questions about the course or assignments. I want to support you in building your skill set as an effective science teacher.

Late Policy

It is expected that you will complete the modules on time. This is especially important for discussions, as you need to interact with and provide feedback to peers. If you are falling behind in completing the modules and assignments, please email the instructor. Consistently late work will result in lower scores on discussions and assignments.

Americans with Disabilities Act (ADA)

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

Cautionary Information Regarding Academic Misconduct

In order to be an effective teacher, one must rely upon the wise use of a variety of resources. It is unreasonable to expect a novice teacher to create every activity, lesson plan, and assessment tool from scratch. Good teachers are always making use of ideas and materials they have gathered from others. On legal and moral grounds, it is acceptable for teachers to use other's work with the understanding that the use is for educational purposes and no monetary profit will be made by this "intellectual borrowing" of materials that came from elsewhere. One example is the allowance for using copyrighted materials: if the sole purpose is for education then making copies of an article or picture are usually not in dispute. In this course, I expect that you will gather resources and ideas from others. As a teacher you will adapt ideas, and synthesize resources to develop lessons, learning activities, and assessments that meet the needs of your students. **If you use ideas and materials from another source you must acknowledge that source. Do not plagiarize.** If you cheat or plagiarize, the minimum consequence will be a 0 on the assignment.

Required Course Syllabus Statement from Southern Utah University

Use this link to review the SUU Required Course Syllabi Statements. These statements are also included on the syllabus page of the Canvas course.