

Science Education 201: Matter and Energy in Physical Systems

Western Washington University, Fall 2024

Class meetings: M-W-F 12-2 in SL 240S, F are sometimes asynchronous (where you can use this zoom link to join and form breakout groups): <https://wwu-edu.zoom.us/j/92990415233>
Instructor: Dr. Susan DeBari she/her/hers debari@wwu.edu
Office hours: M-W 2:00-2:30 in SL240S; WF 10:30-11:30 pm in ES237 or zoom, and by appt.
Textbook: “NextGen Physics and Everyday Thinking” available at the campus bookstore.
Teaching assistant: Megan Robbins robbinm7@wwu.edu (Office hours SL220 M9-10, Wed 2:30-3:30)

Course Overview:

This is a student-centered, discussion-oriented physics course for all students but especially targeted to those pursuing a career in elementary teaching. If you are going to be an elementary teacher, you will teach science! If you are a citizen of this world, you need some understanding of science! This course will help you develop some foundational ideas in science, and even more importantly, will model scientific processes like interpreting evidence and developing scientific explanations. These skills are important not only for teachers and their students, but for all of us to function in today’s society, which demands some level of scientific literacy. You will learn science in ways different from many other school science experiences - by evidence seeking, collaboration, and consensus building. In that way, our course models not only a vision for elementary school science but also how science out there in the world proceeds. We will also discuss ways in which we can create classroom environments to help all children see themselves as “science people.” In doing so, I hope you will too!

Learning Goals:

- 1) **Physics content.** Students develop deep understanding of basic physics concepts and reasoning in order to explain everyday phenomena. Topics include those that are covered in the elementary school science curriculum.
- 2) **Learning about learning.** Students develop awareness of how their own ideas change and develop, and how the structure of the learning environment and curriculum facilitates these changes.
- 3) **Scientific practices.** Students develop their knowledge of matter and of science using scientific practices defined in the Framework for K-12 Science Education, including analyzing and interpreting data, engaging in argument from evidence, and developing and using scientific models.

As an LSCI GUR, this course also fulfills the following GUR competency: *Use quantitative and scientific reasoning to frame and solve problems.* The following literacies and core competencies are also addressed in this course: *Quantitative, scientific, and technological literacies; creative and problem-solving literacies; and critical and reflective literacies.*

Materials needed:

A SCED 201 coursepack (purchased at the bookstore). This packet contains modules from the Physics and Everyday Thinking curriculum, specifically developed for future teachers.

What to expect during class meetings (MW and most Fridays):

We will develop and apply an energy-based model and a force-based model for motion and interactions for real-world situations. There will be little traditional lecturing. Instead, you will generate knowledge through your own work and discussion. I will serve as a facilitator rather than the source of knowledge. Thus, learning is student directed and achieved through collaboration and consensus between you and your peers. For this reason, attendance is required (see below). I hope that you, as a learner, are excited about this approach, but recognize that it may also be scary and/or frustrating at first. I hope you will find that many of the learning and teaching strategies employed in this course are valuable and appropriate for you to use when you begin your teaching career.

What to expect during occasional asynchronous Fridays: on this day I will keep a zoom link open for your group to use during the 12-2 time slot. You are not obligated to meet during this time, but you **will** be expected to do activities and check in with your group before Monday class.

How can we positively contribute to our classroom climate?

All students are capable of understanding and doing science. I want you to embody this idea and, for those of you who become teachers, impart it to your future students. We will establish and maintain a classroom climate that is inclusive and respectful of all students. Learning includes being able to voice and hear a variety of perspectives, and classroom discussion is essential to building your knowledge and understanding. We will work hard to create an environment where it is safe to share ideas, even if they may be different from other students' ideas, or if we are afraid they might be wrong. I want all students to succeed, regardless of race, gender, ethnicity, preconceptions, personality, or learning style.

ATTENDANCE AND PARTICIPATION POLICIES

The short version: Show up for every class, be on time, with your cell phone off, and be ready to learn!

The longer version:

Missing a Class: Because this is a hands-on, collaborative, inquiry-based class, a missed class cannot simply be made up by getting the notes from a peer or the instructor. Your groupmates depend on your participation, and your success depends on building up understanding of each successive activity. Because of this, **attendance is required** unless you have a valid excuse **and** have communicated with the course administrator (via email) at least an hour PRIOR to class.

Valid reasons include:

- You are ill and don't feel well enough to participate in class and/or are contagious
- A planned trip away from campus that is associated with a school organization (e.g., you are a WWU soccer player traveling to a game in Ellensburg), or
- A family emergency
- Religious accommodation (see below)

Reasons that are **not valid** include:

- A family vacation for which your plane ticket was already purchased,
- A dentist appointment
- Going to the office hours of the instructor for one of your other classes, etc.

If you have any special circumstances that make you think you will have other reasons to miss class, please contact me right away so we can work out an equitable solution. (see *religious accommodation* section below)

-Each unexcused absence will drop your course grade by 3%.

-If you have more than 4 absences, excused or unexcused, you will not be able to pass the class, unless something is worked out with the instructor ahead of time. If you do miss a class, you must make up the work prior to the next class period, and assigned homework is still due at the assigned time unless otherwise agreed upon with your instructor.

If you miss a class:

- Communicate with your group to see what we worked on.
- Do the activity on your own. If needed, watch [movie\(s\)](#) to substitute for experiment(s) in class.
- Complete the homework to the best of your ability and turn it in at the next class meeting.

Late arrivals: Due to the intensely collaborative nature of this class, it is imperative that everyone arrives to class on time ready to go. Because of this necessity, points will be deducted from your participation grade each time you are late to class. You must call/email in advance and/or have a valid emergency for a late arrival to be excused. Three late arrivals (5+ minutes each) will be marked as an absence.

Cell phone use: Please do not use cell phones during class. This includes text messaging. Repeated cell phone use during class will result in deduction of participation credit.

Religious Accommodation:

Western provides reasonable accommodation for students to take holidays for reasons of faith or conscience or for organized activities conducted under the auspices of a religious denomination, church, or religious organization. Students seeking such accommodation must provide written notice to their faculty within the first two weeks of the course, citing the specific dates for which they will be absent. "Reasonable accommodation" means that faculty will coordinate with the student on scheduling examinations or other activities necessary for completion of the course or program and includes rescheduling examinations or activities or offering different times for examinations or activities. Additional information about this accommodation can be found in [SB 5166: Providing religious accommodations for postsecondary students](#).

Communication:

I use Canvas announcements to communicate to the whole class and email to communicate with individual students. You are expected to check your WWU email account and Canvas daily.

Late work: I would rather have you do the work late, than not do it at all. While it is important to keep to deadlines, sometimes life happens and you may not be able to turn something in on time. I will accept homework assignments late, with a ~25% point deduction per class day late. For example, for a 4 point assignment that is due Wednesday, if you turn it in Friday, 1 point will be deducted for lateness. If you turn it in Monday, 2 points will be deducted.

GRADING POLICIES

Participation (25% of course grade). You will be generating your own knowledge and understanding in this course. Active engagement is essential, both during small group work and during full class discussions. Active engagement includes asking questions, responding to questions of other students, and offering your own ideas. Participation credit is assigned on the basis of contributions of these types. Some other ways that participation credit will be assigned include: self and peer evaluations of the level of participation during in-class work, completing surveys and questionnaires, and possible checks during the course of the workbook for being complete and up to date.

Your participation grade is out of 100 points and will be based on:

- Active participation in small group discussions (and evaluation by your small group peers). Do you actively contribute to group work? Are you engaged with your peers?
- Active participation in class discussions (do you pose clarifying questions to the class? Paraphrase what other say? Ask for help from the class when you are confused? Share what you do understand?)
- Up-to-date and complete workbook during course, self and peer evaluations

Awarding participation points: You will be awarded 100 points (equivalent to an A+) if you are an effective leader both in small group AND in classroom discussions (effective means sharing your own thoughts, but also being able to bring others into the discussion). If you are a good active participant in both, you will receive 95 points (equivalent to an A). If you are stronger in one than the other, you may receive 90 points (equivalent to an A-). If you are active in your group but your

only contribution to the class discussions is to present your whiteboard, then your participation grade will not be higher than 85 points (equivalent to a B). Lower points are possible, but if this is the case, you will be given notice during the quarter by the instructor.

Homework and Activities (30% of course grade). Homework will be assigned after most class periods; you will commonly need to have internet access for these homeworks. Some assignments will consist of applying the concepts and reasoning developed in class to new situations, or extending those concepts. In other cases, you will be asked to reflect in writing on your learning and understanding. Due dates will be announced in class. *All assignments are due at the beginning of class.* See late policy above. Homework will be graded with written feedback and returned.

Chapter exams (aka end-of-unit quizzes) (35% of course grade). All quizzes are closed book. Since the course is largely self-paced, dates of quizzes cannot be announced in the syllabus. Quiz dates *will* be announced ahead of time in class.

Learning commentaries (10% of course grade). These will be due at the end of each chapter (3 total) on the day of the chapter quiz and will have specific instructions (see Canvas). Their purpose is for you to reflect on how your ideas about a specific physics concept have changed over the course of the chapter, and what caused those ideas to change.

Course grades:

Your final grade will be based on the following components and weighting:

Assignments	30%
Learning commentaries	10%
Chapter Quizzes	35%
Participation	25%

The scale is as follows:

93-100% A	83-86.9% B	73-76.9% C	63-66.9% D
90-92.9% A-	80-82.9% B-	70-72.9% C-	60-62.9% D-
87-89.9% B+	77-79.9% C+	67-69.9% D+	< 60% F

Other Important Notes

Special exam conditions

Reasonable accommodation for persons with documented disabilities should be established within the first week of class and arranged through the Disability Access Center: telephone 650-3083; email drs@wwu.edu; and on the web at <http://www.wwu.edu/depts/drs/>

Student Services

Western encourages students to seek assistance and support at the onset of an illness, difficulty, or crisis.

- In the case of a medical concern or question, please contact the Health Center: 650-3400 or www.wwu.edu/chw/student_health/
- In the case of an emotional or psychological concern or question, please contact the Counseling Center: 650-3400 or www.wwu.edu/counseling
- In the case of a health and safety concern, please contact the University Police: 650-3555 or www.wwu.edu/ps/police/index.shtml
- In the case of a family or personal crisis or emergency, please contact the Dean of Students: 650-3450 or <https://wp.wwu.edu/students/>
- To seek confidential support related to sexual violence, please contact CASAS (650-3700; www.wwu.edu/pws/about_casas.shtml), the Student health Center, and/or the Counseling Center.

To report sexual violence, please contact University Police, Bellingham Police, and/or the Title IX Coordinator in Western's Equal Opportunity Office (650-3307; wp.wwu.edu/sexualviolence). Faculty are responsible employees who are required to report sex discrimination, including sexual violence that they learn about to the Title IX Coordinator.

Academic Integrity

As a community, Western is committed to integrity in all aspects of academic and campus life. An excellent resource on integrity for faculty and students is the Western Coalition for Integrity. (See www.wwu.edu/integrity/) In addition to providing resources concerning common problems related to academic integrity, such as plagiarism and cheating on exams, the Coalition website also addresses related issues such as collaborative work, the use of language translators, and submitting the same paper in different classes. In addition to this site, the University Catalog in Appendix D—Academic Honesty Policy and Procedure—delineates rights and responsibilities. (<http://catalog.wwu.edu/content.php?catoid=10&navoid=1794>)

- **Plagiarism:** Plagiarism is presenting as one's own—in whole or in part—the argument, language, creations, conclusions, or scientific data of another without explicit acknowledgement. See the Library's [Plagiarism Policies & Guidelines](#) for examples and citation guides. See [Appendix D: Academic Honesty Policy & Procedure](#) of the catalog for examples, procedures, and methods of appeal and [Ensuring Academic Honesty](#) for appeal rules and timeline

Final comment

The emphasis of this course is learning through collaboration and consensus—a method proven effective by extensive research and the way we hope you will teach. The approach may be different than science courses you have taken previously. Importantly, mutual respect for everyone is a key to ensuring a safe learning environment in which all students thrive. If you aren't sure why I am doing what I am doing, or have concerns about anything related to the course, don't hesitate to ask! I am interested in talking to you about physics concepts, the nature of learning and teaching, and your personal experience in the class.

On a broader level, I am committed to establishing and maintaining a classroom climate that is inclusive and respectful for all students. Learning includes being able to voice a variety of perspectives, and classroom discussion is encouraged. While students' expressed ideas may vary and/or be opposed to one another, it is important for all of us to listen and engage respectfully with each other. In this class I expect students to make their best efforts to pronounce one another's names correctly, and to respect one another's personal pronouns. If you have questions or concerns related to these expectations, please speak with me.

This syllabus is subject to change. Changes, if any, will be announced in class. Students will be held responsible for all changes announced in class.

For more details on WWU syllabus policies, which are all applicable to the SCED 201 syllabus, please see <https://syllabi.wwu.edu>