

# Science Education 201: Matter and Energy in Physical Systems

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*Fall 2020*

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Class meetings: MWF 2:00 - 3:00 pm via Zoom + 50 min asynchronous work  
Zoom Link: <http://bit.ly/SCED201BordaZoom> PW: 677580  
Instructor: Dr. Emily Borda she/her/hers [bordae@wwu.edu](mailto:bordae@wwu.edu)  
Office hours: MWF 3:00 - 4:00 or by appointment  
Teaching Assistant: Sarah Swan [swans4@wwu.edu](mailto:swans4@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 four 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.

As an LSCI GUR, this course also fulfills the following GUR competency: *Use quantitative and scientific reasoning to frame and solve problems.*

## YOU WILL NEED:

- wifi-capable computer with audio and/or video
- We will use [Zoom](#) for all synchronous meetings and office hours. You will need your own account for asynchronous work with your partner(s). You can sign up for a free account through Canvas (click on Zoom link in the main menu).
- OneNote (Included with [Office 365](#), free for all WWU students). The curriculum (Goldberg, Robinson, Otero Next Gen Physics and Everyday Thinking) will be delivered through our [OneNote Class notebook](#). You will not need to purchase a copy.
- [Adobe Reader DC](#) (free to download)

## COURSE STRUCTURE

This course is remote and will blend synchronous and asynchronous learning. Our class is scheduled for MWF 2-3:50 PM. However, we will meet synchronously via Zoom MWF 2-3 PM with 50 minutes of asynchronous class time expected following each course.

### 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 a 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 others' identities by learning and using each others' preferred names and personal pronouns.

### ATTENDANCE AND PARTICIPATION POLICIES

Because of the collaborative nature of this class, it is important to attend all Zoom class meetings and arrive on time. Your learning depends on being present and participating. In addition, your partners are depending on you. You can miss up to four classes with no penalty. Each additional absence will drop your course grade a full letter grade. See the grading contract for more details.

There are many reasons why a student will miss a class, and you aren't obligated to provide me with an excuse for your absence. You may contact me if you feel it is necessary; for missed work, see Canvas and OneNote which will be updated with class summaries and assignment deadlines.

If you cannot make our regularly synchronous meetings, please contact me and we can make alternative ways to count as attendance.

*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.

## UNIVERSITY RESOURCES AND POLICIES

*Students are encouraged to check out and utilize the following lists of resources, curated by LGBTQ+ Western:*

- [Resources for Racial Justice](#): self-care, learning, and Black-led LGBTQ+ organization
- [Resources During Remote Learning](#): opportunities for queer self-care and social connection, tips for engaging online, and LGBTQ+ resources beyond Western

*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](#).

*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/](http://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/chw](http://www.wwu.edu/chw)
- In the case of a health and safety concern, please contact the University Police: 650-3555 or [www.wwu.edu/ps/](http://www.wwu.edu/ps/)
- In the case of a family or personal crisis or emergency, please contact the Office of Student Life: 650-3706 or [http://www.wwu.edu/dos/office/slo\\_student\\_assistance.shtml](http://www.wwu.edu/dos/office/slo_student_assistance.shtml)

*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.

## **LABOR-BASED GRADING CONTRACT FOR SCED 201**

**The default grade scale this quarter will be letter grades (ABCDF).** However, you can request Pass/No Pass (EP/NP) grading through the registrar through the seventh week of the quarter (11/6/20). A grade of D+ or above will be considered passing for WWU credit, as well as for teaching endorsement, purposes. See [full grading policy](#) for more details.

**I will use a labor-based grading contract to calculate your final course grade.** I use Asao Inou's framework (Labor-Based Grading Contracts). This grading contract is based on Thanh Le's and Dimitri Dounas-Frazer'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, 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 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.

### **REQUIRED LABOR**

Attending our 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 understand that there are barriers to obtaining official accommodations from the university. 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.

### **Surveys**

One or more surveys may be administered at start 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.

## **Attendance and Participation**

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. Over 4 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 full-class summarizing discussions, which occur at the end of each activity.

## **Review assignments**

After most activities, there will be a review assignment to reinforce ideas developed in the activities, provide practice applying the key ideas to new situations, and offer opportunities for feedback on your thinking. In some cases, review assignments will contain a reading, reflection, and/or discussion board assignment.

## **Extension activities**

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, and they will be due at the start of the following class.

## **Midterms**

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.

## **Collaborative final exam**

The final will be distributed on Friday, December 4 and due the following Thursday, December 10. You will work in pairs on the final exam.

## **Labor log**

You are required to log all your labor and submit your logs on Canvas every 2 weeks. The purpose of the labor logs is to provide data so you can make sense and meaning out of how you labor. They can help you monitor and reflect your process and progress. By noticing useful patterns of your labor, you can generate strategies to maintain better engagement with your work.

## **IMPROVING YOUR GRADE (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.

### **Four extra discussions about physics or teaching physics (counts as 1 labor item)**

At any point after week 1, you may attend office hours or make an appointment with the professor or teaching assistant to discuss topics or assignments from class. You must come prepared with questions of your own, and you must review all relevant class materials beforehand. Four discussions of at least 15 minutes each counts as enough extra labor to boost your grade. At least two discussions must be with me (Emily). Discussions about course, logistics or degree

requirements, though encouraged if you have questions, do not count as discussions about physics. However, discussions about teaching physics do count and are encouraged!

### **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 a 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 750 - 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.

### **Some 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 but before the next class meeting. This window of time is called a “grace period.” **Missed assignments** are assignments that are submitted after the grace period. Missed work is a more serious mark against your contract because its absence negatively impacts you and your classmates for multiple class meetings. **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.

**Gimme**

A gimme is an extra chance. 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 gimme 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 gimme, 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 | Missed classes | Late assignments | Missed assignments | Ignored assignments |
|--------------|----------------------|----------------|------------------|--------------------|---------------------|
| B            | 3.00                 | 0-4            | 0-4              | 0-1                | 0                   |
| B-           | 2.67                 | 0-4            | 5                | 2                  | 0                   |
| C+           | 2.33                 | 0-4            | 6                | 3                  | 0                   |
| C            | 2.00                 | 5              | 7                | 4                  | 0                   |
| D+           | 1.33                 | 5              | 9                | 6                  | 0                   |
| D            | 1.00                 | 6              | 10               | 7                  | 1                   |
| D-           | 0.67                 | 6              | 11               | 8                  | 1                   |
| F            | 0.00                 | 7+             | 12+              | 9+                 | 2+                  |

*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.*