Introduction to the course. This course is an introduction to the evolution of North American landscapes over geologic time. The focus is on some of the continent’s most interesting and distinctive landscapes, where the results of tectonic and geomorphic processes are particularly well displayed. Although the same basic processes have shaped all of these landscapes, the results in each case are unique. Each region has its own set of landforms, soils, vegetation, lakes and streams, aquifers, and own “look” and character. These characteristics often have a strong influence on a region’s human land uses, environmental problems, and natural hazards. One of the most important ideas underlying this course is that none of these distinctive landscapes can be understood without considering their long-term evolution. Each records a sequence of change over geologic time that can include past and present motion of the lithospheric plates, cataclysmic volcanic eruptions, changes in the stream network, glacial erosion, and major fluctuations of climate and vegetation.

The same things could be said about landscapes around the world, but the regions of North America covered in this course offer an especially valuable opportunity to learn about the processes that shape landscapes over time. In part, this is because scientists exploring North American landscapes have so often used them to develop and test basic concepts of geology, physical geography, and biogeography. Two examples discussed in this course include: The influence that the canyons of the Colorado River on our understanding of the power of streams to shape the Earth surface, and the way in which both ancient lake beds in Utah and glacial landforms in Wisconsin helped lead to the recognition that the Earth has experienced dramatic global climate change.

The required text, *Annals of the Former World*, by John McPhee, makes similar connections between North American landscapes and the development of plate tectonics and other “big ideas” of Earth science. Through his travels with a series of geologists, McPhee also conveys the value of actually going out into these landscapes, and spending enough time there to really understand them. I hope that after taking this course, you have the opportunity to visit the real landscapes we discuss, and try out the ideas covered in this course for yourself.

Prerequisites and expectations. Doing well in this course will require both careful note-taking in lecture and careful study of the assigned readings. The readings do not simply repeat lecture material, and you will need to use them, either in studying for tests or in completing homework assignments (I will make it clear which portions of the readings may be covered on each of the exams). I will assume that you have had an introductory course in physical geography or physical geology, but I am also well aware that you may need a review of many of the concepts covered in that course. At the start of the semester, I will review basic concepts of plate tectonics. Later in the term, I will also refresh your memory on glacial and fluvial processes and landforms. I will very briefly discuss the geologic timescale, rocks, and minerals, but I expect you to review these topics in more detail by completing the assigned readings. If you don’t understand a concept discussed in lecture or the readings, ask for an explanation.

Course Learn@UW site

I will post material related to the course on the password-protected Learn@UW site, including readings and reading lists, lecture slides, the syllabus, homework assignments, outlines of exam topics, and links to other useful information. Exam and homework scores will be available through the Learn@UW grade list.

Textbook and other assigned readings. The required text (*Annals of the Former World*, by John McPhee, ISBN 0-374-51873-4) is not a traditional textbook. It will often take you to an important idea by a very roundabout path, with lots of detours. This is actually the way science works and I think that’s one of the reasons McPhee wrote the book in the form he did. I have assigned specific sections as required reading, but if you have the time and interest, go ahead and read the book straight through.

I am also assigning a short U.S. Geological Survey publication, *This Dynamic Earth: An Introduction to Plate Tectonics*, available on the web at [http://pubs.usgs.gov/publications/text/](http://pubs.usgs.gov/publications/text/). This is an excellent overview of plate tectonics, with many useful illustrations. Finally, you may find it useful to look through the web-based
lessons called WebGeology, at the University of Tromso, Norway: [http://ansatte.uit.no/kku000/webgeology/](http://ansatte.uit.no/kku000/webgeology/). The lessons on minerals, rocks, volcanoes, deformation of rocks, plate tectonics and mountain-building are all very good (you can also teach yourself Norwegian, Russian, or Hungarian by using this site…).

Other readings will be provided in electronic form on Learn@UW and/or through the UW Libraries. These are short selections from textbooks, scientific articles and reports, and other sources. **Note:** I will sometimes use illustrations from these readings in lecture, and if you have a copy with you it should help in note-taking (I will announce ahead of time which readings to bring with you). A few of the readings may be highly technical, and I’ve assigned them only because they contain good illustrations. In that case, I will let you know that reading the text is optional.

**Grading.** The course grade will be based on two exams (30% each), and several homework assignments (40% total). The exams will include a combination of short-answer and multiple-choice questions, mostly related to lecture material. Before each exam, I will hand out an outline of the topics to be covered. The homework assignments will include short essays in response to question about readings (especially the book by McPhee) or lecture topics, and projects using maps or diagrams. You will be able to redo the first homework assignment to improve your initial grade.

**Overview of the lecture topics.** The course will start with lectures on basic concepts on Earth Science that will be used through the rest of the semester. We will then study the relatively young and tectonically active landscape of Cascadia (British Columbia, Washington, Oregon, and northern California), at the boundary between two converging lithospheric plates. We will then move south and east across the mountain ranges and basins of the western U.S., where we will often need to consider a much longer and more complicated history of changing plate boundaries. Several lectures will cover the rise and decay of the Rocky Mountains, and the debris from those mountains that is now spread across both the nearby basins and the Great Plains to the east. We will then jump east across the continent to the old mountain ranges of the Appalachians, no longer at an active plate boundary but recording a long history of converging and diverging plates during the Paleozoic and Mesozoic eras. Finally, we will turn to the Midwestern US and the Canadian Shield, where the present landscape records events near both ends of the geologic timescale, including tectonic processes in the Precambrian and glacial erosion and deposition within the last two million years.

**Lecture and exam schedule.** The exam dates listed are fixed, but the schedule of lecture topics may be modified as needed. Two or more reading lists will be handed out during the semester, including one on the first day. These will also be available from the course website.

9/6, 9/8, 9/13. **Introduction to the course.** Review of geologic timescale, rocks, and minerals (*not covered in detail in lecture, students will need to do assigned readings on these topics*). Basic concepts of plate tectonics. Faulting and folding, fold and thrust belts. Isostasy and mountain-building processes. Volcanism and major types of volcanoes.


10/11. **California:** Evolution of the Sierra Nevada and Central Valley; the California goldfields

10/20. Exam 1

10/25, 10/27. **Big Picture 2.** Laramide Orogeny, anatomy of a Laramide uplift, post-Laramide erosion. Dinosaur bonebeds and the Dinosaur Wars. Uplift, climate change, and erosion in the Late Cenozoic.


11/17, 11/22. **Big Picture 3.** The Atlantic margin and formation of the Appalachian Mountains.


12/6. **Big Picture 4.** Precambrian evolution of the North American Craton, and the Mid-Continent rift. Basins and arches of the Midwest, the Baraboo Range, and the Sioux Ridge. Epicontinental seas and Paleozoic to Mesozoic rocks of the mid-continent. **Interior Low Plateaus.** Kentucky Bluegrass, the Knobs, and the Driftless Area.

12/8, 12/13. **Big Picture 5.** The Laurentide Ice Sheet and continental-scale patterns of ice flow, erosion, and deposition. Sculpting of the Great Lakes basins, the northern Great Plains, and the Canadian Arctic. Variation of glacial landforms across the mid-continent. Drainage rearrangement as a result of glaciation. Ten thousand lakes, and how the fish got to them.

12/15. **Exam 2 [no exam during finals week]**