GEOL 350 *Teaching the Geology of the Pacific Northwest*

**Course Description:** This course is for Earth science teaching majors, general science teaching majors, and anyone who is interested in both the geology of the Pacific Northwest and how to teach. Includes a teaching practicum in the local high school.

**Prerequisites:** Introductory geology (including a lab)

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**Office hours** Wednesday 3:00-5:00 pm, and by appointment/drop-in

**Overview**

Earth science differs in fundamental and important ways from the other scientific disciplines commonly taught in the high school setting. This course is meant to help you distinguish those unique aspects of Earth science and develop ways to teach those in the future. **My primary goal for this course is to empower you to teach Earth science** by giving you the opportunity to

* focus on developing your own Earth science knowledge and skills, particularly within the context of understanding the geology of the Pacific Northwest;
* reflect on your own understanding of the nature and process ;of Earth science, and how that differs from other scientific disciplines;
* practice methods of teaching and learning Earth science; and
* work collaboratively with your peers to improve your science teaching.

We will explore broad themes in Earth science teaching through specific examples in Pacific Northwest geology; your job is to move those ideas into your classroom.

The course comprises four sections: working with Earth science data, teaching in the field, learning from rocks, and regional geology. Each section has specific knowledge, skills, and pedagogy learning outcomes, listed in the schedule below. Together, these complementary learning outcomes form your pedagogical content knowledge—the discipline-specific knowledge and skills you need to effectively teach in that discipline.

**Course materials**

There is no textbook for this course. You do, however, need the following:

* Access to Blackboard (<http://courses.cwu.edu>): All course materials will be posted on Blackboard, including readings and foundational documents.
* National Science Teachers Association student membership: This is available through the CWU student chapter at the very low cost of $5. A form will be available during class. Several of our readings will be from NSTA journals.
* Earth Science Puzzles: You will need to purchase this collection of exercises that involve using data in the middle and high school classroom through NSTA. You can purchase an e-book or print and e-book bundle (see link on Blackboard site).

# Assessment

There is a lot of work involved in this course, and it requires that you really stay on top of things. There will be numerous readings, each of which will have a series of questions for you to answer in Blackboard prior to coming to class. Grading is based on the assignments and point values shown below, and will follow a traditional grading scale (90-100% 🡪 A- to A; 80-89% 🡪 B- to B+; 70-79% 🡪 C- to C+; 60-69% 🡪 D- to D+; <60% 🡪 F).

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| **Assignment** | **Points** |
| Reading questions/reflections (10 pts each) | 100 |
| Craig’s Hill lesson plan and practicum | 200 |
| Take home quiz  | 50 |
| Regional geology presentation | 200 |
| Lesson plan | 200 |
| **Total** | **850 pts** |

**Class Policies**

1. Engage. During class time, we will be working, so come to class on time and ready to engage in science with me and your peers.
2. Be responsible. I expect you to work hard in this class and take responsibility for showing up on time, turning off your cell phone, and turning in assignments on time. Late assignment will be penalized 10% each day, up to 50%. Exceptions may be made for extenuating circumstances we discuss in advance.
3. Be ethical. Scientists follow a code of ethics that I expect you to follow as well. Copying others’ work is not acceptable. If you turn in an assignment that is not your own work, you will receive a zero for that assignment. Please document your sources on all assignments.
4. Prepare yourself to succeed. Success in this course requires open-mindedness and effort (about two hours of study/work time for each hour of class). Depending on your academic background, prior knowledge, and work with children, you may need to spend more or less time than that. Please budget your time to accommodate the workload. By working together, we can accomplish significant and meaningful learning.

**Disability Accommodation Statement**

Students with disabilities who wish to set up academic adjustments in this class should give me a copy of their “Confirmation of Eligibility for Academic Adjustments” from the Disability Services Office as soon as possible so we can discuss how the approved adjustments will be implemented in this class. Students without this form should contact Disability Support Services at 509-963-2171 (TDD: 509-963-2143)

**Tentative schedule**

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|  | **Topics and activities** | **What’s due\*** |
| **Week 1** |
| **W 3/28** | Introductions: Me, You, the syllabusPacific Northwest Geology overview |  |
| **F 3/30** |  | **Blackboard:** Survey |
| Weeks 2-3: **Working with Earth science data****Pacific northwest geology learning outcomes*** Explain the distribution of earthquakes and volcanoes in the Pacific northwest
* Describe the plate tectonic setting of the Pacific northwest

**Geoscience skills learning outcomes*** Use GoogleEarth and GeoMapApp to display and explore data, draw maps and cross-sections
* Navigate online resources for accessing real-time and historical data

**Pedagogy learning outcomes*** Develop a lesson plan for use in a high school classroom using computer-based data
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| **M 4/2** | The nature of geoscienceExploring earthquakes in the Pacific NW | **Reading:** Multiple modes of inquiry, Kastens and Rivet, 2008**Blackboard:** *Answers to reading questions* |
| **W 4/4** | Exploring volcanoes in the Pacific NWDiscuss lesson plan assignment | **Reading:** Understanding Scientific Journals and Articles, Carpi et al., 2008Jigsaw readings of Quaternary Magmatism in the Cascades, Hildreth, 2007**Blackboard:** *Answers to reading questions* |
| **M 4/9** | Using Earth science data in the classroomDiscuss lesson plan drafts *Take-home exam goes live on Blackboard* | **Reading:** Introduction & Using Data Puzzles in *Earth Science Puzzles*, Kastens and Turrin, 2010**Blackboard:** *Answers to reading questions* |
| **W 4/11** | Orphan tsunamis and giant earthquakesDiscuss field trip to Craig’s Hill | **Blackboard:** *Take-home exam due*  |
| Weeks 4-5: **Teaching in the field****Pacific northwest geology learning outcomes*** Explain the depositional environment of the formations that make up Craig’s Hill
* Describe the geologic history of the region based on field data

**Geoscience skills learning outcomes*** Use relative age techniques to develop a geologic history
* Collect and interpret data in the field

**Pedagogy learning outcomes*** Develop and teach a lesson plan centered on a field trip
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| **M 4/16** | Field trip to Craig’s Hill | **Blackboard:** *Lesson plan: using data in the classroom* |
| **W 4/18** | Designing a field trip for 9th-grade students | **Reading:** A model for the development and implementation of field trip**,** Orion, 1993**Blackboard:** *Answers to reading questions* |
| **M 4/23** | Return to Craigs Hill, work on field trip | **Reading:** Eruptive style and location of volcanic centers in the Miocene Washington Cascade Range: Reconstruction from the sedimentary record,Smith et al., 1988**Blackboard (midnight):** *Craigs Hill Lesson Plan* |
| **W 4/25** | EHS practicum |  |
| **Th 4/26** | Craig’s Hill practicum |  |
| **F 4/27** | Craig’s Hill practicum |  |
| **Week 6** |
| **M 4/30** | Complete EHS practicum |  |
| **W 5/2** | Discuss practicum and data lesson plans | **Blackboard:** *Answers to questions (self-evaluation)* |
| Weeks 7-8: **Learning from the rock record****Pacific northwest geology learning outcomes*** Describe the evidence for the Yellowstone plume and the origin and distribution of the Columbia River Basalts
* Describe the evidence for and the history of the Missoula floods

**Geoscience skills learning outcomes*** Read and summarize the scientific literature
* Describe and analyze rocks, erosional features, and sedimentary deposits and interpret their origin

**Pedagogy learning outcomes*** Describe ways to incorporate the rock record into teaching.
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| **M 5/7** | Provinces of the Pacific NorthwestIntroduction to province project |  |
| **W 5/9** | The Yellowstone hot spot and the CRBsIgneous rocks | **Reading:** Genesis of mafic magmatism in the Pacific northwest, Camp and Ross, 2004**Blackboard:** *Answers to reading questions* |
| **M 5/14** | The Missoula floods Sediments and depositional environments | **Reading:** The Channeled Scabland,Baker, 2009**Blackboard:** *Answers to reading questions* |
| **W 5/16** | No class | **Blackboard:** *Revised exam due* |
| Weeks 9-10: **Regional geology****Pacific northwest geology learning outcomes*** Explain the geologic significance and history of a province in the Pacific northwest
* Describe the geologic provinces of the Pacific northwest

**Geoscience skills learning outcomes*** Utilize the primary literature to find recent scientific studies about the region
* Use multiple lines of evidence to support your understanding of the geologic history

**Pedagogy learning outcomes*** Develop a graphics- and data-rich oral presentation about a region.
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| **M 5/21** | Province presentations | **Blackboard:** *Presentation (if applicable)* |
| **W 5/23** | Province presentations | **Blackboard:** *Presentation (if applicable)* |
| **M 5/28** | *Memorial Day: no class* |  |
| **W 5/30** | Putting together the history |  |
| **Finals week** |
|  | Final lesson plan | **Blackboard:** *Earth science teaching reflection* **Blackboard:** *Revised lesson plan* |