

Course Syllabus

SCED 202: Matter and Energy in Earth Systems

Course Description: An inquiry-based survey of Earth Science designed to give a basic understanding of the energy transfers occurring in solid earth and the processes by which they occur.

This is an activity-based and discussion-oriented course with three major goals:

- (1) **Geologic Content:** To help you develop a deep understanding of geologic ideas that can be used to explain natural phenomena, and that are included in the elementary school science curriculum;
- (2) **Nature of Science:** To help you practice and develop an understanding of how knowledge is developed within a scientific community: that doing science involves using evidence and creative thinking, that knowledge is established through collaboration and consensus, and that science knowledge can change over time;
- (3) **Learning about learning:** To help you become more aware of how your own geologic ideas change and develop over time, and how the structure of the learning environment and curriculum facilitate these changes.

Student Learning Outcomes: By the end of this course you will:

1. Appreciate that science is a universal language that transcends race, cultures, and geography.
2. Experience different learning styles through group work in discussion and laboratory activities.
3. Believe that scientific literacy is possible for any person.
4. Learn about your own and your peers' science learning
5. Read and interpret scientific data presented graphically
6. Formulate hypotheses and predictions
7. Construct models explaining the components of systems and their interactions.
8. Demonstrate understanding that sufficient data and multiple fundamental scientific theories are needed to explain complex systems and that these theories evolve.
9. Use the concept of energy as a powerful tool for looking at the relationships of Earth systems and their changes over time.
10. Understand how the transfer of heat from the interior of the Earth toward the surface causes slow changes in the position of the Earth's plates (e.g., formations of mountains and ocean basins) and relatively rapid changes at the surface (e.g., volcanic eruptions and earthquakes).
11. Understand that physical evidence, such as fossils, relationships between rock units, and radioisotopic dating, provide evidence for the Earth's evolution and development.
12. Understand how energy interactions and changes are fundamental in explaining the dynamics of living organisms, the earth and the universe

ATTENDANCE AND PARTICIPATION POLICIES

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. Because of this, attendance is required unless you have a valid excuse *and* have communicated with the course administrator (via phone or email) PRIOR to class. Valid reasons include:

- If 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 (a letter from the Office of Student Life documenting that the student's absence from the university is excused will need to be provided after the fact.)

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.

Each unexcused absence will drop your course grade by 3%. If you have more than 3 absences, excused or unexcused, you will not be able to pass the class.

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.

Late arrivals: Due to the intensely collaborative nature of this class, it is imperative that everyone arrives to class on time and ready to go at noon. Late arrivals are unacceptable and will negatively impact your grade. Each time you are late to class points will be deducted from your attendance grade. You must call/email in advance and/or have a valid emergency for a late arrival to be excused.

Cell phone use: Please do not use cell phones during class. This includes text messaging.

Internet Usage: You need to be able to access the course website as well as use the internet for assignments. Internet access is available in a number of computer labs on campus.

Academic Integrity Cheating, plagiarism, etc., will not be tolerated. All work you submit for the course should be your own. Students who cheat or plagiarize, or who knowingly help another to cheat will receive a minimum of zero on that assignment and may fail the course.

SPECIFIC COURSE POLICIES AND PROCEDURES (including grading)

Participation (25% of course grade): Because this is an inquiry-based class, you will be developing your own understanding of the material through the lab experiences, and as such, must be engaged, questioning and contributing to the group for success. Therefore, participation is a key element in this course and in the final grade. Periodically, you will be evaluating your group and yourself, as well as doing a reflective evaluation of your learning at the end of each cycle and at the end of the course. In order to receive full credit for participation, complete and up-to-date workbooks are required.

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

Awarding participation points: You will be awarded 100 points if you are a strong leader both in small group and in classroom discussions (equivalent to an A+). 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 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 (15% of course grade): Homework will be assigned throughout each cycle and may require viewing videos, watching demonstrations, visiting websites, etc. Homework should be completed individually, and should be your own work. Due dates for assigned work will be announced in class and posted on the course website. All *assignments are due at the beginning of class* (or they are late). Work submitted late will receive a 10% deduction per calendar day, and no work will be accepted after 2 days past the due date.

Field Trip (5% of course grade): There will be an all day *required* Field Trip to Larrabee State Park and Clayton Beach. Details will be provided. There will be a writeup associated with this field trip.

Cycle Quizzes (40% of course grade): All exams will be closed book. Attendance on exam dates is required unless you have a valid medical or family emergency excuse and/or have communicated with the course administrator (via phone or email) prior to the exam. You may be asked for a doctor's note. Missing an exam without a valid excuse and/or prior notification will result in a zero as a score for the exam.

Reflective essays (learning commentaries) (10% of course grade): At the end of each cycle you will be asked to review what you have learned. In the form of a short essay, write about:

1. A particular concept or concepts that you learned. Compare your understanding now with what you thought before using evidence from your initial ideas writing
2. How you learned it (or what hindered your learning). What particular activity or discussion got you to an “ah-ha” moment. You'll need to cite evidence from the activity, and use examples from your writing.

These essays will not be graded on *how much* Earth Science you learned, but on your thought process about your learning, and how well you utilize evidence. See rubric on Canvas.

Final reflective essay (5% of course grade)

Prompt: Once we have finished the cycles, we will discuss the conceptual framework that was used in designing and building this course. Each cycle was meant to build upon the previous one. Given this framework, what were the two or three most important conceptual learnings for you during the quarter? As usual, you must cite evidence for your learnings. This evidence should include quotes from your writing, such as initial ideas, changing ideas during activities, and final ideas. Depending on what concepts you write about, these quotes could span different cycles. Two to three double-spaced pages is typical.

Final Quiz (part of quiz grade): The final exam will probably consist of the Cycle 6 and Cycle 7 Exams (plus some cumulative questions) and the Content/NOS Post-tests. *It is scheduled during finals week.*

FINAL GRADE

YOU WILL NOT RECEIVE A FINAL GRADE UNLESS THE ONLINE PRE-AND POST-TESTS ARE COMPLETED

Your final grade will be based on the following components and weights (but see policy above for grade deduction for unexcused absences):

Attendance	required
Participation	25%
Homework	15%
Field trip writeup	5%
Learning commentaries	10%
Final reflective essay	5%
<u>Quizzes</u>	<u>40%</u>

Your class grade is determined using the following scales:

100% ≥ A > 93%	83% ≥ B- > 80%	70% ≥ D+ > 67%
93% ≥ A- > 90%	80% ≥ C+ > 77%	67% ≥ D > 63%
90% ≥ B+ > 87%	77% ≥ C > 73%	63% ≥ D- > 60%
87% ≥ B > 83%	73% ≥ C- > 70%	60% ≥ F > 0%

If your average is borderline between two grades and/or close to a break point, the instructor will have the discretion to use your progress in the course as the deciding factor to determine your final grade.

STRUCTURE OF THE COURSE CYCLES

Each individual cycle consists of several sections with slightly different aims.

Activities

Each cycle is divided onto several activities each with a specific focus on as aspect of the cycle topic.

Purpose

A short introduction describing the aims of the activity and how it ties in to the topic. It also poses the *key question(s)* for the activity.

Initial Ideas

Questions that give you a chance to express your own initial ideas on the topic of the activity, before you do any experiments. These initial ideas are important, as they will form the basis on which you build further understanding.

Experiments and Exercises

Here's where you do the experiments and record your predictions, observations and data that provide the evidence to support or refute your ideas. You will also be given data and as an exercise will interpret the data.

Group Discussions and Whiteboarding

These small group sessions will give students an opportunity to discuss and formulate a consensus and then draw out the groups ideas on a whiteboard.

Class Discussion

Each group will share their whiteboard with the class in order to communicate their ideas and working together, the whole class will try to summarize what they have learned in the activity by answering a few questions.

Homework

These assignments are designed for students to explore certain topics in more detail and integrate in-class activities with this material.