

# GEL 140: Process Geomorphology

University of California Davis

Fall, 2017

**Class Times:** TR 9:00 – 10:20 Lectures EPS 1316  
T or R 4:00 – 7:00p Laboratory EPS 2231

**Instructor:** Nicholas Pinter  
Office: EPS 3113; email: npinter@ucdavis.edu  
Hours: M 10:00-11:00a, W 11:00a-12:00  
*or by appt.* (please ask for appointments in advance)

**Teaching Asst:** George Snyder (grsnnyder@ucdavis.edu)

## Course Description and Goals:

What makes a landscape? Seeking the answers to this question is the science of **geomorphology**. A student of geomorphology does not merely appreciate the patterns and textures of a landscape, but is able to interpret from these patterns the processes that build, maintain and destroy it. Once you know what makes a landscape, what can you do with it? The answers are surprisingly varied, as indicated by the variety of peers you may encounter in this class:

**Geologists:** geomorphology represents the final ‘act’ of earth history and a way to link modern processes to the geologic record.

**Ecologists:** geomorphology describes physical environment upon which the Earth’s biota depend.

**Archeologists:** geomorphology enables prediction of the human interaction with the landscape.

**Engineers:** designing human infrastructure requires understanding the earth-surface processes in which that infrastructure must be built, function, and be maintained.

**Hydrologists:** geomorphology determines routing and storage of water on and below the earth’s surface.

**Geographers:** geomorphology relates topography to spatial distribution of physical processes, which in turn influences the way that humans interact with the Earth.

This is an introductory course in geomorphology. It is designed to provide students with a background in recognition and quantitative interpretation of surface processes from topography and landscapes. The class surveys a broad spectrum of landforms and related physical processes, including weathering, hillslopes, fluvial systems, pedogenesis, eolian transport, and glaciation. Skills in process geomorphology include recognition of basic landscape elements from topography and field criteria; understanding physical forcing mechanisms driving landscape evolution; and quantifying earth-surface dynamics, topography, and change.

## Communications:

Students are strongly encouraged to bring questions to the professor's office hours every week. I will respond to email within ~24 hours unless on travel, but email is not a substitute for a face-to-face discussion. The TA will also hold weekly office hours.

**Textbook:** Process Geomorphology, 5th ed. Ritter, Kochel, Miller. McGraw Hill.  
Selected other readings also will be assigned.

A used copy of the 4th edition is acceptable. (*Note: Users of previous edition MUST be careful to read the correct TOPIC for each week, as page and chapter numbers change between editions.*)

**Quizzes:** Students are expected to complete assigned readings by the dates listed in this syllabus and to take concise, well organized notes. Quizzes will be closed-book, but students may look at any hand-written notes they have taken.

Absolutely no make-up quizzes will be given, but the lowest quiz grade will be dropped in lieu of one excused absence. Class exams will draw from both lecture and textbook materials, including some information included in one but not the other source.

<b>Grading:</b>	Mid-term Exam . . . . .	15%
	Quizzes . . . . .	20%
	Participation . . . . .	10%
	Labs exercises . . . . .	20%
	Field Trip Presentations or Term Project. . . . .	10%
	Final Exam . . . . .	25%

**Exams:** Mid-term: 10/31 in class  
Final: 12/13 1:00-3:00 p.m.

**Weekend Field Trip:** Taking a geomorphology course without going into the field would be like a class in "theory of swimming" – lots of useful background, but little practical experience. We have scheduled a 3 ½ day field trip, as detailed in the calendar below. We will be joining the Friends of the Pleistocene (FoP) trip to northern Owens Valley. Trip will depart **2pm on Friday Oct. 6** and return late on Sunday night, Oct. 9. Please make arrangements with your instructors for missing any Friday afternoon classes. **Note that FoP trips allow alcohol, but UCD does not. We must enforce a strict "dry trip" policy, and any student violating this policy will receive a zero grade for the trip and may be sent home by the next available public transportation.**

The trip is a strongly recommended part of this class, but can be substituted for a 12-page **term project** for students with irreconcilable scheduling conflicts or other issues. The trip will include rough camping at unimproved sites, and students are responsible for securing appropriate gear, including appropriate cold weather gear (e.g., sleeping bag rated to 20°F strongly recommended). The field trip registration fee has been donated for all GEL140 participants, but students are responsible for the cost of their meals and incidentals. Cooking groups will be organized.

Students participating in the field trip will be assigned a paper, which they will read and for which they will become a content expert. A 1-page summary of that paper is due Oct. 6 at 2pm (before trip departure), and a 1-page reflection is due by Oct. 13 at 5pm. See details in the GEL140 Canvas page, including submission instructions.

**Possible 1-Day River Field Trip:** An additional one-day field trip may be arranged as an optional substitute for selected labs. The tentative date is **Saturday November 18**. The class TA will communicate the final trip date and ask students for a firm commitment whether they will attend the trip or complete the indoor lab exercise (no-shows will receive a zero). Field trip participants will have a trip write-up due to their TA by the following week. Students selecting the indoor lab should attend their regular scheduled lab time.

# Course Schedule

Due

## INTRODUCTION TO GEOMORPHOLOGY

### Week 1 Principles of Geomorphology and Landscape Evolution

9/28 Class mechanics, introduction to geomorphology  
Physiographic provinces of the U.S.

**Exercise 1:** Maps, topographic profiles, and other fundamentals

## CONSTRUCTIONAL EARTH-SURFACE PROCESSES

### Week 2 Landforms of Active Tectonics

10/3 Lecture

Keller & Pinter Chap. 2

10/5 Lecture

**Lab 1:** Air Photos and Intro to Tectonic  
Geomorphology

Hand in Exercise 1

**10/6 Field Trip departs EPS at 2pm**

**Field Trip returns to Davis** very late Sunday night

### Week 3 Volcanic Processes and Landforms

10/10 Lecture

Summerfield Chap. 5

10/12 Lecture

**Lab 2:** Introduction to Digital Topography

Hand in Lab 1

### Week 4 Orogenesis

10/17 Lecture

Keller & Pinter Chap. 9

10/19 Lecture

**Lab 3:** Fault trenching and isostasy

Hand in Lab 2

## EROSIONAL EARTH-SURFACE PROCESSES

### Week 5 Weathering and Mass Wasting

10/24 Lecture

Ritter pp. 48-61 (5<sup>th</sup> ed)  
+ Ritter pp. 86-139 (5<sup>th</sup>)  
(4<sup>th</sup> Ed.: p. 43-58 + 80-125)

10/26 Lecture

**Lab 4:** Slope Stability and Landsliding

Hand in Lab 3

Lab 4 due at end of lab

### Week 6 Midterm + Start of Glacial Processes

10/31 **MIDTERM EXAM**

11/2 Lecture

pp. 334-340  
(4<sup>th</sup> Ed.: 297-302)

**Week 7 Glacial Processes and Landforms**

11/7 Lecture

pp. Chap. 10  
(4<sup>th</sup> Ed.: Ch. 10)

11/9 Lecture

**Lab 5:** High-Resolution Topography and Glaciers

**Week 8 Fluvial Processes**

11/14 Lecture

Chap. 6 (both 4<sup>th</sup> and 5<sup>th</sup> Ed)

11/16 Lecture

**Lab 6:** Indoor lab (ArcGIS)

Hand in Lab 5

11/18 (Saturday): *Possible 1-day Rivers field trip*

**Week 9 Fluvial Landforms**

11/21 Lecture

Chap. 7 (both 4<sup>th</sup> and 5<sup>th</sup> Ed)

11/23 *Thanksgiving – No Class*

Lecture

No Lab: Individual assistance available from TAs

**ADVANCED TOPICS IN GEOMORPHOLOGY**

**Week 10 Coastal Geomorphology**

11/28 Lecture

Chap. 13 (both 4<sup>th</sup> and 5<sup>th</sup> Ed)

11/30 Lecture

**Lab 7:** Coastal and Eolian Landforms

Hand in Lab 6

**Week 11 Eolian Processes and Landforms**

12/5 Lecture

Chap. 8 (both 4<sup>th</sup> and 5<sup>th</sup> Ed)

12/7 Lecture, including Planetary if time permits

**Lab 8:** Planetary Geomorphology

**Final Exam**

Wednesday, Dec. 13, 1:00-3:00 p.m.

Study!!!

---