

GEOMORPHOLOGY (GEOL/GEOG 386)

Course Objectives

Geomorphology is the study of the earth's surface: the processes that shape the surface of the earth, as well as the forms and features created by these processes. Through lectures, labs, field trips and discussions we will investigate various geomorphic processes, such as weathering, mass movements, rivers, wind and glaciers, which are responsible for creating the enormous variety of landscape features on Earth. By understanding the processes involved, you will have the tools to begin to identify and interpret the 'hows and whys' of the landforms you see all around you. You will observe and appreciate your surroundings with new eyes after this spring!

Learning Objectives:

- Analyze and interpret field observations and measurements
- Design and carry out field experiments to test a hypothesis
- Construct a geomorphic map from aerial photos, maps and field observations
- Conduct an independent research project and present findings in written report and oral presentation
- Understand the processes by which different soils form and use this knowledge to interpret and compare two soils in the field
- Assess the effects of climate and lithology on weathering and hillslope processes
- Understand how river hydraulics affect channel pattern and dimensions; measure and analyze in the field
- Read a scientific paper on a geomorphic process and summarize the main findings
- Differentiate landforms from glacial, fluvial, eolian, karst, and tectonic processes on aerial photos
- Assess the effects of past glaciers on the present landscape

Course Content and Organization

The course will consist of lecture/discussion periods, readings, laboratory and field projects, short homework and in-class assignments, and a final research project of your own design (done in pairs of 2 students). The four lecture periods per week will be a mixture of lectures, hands-on work with photos and maps, and discussions. The required readings from the text provide background and additional information on the subjects covered in lecture, and are listed in the course outline. There will also be occasional readings from other sources to supplement the text or provide the basis for class discussions. Exams will cover material presented in the lectures, labs and readings.

Grading

Two 1-hour exams (15% each):	30%
Comprehensive Final exam	20%
Lab reports, in-class activities and assignments:	35%
Independent Project	15%

Labs

Field observations are an essential component of geomorphic studies. We will go on several field trips during the afternoon lab periods. The field and lab projects will focus on original investigations of particular geomorphic processes or features. Individuals or teams of students will collect geomorphic field data and observations, analyze the data, and interpret it in written reports. The purpose is for you to explore first-hand the process of scientific research. Field trips during lab are absolutely required, no exceptions. You must be available for the entire 3-hour lab period. Each lab will require a written report, the format of which will be explained during the lab sessions. Lab reports will be due 1 week after the end of the lab (some labs will cover multiple weeks). Penalty for late labs: Grade reduced 5% per day. There will be no make-up labs. If you have a valid conflict with an official academic activity and you discuss it with me ahead of time you may be able to attend the other lab section during the same week if there is space. You are encouraged to work in groups on your lab projects, but each student must turn in

his/her own separate report unless I specifically instruct you otherwise.

Lab Materials: (Have these by the first lab period and bring to all lab meetings)

--Calculator (will also use in class)

--ruler, inches and metric (I recommend the clear plastic type)

--mylar for making maps from aerial photos; at least 4 8.5" x 11" sheets or one large sheet to start with (you might need more later). Get mylar with a frosted matte finish on one side so that you can draw on it with pencil.

--colored pencils and regular pencil with eraser

Required all-day field trip on Saturday, May 17.

If you have a valid conflict and can not attend this field trip, you must see me at least 2 weeks before the field trip to discuss an alternative assignment. If you miss the field trip and have not arranged an alternative assignment ahead of time, you will not be able to make up these points.

Research Project

The final lab project will be an independent research project of your own design. The project can be field, laboratory or computer based, but must involve the collection and interpretation of original data.

This is a group project, to be done in **pairs of 2 students**. Each group will turn in a title and proposal mid-way through the quarter and a single jointly-written report (along with maps, data, and any other supplementary materials) due during the last week of classes. Each group will make an oral presentation of their study during their scheduled lab period in the last week of classes. All members of a group will receive the same grade for the project. I will give you a more detailed handout describing the format and procedure for the research project within the first couple weeks of the quarter.

Scheduled Due Dates for Research Project:

-Thurs, April 17: A title and 1-paragraph description of your research project, citations of 3 references to relevant published papers on your chosen topic, and names of the members of your group (turn in one per group). Citations of websites will not count as references-- use published journal articles, reports or books.

-Thur, Apr 24: You must set up an appointment for your group to discuss your project with the Graduate T.A. by this date. Failure to do so will result in points being deducted from your grade on your proposal.

-Mon, May 5: A formal 2-page project proposal describing in detail your research objectives and methods (1 per group). Guidelines for the proposal will be described on a separate handout.

-Tues, May 27 & Weds, May 28: Oral presentation of your project during your scheduled lab period.

-Fri, May 30: Final project report is due (1 per group). Guidelines for report on separate handout.

Course Outline--GEOMORPHOLOGY (GEOL/GEOG 386)

<u>Date</u>	<u>Topic</u>	<u>Readings</u>
<u>Week 1</u>		
Mar 25-27	Geologic processes and the landscape Physical and Chemical Weathering In-class workshop: Mapping geomorphic features from aerial photos	Chap. 1 Chap. 4, 79-92
Lab 1:	Use of maps and photos in geomorphic studies	
<u>Week 2</u>		
Mar 31-Apr 3	Climate, Chemical Weathering and Soils Introduction to hillslope processes, slope profiles	Chap. 3, 42-78 Chap. 4, 92-133
Lab 2:	Field Trip: Landforms of the Yakima River and Kittitas Valley	
<u>Week 3</u>		
Apr 7-10	Hillslope processes, Mass movements Introduction to hydrologic cycle and drainage basins	Chap. 4, 92-133 Chap. 5, 134-140
Lab 3:	Geomorphic map of Upper Kittitas Valley & Soil Descriptions	
<u>Week 4</u>		
Apr 14-17	Hydrologic cycle; Drainage basin development; Introduction to river processes -flow characteristics sediment transport, -channel form and patterns; graded streams	Chap. 5, 141-160; 164-165, 168-183 Chap. 6
Thurs, Apr 17	Research Project Topic Due	
Lab 4:	Field Trip: Landslides and Debris Flows	
<u>Week 5</u>		
Apr 21-24	In-class exercise: Discharge Calculations River processes (cont); Floods and floodplains Landforms of rivers—terraces, alluvial fans	Chap. 6 (cont) Chap. 7
Lab 5:	Field Trip: Channel Characteristics and Hydraulics	
<u>Week 6</u>		
Mon, Apr 28	HOOR EXAM I	
Apr 29-May 1	Coastal Processes Mysterious Mima Mounds	
Lab 6:	Field trip: Channel Characteristics and Hydraulics	

Week 7

Mon, May 5 Research Project Proposal Due

May 5-8 Eolian Processes

Glacial processes

Chap 8

Chap. 9, 296-315

Lab 7: **Field Trip:** Mima mounds

Week 8

May 12-15 Glacial landforms

Channeled Scablands

Chap. 10

Handout

Thur, May 15 Symposium on Undergraduate Research and Creative Expression (SOURCE)

(required attendance at SOURCE activities in lieu of class)

Lab 8: Independent Research Projects

Sat, May 17 All-Day Field Trip: Channeled Scablands and Glacial Features

Week 9

Mon, May 19 SOURCE Write-up Due

May 19-21 Quaternary Geomorphology and Climate Change

TBA

Thur, May 22 HOUR EXAM II

Lab 9: Independent research projects

Week 10

May 26 MEMORIAL DAY HOLIDAY--NO CLASSES

May 27-29 Tectonic and climatic geomorphology

Karst Topography

Chap. 2: 20-31

Chap. 12: 406-413;

419-428

Fri, May 30 Research project reports due by 5:00 PM

Lab 10: **Oral presentations of research projects during lab periods**

FINAL EXAM (comprehensive): Thursday, June 5, 8:00-10:00 AM