

## Scied 202 - Matter and Energy in Earth Systems

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Class Meetings TThF 1-3 SL210

Course Website on WWU Blackboard

Required text:

1. Scied 202 Winter 2013 Course Manual and supplementary packet, available at the bookstore. Please bring the manual to class each day.
2. **E-book chapter** (must be purchased online - ~\$5). *Exploring Geology*, Chapter 3, Plate Tectonics. Author: Steve Reynolds

### **REQUIRED FIELD TRIP: Saturday, Feb 23, 9:00-4:30**

**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.

**Prerequisite:** Math 112 or higher, SCED 201

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

### **GENERAL POLICIES AND PROCEDURES**

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.

Late arrivals: Due to the 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. Chronic lateness will result in a loss of 20% of the points for the class. You must call/email in advance and/or have a valid emergency for a late arrival to be excused.

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. Each unexcused absence will result in the deduction of 5% of the total points of the class (points will be deducted from the participation/attendance score to a maximum of 25%). Only WWU approved activities and emergencies are acceptable excuses for missing class.

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

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**

Participation: 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 will be based on:

- Active participation in class discussions
- Evaluations by your peers and the instructors
- Completion of surveys and handouts
- Up-to-date and complete workbook during course

Homework: Homework will be assigned throughout each cycle and may require viewing videos, watching demonstrations on CD, 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: There will be an all day *required* Field Trip to Clayton Beach. Details will be provided. There will be a writeup associated with this field trip.

Cycle Exams: 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): 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. What you learned (focus on a particular concept or concepts)
2. How you learned it (or what hindered your learning). What particular activity or discussion got you to an “ah-ha” moment (this is your evidence)

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.

#### Final reflective essay

**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 (when and where and how did you learn the particular concepts). Two to three double-spaced pages will suffice.

Final Exam: The final exam will consist of the Cycle 5 and Cycle 6 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 PRE-AND POST-TEST IS COMPLETED

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

Attendance	10%
Participation	15%
Homework	10%
Field trip writeup	5%
Reflective essays	10%
Final reflective essay	10%
<u>Exams</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 an 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.

**SCED 202 TENTATIVE COURSE SCHEDULE (definitely will change)**

Week	Tuesday	Thursday	Friday
1	<b>1</b> 1/8 Cycle 1 Pre-assessments online <i>Hmwk:</i> Cycle 1 Hmwk	<b>2</b> 1/10 Cycle 2, Act 1 Cycle 2, Act 2 <i>Hmwk:</i> Cyc 2, Act 2 Hmwk	<b>3</b> 1/11 Cycle 2, Act 2 Cycle 2 Act 3 Initial Ideas
2	<b>4</b> 1/15 Cycle 2, Act 3 Jigsaw <i>Hmwk:</i> Scientists Ideas	<b>5</b> 1/17 Cycle 2, Act 3 <i>Hmwk:</i> Revise Cycle 1 hmwk rock question	<b>6</b> 1/18 Finish Cycle 2, Begin Cycle 3
3	<b>7</b> 1/22 Cycle 3, Act 1 <i>Hmwk:</i> Cycle 3, Act 1 Summarizing Questions	<b>8</b> 1/24 <b>Cycle 1&amp;2 exam</b> (short exam, 1 hour) <b><i>Due: Cycle 2 Learning reflection, group eval</i></b> <u>Cycle 3, Act 2</u> <i>Hmwk:</i> Scientists Ideas	<b>9</b> 1/25 Cycle 3, Act 2 <i>Hmwk:</i> Act 2 Summ quest Cycle 3, end of cycle hmwk set 1-7
4	<b>10</b> 1/29 Cycle 3, Act 3	<b>11</b> 1/31 Cycle 3, Act 3 Finish the cycle <i>Hmwk:</i> Cycle 3, end of cycle hmwk set 8-14	<b>12</b> 2/1 Modified cycle 4 <i>Hmwk:</i> Geologic Time, Initial Ideas <i>Due:</i> group evaluations
5	<b>13</b> 2/5 <b>Cycle 3 exam</b> Modified cycle 4 <i>Due:</i> Cycle 3 Learning reflection <i>Hmwk:</i> Scientists ideas, Table 4-3	<b>14</b> 2/7 Begin cycle 5 <i>Hmwk:</i> C4Act 1 Hmwk	<b>15</b> 2/8 Cycle 5, Act 1 <i>Hmwk:</i> Bagel on moon
6	<b>16</b> 2/12 Cycle 5, A1 <i>Hmwk:</i> Geol time, Scientists Ideas, part A&B, & comparison	<b>17</b> 2/14 Cycle 5, Act 1 Whiteboard Geol Time <i>Hmwk:</i> Geopuzzle 1-3 & other examples	<b>18</b> 2/15 Cycle 5, Act 1 <i>Hmwk:</i> Activity 1 questions <i>Hmwk:</i> Geopuzzle 4
7	<b>19</b> 2/19 Finish C5A1; begin Act 2 <i>Hmwk:</i> Cycle 5 Act 1 hmwk	<b>20</b> 2/21 Cycle 5 Act 2 <i>Hmwk:</i> Scientists Ideas	<b>21</b> 2/22 Cycle 5 Act 2  <b>FIELD TRIP Sat Feb 23</b>
8	<b>22</b> 2/26 Cycle 5 Act 2 & wrap up	<b>23</b> 2/28 Cycle x. Earth surface processes <i>Due:</i> Group evaluations	<b>24</b> 3/1 <b>Cycle 5 Exam</b> Cycle x <i>Due:</i> Cycle 5 Learning Reflection
9	<b>25</b> 3/5 Cycle x <i>Due:</i> Field trip writeup	<b>26</b> 3/7 Cycle x	<b>27</b> 3/8 Cycle x
10	<b>28</b> 3/12 Cycle x	<b>29</b> 3/14 Cycle x Wrap up Begin Cycle 6	<b>30</b> 6/3 Cycle 6 <i>Due:</i> Cycle 5 Learning reflection; Group eval.

**Final Exam: Monday March 18 from 1:00-3:00 (Cycle 5 and 6 Exam)**

**Final learning commentary due no later than Wednesday March 20, 5 pm**

**Online Post-tests (survey-graded for completion only) due by Wednesday March 20, 5 pm**