



SCIENCE EDUCATION 201: MATTER and ENERGY IN PHYSICAL SYSTEMS

Spring 2022

Class meetings: MWF 12:00 - 1:50 PM (face-to face in SL 240)
Instructor: Dr. Norda Stephenson she/her/hers stephen2@wwu.edu
Office/student hours: Tues. 1-2 PM (via [Zoom](#)) or by appointment
Teaching Assistant: Colleen Nguyen nguye409@wwu.edu

COURSE OVERVIEW and LEARNING GOALS

This is a student-centered, discussion-oriented physics course intended for students pursuing a career in K-8 teaching. The course has the following major 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 will 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 will 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.
- 4) **Use quantitative and scientific reasoning to frame and solve problems.** As an LSCI GUR, this course also fulfills this GUR competency.
- 5) **Equity in STEM fields.** Students will develop awareness of structural and cultural issues that limit representation in STEM by women and certain racial and ethnic groups. Students will learn how limited representation in STEM limits the inherent equity and advancement of STEM and society, and will explore its implications for K-8 STEM instruction.

YOU WILL NEED:

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

COURSE STRUCTURE

WHAT TO EXPECT DURING CLASS MEETINGS

SCED 201 is a student-centered, lab-based physics course intended primarily for students interested in a career in K-8 teaching, but is open to all students. The course is focused on the foundational concepts of energy and force. We will develop and apply an energy-based model and a force-based model for motion and interactions for real-world situations and phenomena. There will be little traditional lecturing in this course. Instead, students generate knowledge through their own work and discussion. The instructor will serve as facilitator rather than the source of knowledge and answers. Thus, learning is student-directed and achieved through collaboration and consensus.

CLASSROOM CLIMATE

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. We will also commit to honoring each person's identity by learning and using preferred names and personal pronouns.

ATTENDANCE AND PARTICIPATION POLICIES

Because of the collaborative nature of this class, it is important to attend all class meetings and arrive on time. Your learning depends on being present and participating. In addition, your partners are depending on you. If you miss a class, you must make up the work prior to the next class. You may have up to 3 excused absences, with no penalty to your grade. You must contact the instructor, before class if you can, to get an absence excused. Each absence thereafter will drop your grade by 1/3 of a point.

Excusable absences include:

- If you are ill and don't feel well enough to participate in class (please don't ask for a note from the health center; your word is enough);
- A planned trip away from campus that is associated with a school organization; or
- A family emergency.

Reasons that will not be excused include:

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

COMMUNICATION

Generally, I use Canvas announcements to communicate with the whole class and email to communicate with individual students. You are expected to check your WWU email account and Canvas daily. If you need to make contact with me, please email stephen2@wwu.edu. (Please put "SCED 201" in the subject line. I try to respond within 24 hours on weekdays; response time on weekends is likely to be longer.)

LABOR-BASED GRADING CONTRACT FOR SCED 201

I will use a labor-based grading contract to calculate your final course grade. I use Asao Inoue's framework (Labor-Based Grading Contracts). This grading contract is based on Thanh Le's and Emily Borda's contracts from their SCED 201 courses.

Why use a labor-based grading contract?

Conventional grading schemes can discourage students from taking risks and learning through failure. In addition, they can orient students towards outcomes rather than the learning processes, so that students tend to focus more on acquiring points than on their own learning. In SCED 201, my goal is to cultivate a learning environment that focuses on and rewards effort, process, and feedback. I will pay attention to your ideas as they are articulated during class discussions, written assignments, and conversations with me via email or during office hours. I commit to providing feedback on your scientific thought and practice, often in the form of guiding questions.

What counts as labor?

Your default grade in SCED 201 is a B (or 3.00 on a 4.00 scale). If you do all the labor that is expected of you (minimum expectations), you will earn a B. These requirements include coming to class prepared to learn, participating fully during class, embracing the spirit of learning physics from and with your peers, and completing out- of-class assignments, quizzes, and exams. It will not matter what your peers and I think of your work; if you put in the required labor, you are guaranteed a B for the course. If you miss class, turn in assignments late, or forget to do assignments, you will get a lower grade.

MINIMUM EXPECTATIONS: REQUIRED LABOR

Attending classes, participating fully, and completing all the outlined tasks on time and in the spirit of learning constitute the labor requirements for a B in SCED 201. I am aware that actively engaging with other students may pose a barrier to accessible learning for some people, and I am willing to work with students on a one-on-one basis to amend this labor contract through a shared understanding of what types of participation, collaboration, and individual work are accessible and equitable for you.

Note: A labor-based grading scheme means that assignments, quizzes, and exams will not be graded with a numerical score. Also, research suggests grades posted alongside feedback detracts from the feedback. Thus, you will receive only feedback with strengths and notes for improvement.

Attendance and Participation (Required Labor)

In this course, students generate physics knowledge and understanding through a process of collaborative discovery. Thus, attendance and participation in synchronous class activities is critical. More than 3 excused or 2 unexcused absences from synchronous class activities will result in a decrease of your default grade (see grading table). Active engagement includes asking questions, responding to your classmates' questions, and offering ideas, either in class or on discussion boards. Engagement is critical during small group work, as well as in the whole-class summarizing discussions, which occur at the end of each activity.

Surveys (Required Labor)

One or more surveys may be administered at the start, middle, and end of the quarter. They are not intended to evaluate individual performance, but rather to help evaluate the impacts of the course as a whole.

Discussion Activities (Required Labor)

Discussion activities will be done using discussion boards on Canvas. Discussion activities may involve readings, watching videos, listening to podcasts, among others, and then responding to question prompts related to these activities. The specifics of each discussion activity will be provided later. Discussion activities will be graded on completion: responses/posts that do not reflect a good faith effort will not be considered complete.

Extension Activities (Required Labor)

Extension activities are online multiple-choice activities that check understanding from class and introduce some new ideas. They will be assigned after we complete most activities. Although scores are not a determinant of your grade in this course, you will be required to show mastery of the content in Extension activities by obtaining a score of 80% or better. You will have an unlimited number of opportunities to take the Extension activities, within the timeline. Once you have obtained a score of 80% or better, the activity will be considered complete.

Midterms (Required Labor)

There will be two midterms. You may refer to your notes and other materials from class as well as relevant resources online for midterms. After your midterm is returned, you will make revisions based on the feedback you received.

Final exam (Required Labor)

You may work collaboratively (in pairs) on the final exam. The final will be assigned and due according to the following dates. (Any changes to these dates will be discussed in class.)

- Friday, May 27: Final exam becomes available
- Friday, June 03: Initial final exam responses due
- Tuesday, June 07: Feedback on final exam responses from instructor becomes available
- Thursday, June 09: Revisions based on instructor feedback due

EXCEEDING MINIMUM EXPECTATIONS: EXTRA LABOR

You may choose to improve your grade by performing extra labor. I describe several items below which may count as extra labor. Each item will boost your grade by a third of a letter grade: from B to B+, B+ to A-, or A- to A.

Two explanations of physical phenomena (counts as 1 labor item)

On each midterm, you may provide a scientific explanation for a phenomenon of your choice. You must describe the phenomenon, pose a question, and describe your answer using diagrams, graphs, and written narratives. More details will be available on the midterm. You must respond to the optional prompts **on both midterms** in order to perform enough extra labor to boost your grade.

Two commentaries (counts as 1 labor item)

Various types of commentary assignments will be made available at different times during the quarter. You must complete two in any combination to perform enough extra labor to boost your grade. All commentaries should be 500 - 1000 words in length. Feedback will be given on content, not on writing mechanics (e.g. grammar, organization). The different types of commentaries are listed below. More details will be given on Canvas when these are made available.

- *Participation commentary*: Identify one aspect of your class participation that you think is going well and one aspect that could be improved.
- *Learning commentary*: use evidence from your assignments, quizzes, and/or midterm(s) to provide evidence for changes in your understanding over time.
- *Science practices commentary*: Choose a science practice from the [Framework for K-12 Science Education Chapter 3](#) and describe how you have engaged in the practice in this class.
- *Life of a scientist commentary*: Choose a physicist of color you would like to learn more about. Summarize their life and work, highlighting any connections to social justice and equity.

Other labor that benefits the class

Do you want to demonstrate your physics knowledge through art, music, or performance? Are you interested in economic, social, or political aspects of physics? Would you like to create a lesson plan for teaching children how to make and interpret graphs? If you have an idea, let me know. We will plan it together so that the amount of labor is appropriate.

I may also have ideas about other extra labor items that will benefit you and the class, and I reserve the right to add these as options. However, I will never change the labor requirements or their relationship with your course grade.

GRADING SCALE

If you show up to class and complete your work on time, you are guaranteed a B in the class. There are many legitimate reasons why you might skip a class or miss a deadline. You can miss a small number of classes or deadlines and still receive a B grade. However, too many missed classes, late arrivals, or missed deadlines will result in a grade reduction. **Late assignments** are assignments that are submitted after the deadline. **Ignored assignments** are assignments for which I have no record of you doing the work or turning it in.

You may improve your grade by completing extra labor, as described above. If you are performing labor at the B level, extra labor will improve your grade as follows:

- 1 extra labor item = course grade of B+
- 2 extra labor items = course grade of A-
- 3 extra labor items = course grade of A

If you are working toward a baseline lower than a B due to missed classes or assignments, you may complete more than 3 extra items to continue to raise your grade.

Brawta

A brawta is an extra opportunity. If you are unable to meet some aspect of the labor contract, please come to me as soon as possible, hopefully before the contract is breached. I will consult with you to find a fair and equitable arrangement. You may use a brawta only once in the quarter. Please keep in mind that the labor contract is a public and social agreement, and it is my job to ensure that whatever arrangements we make will not be unfair to the other students in the course.

Exemplary labor

At the end of the quarter, if you have not missed any classes or deadlines and have not used a brawta, you will earn an extra third of a letter grade (equal to one extra item) on your final grade. This rule is meant to reward students who engage in all the labor in the fullest spirit asked of them.

FINAL BASE GRADE* CALCULATIONS
***Before taking extra labor into account**

| Letter Grade | Numerical equivalent | Unexcused absences | Late assignments | Ignored assignments |
|--------------|----------------------|--------------------|------------------|---------------------|
| B | 3.00 | 0-2 | 0-5 | 0-2 |
| B- | 2.67 | 3 | 6-7 | 3 |
| C+ | 2.33 | 4 | 8-9 | 4 |
| C | 2.00 | 5 | 10-11 | 5 |
| C- | 1.67 | 6 | 12-13 | 6 |
| D+ | 1.33 | 7 | 14-15 | 7 |
| D | 1.00 | 8 | 16-17 | 8 |
| D- | 0.67 | 9 | 18-19 | 9 |
| F | 0.00 | 10+ | 20+ | 10+ |

Unexcused means that you did not inform the instructors and complete the corresponding alternate assignment(s) for the class(es) you missed. **Late** means that you submitted the assignment after the due date. **Ignored** means that we have no submission or other record of completion from you.

UNIVERSITY RESOURCES and POLICIES

I want each and every one of you to thrive at WWU, and in this class. I encourage you to check out and utilize the following list of resources. Check out this [Overview of Student Services](#) for even more.

- [WWU Counseling Center](#): Asking for help is OK! Please stop by, virtually or in-person, if you are feeling anxious, depressed, overwhelmed, or just need to talk with someone.
- [Student Health Center](#): In case of a medical concern or question
- [Office of Student Life](#): In case of a family or personal emergency
- [University Police](#): In case of a health and safety concern
- [Resources for Racial Justice](#): self-care, learning, and Black-led LGBTQ+ organization

Reasonable Accommodation. Reasonable accommodation for persons with documented disabilities should be established within the first week of class and arranged through the [Disability Access Center](#): telephone 360-650-3083; email drs@wwu.edu; and on the web at disability.wwu.edu. Review their [Documentation Guidelines](#) for the procedure for providing reasonable accommodations for students with disabilities. See also the [Accessibility Map](#).

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](#).

Academic Integrity

Academic Honesty: All Western Washington University students have an obligation to fulfill their responsibilities as members of an academic community. Academic integrity is demanded; moreover, academic dishonesty at Western is a serious infraction dealt with severely. No student shall claim as his or her own the achievements, work, or arguments of others, nor shall he or she be a party to such claims. It is the instructor's responsibility to confront a student and to take appropriate action if such academic dishonesty has occurred. 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.

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.

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.