

January 12, 2015

GEO SC 340
Geomorphology
Spring 2015

Lecture (004 Deike): MWF 12:20-1:10 pm

Lab (203 IST): F 2:30-5:30 pm

Instructor

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(or by appointment)

Teaching Assistant

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Prerequisite: GEO SC 001

Course description and overview

Geomorphology is the study of landscapes and the processes that sculpt them. In this course, we want to understand the landforms that develop as a consequence of various surface processes, and predict the manner in which landscapes respond to changes in external forcing (i.e., climate, tectonics, and people). This is a large undertaking, but by studying some selected examples, you will be able to reach the following goals:

- Evaluate the role of surface processes in the evolution of landscape form
- Predict the response of surface processes to changes in climate, tectonics, and land use
- Interpret Earth history from a landscape

In addition, by working with real-world research problems, you will have the opportunity to:

- Observe critically
- Think quantitatively
- Communicate clearly and concisely

The class is scheduled for 3 lectures and 1 lab per week. The lectures will draw partly from the textbook, but also significantly from outside material. It is critical to 1) attend class regularly and 2) come prepared for each class by reading the appropriate sections as assigned.

The laboratory sections will meet in the computer lab of 203 IST, and consist primarily of GIS-based exercises. Thus, in addition to developing a scientific understanding of geomorphology concepts, you will also emerge from this course armed with the practical skills for analyzing digital landscapes.

Assignments and grading

There are four principal components that Sheila and I will use to assess your comprehension of Geomorphology and to assign grades.

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Lab Exercises (40%): These will constitute the bulk of your workload. They will focus on applying the concepts and techniques we discuss in lecture to problems in surface processes. You should be able to complete much of the data analysis during the weekly 3-hour lab period. However, expect to spend time outside of class writing up your interpretations.

Labs are due the following Friday before class unless otherwise noted. Labs will be accepted up to 2 days late with a 10% per day penalty, and not accepted after that. If you are sick or otherwise unable to turn your lab in on time, it needs to be cleared *before* the due date.

There will be one **mandatory** field trip associated with the lab, and run on the weekend of March 21/22. Activities during the trip will involve collection of field data used elsewhere in the course. Thus, attendance on this trip is absolutely critical.

Quizzes (15%): There will be 3 short (10-15 minutes each) quizzes throughout the semester that will draw primarily on material presented in lecture.

Exams (35%): There will be two exams that focus on concepts covered in class and problem solving.

Final project (10%): Towards the end of the semester, you will develop and present an independent project that draws on your newfound expertise in geomorphology.

Grading rubric: Laboratory exercises and the final project will be assessed on both content and presentation. Note that one of the most important scientific skills is to be able to synthesize concepts and information, and apply these in a new situation or to an unknown problem. Thus, I am particularly looking for how well you support your conclusions with concepts we covered in class or covered by the text. There is not necessarily a 'right' answer.

Here are some rough benchmarks:

A+ (~98%): Outstanding explanation with superior supporting information; unusual insights and flashes of brilliance; creative and original analyses and thoughts

B+ (~88%): Good solid job on explanation, with excellent support from examples, data, figures, etc.; excellent reasoning, or excellent explanations

C+ (~78%): Satisfactory job; does what the assignment asks; decent reasoning or explanations; good support by data, figures, examples, etc.; overall, fair work

D+ (~68%): Decent explanation, but too general or some inaccuracies or flaws in reasoning or coverage is accurate but cursory; does not meet the minimum required for a complete answer

F (~58%): Does not effectively address assignment; fails to support assertions with data or examples; does not address topic at hand; unclear explanations; inadequate understanding; major flaws in reasoning

Course Materials

Required textbook: Anderson and Anderson, *Geomorphology: The Mechanics and Chemistry of Landscapes* (ISBN 978-0521519786)

Angel website: The Angel website will be the primary repository for course materials, including data for GIS labs, lecture notes and slides, and any assigned outside reading or supplementary materials.

Academic Integrity

While collaboration is encouraged on laboratory exercises, all work turned in should be your own. In general, you should be able to reproduce/explain any work you turn in.

Written assignments will sometimes require the use of external source material to support your arguments. While cases of intentional plagiarism sometimes occur (such as purchasing or wholesale copying of term papers), more often than not plagiarism is the unintentional result of careless research and improper citation. Plagiarism is simply defined as the act of stealing or passing off the ideas, words, or creations of another person as your own. When in doubt, cite the reference. If you still are not sure, please come see me or your TA. We will be more than happy to help you decide when and how to reference source material properly.

Finally, you will be penalized for cheating. Students who present other people's work as their own will receive at least a 0 on the assignment and may well receive an F in the course. For more details, please see: Earth and Mineral Sciences Academic Integrity Policy, which this course adopts: http://www.ems.psu.edu/current_undergrad_students/academics/integrity_policy

Accommodations for Students with Disabilities

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The Office for Disability Services (ODS) website provides contact information for every Penn State campus: (<http://equity.psu.edu/ods/dcl>). For further information, please visit the Office for Disability Services website (<http://equity.psu.edu/ods>).

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation based on the documentation guidelines (<http://equity.psu.edu/ods/guidelines>). If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. You must follow this process for every semester that you request accommodations.

Assistance with textbooks:

Penn State honors and values the socioeconomic diversity of our students. If you require assistance with the costs of textbooks for this course, contact the Office of Student and Family

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Services (120 Boucke Building, 863-4926, <http://studentaffairs.psu.edu/familyservices/>). For additional need related to socioeconomic status please visit sites.psu.edu/projectcahir.

Attendance policy

Quizzes and exams will pull much material from lectures and labs, thus attendance is critical. Specifically, you will not pass the course if you miss more than **3** labs. That being said, students who miss class for legitimate reasons will be given a reasonable opportunity to make up missed work. Whenever possible, students participating in University-approved activities should submit to the instructor a Class Absence Form available from the Registrar's Office: http://www.registrar.psu.edu/student_forms/, at least one week prior to the activity.

Some relevant information on PSU attendance policies:

Attendance Policy 42-27: <http://senate.psu.edu/policies/42-00.html#42-27>

Attendance Policy E-11: <http://www.psu.edu/oue/aappm/E-11.html>

Conflict Exam Policy 44-35: <http://www.psu.edu/ufs/policies/44-00.html#44-35>

Illness Verification Policy: <http://studentaffairs.psu.edu/health/welcome/illnessVerification/>

Religious Observance Policy: <http://www.psu.edu/oue/aappm/R-4.html>

Office of Student and Family Services: <http://studentaffairs.psu.edu/familyservices/>

Weather delays

Campus emergencies, including weather delays, are announced on Penn State News: <http://news.psu.edu/> and communicated to cellphones, email, the Penn State Facebook page, and Twitter via PSUAlert (Sign up at: <https://psualert.psu.edu/psualert/>).

2015 Geosc 340 schedule (updated Jan. 19)

Week	Date	Lecture Topic	Reading (Anderson)	Lab Exercises
1	Jan 12	Introduction/motivation		
	Jan 14	Unifying principles in geomorphology	p2-15	
	Jan 16	Landscape evolution models	Pazzaglia, 2003	Lab 1: Intro to ArcGIS
2	Jan 19	<i>MLK day - No class</i>		
	Jan 21	Measuring erosion rates	p. 131-142; skim Ch. 6	
	Jan 23	Weathering and soil production	p. 161-168; skim Ch. 7	Lab 2: Cinder cones
3	Jan 26	Hillslope mass balance and form	p304-310; skim 311-330	
	Jan 28	Soil transport (linear)		
	Jan 30	Soil transport (non-linear)	Roering et al., 2001	Lab 3: Soil-mantled hillslopes
4	Feb 2	Landslides <i>Quiz 1</i>	p. 330-343	
	Feb 4	Slope stability analysis		
	Feb 6	Landslide hazards	assigned paper	Lab 4: Slope stability
5	Feb 9	Hillslope hydrology and runoff	p363-373; skim Ch. 11	
	Feb 11	Drainage density/Channel initiation	assigned paper	
	Feb 13	TBD		Lab 4: Slope stability (continued)
6	Feb 16	<i>Pres. day - No class</i>		
	Feb 18	<i>Exam 1</i>		
	Feb 20	Introduction to rivers		Lab 5: Watershed hydrology
7	Feb 23	Flow mechanics	Chapter 12	
	Feb 25	Flow mechanics		
	Feb 27	TBD		Lab 6: Flood frequency
8	Mar 2	Sediment transport	Chapter 14	
	Mar 4	Sediment transport		
	Mar 6	Channel morphology <i>Quiz 2</i>		Lab 7: Alluvial fans
9	Mar 9	<i>Spring Break - No class</i>		
	Mar 11	<i>Spring Break - No class</i>		
	Mar 13	<i>Spring Break - No class</i>		
10	Mar 16	Channel morphology	Chapter	
	Mar 18	Alluvial and bedrock terraces		
	Mar 20	Dating of depositional landforms		Lab 8: Field trip prep
	Mar 21/22			<i>Weekend field trip (Sat/Sun)</i>
11	Mar 23	Tectonic geomorphology: geomorphic markers	Chapter 4	
	Mar 25	Tectonic geomorphology: bedrock rivers and relief		
	Mar 27	Tectonic geomorphology: Isostasy and rock uplift		Lab 9: Field trip data analysis
12	Mar 30	Transient landscapes	Chapter 13	
	Apr 1	TBD		
	Apr 3	<i>Exam 2</i>		Lab 10: Tectonic geomorphology
13	Apr 6	Glacial mass balance and ice flow	Chapter 8	
	Apr 8	Glacial erosion		
	Apr 10	Glacial landforms and deposits		Lab 11: Glacial landscapes
14	Apr 13	Post-glacial landscapes: sea level and uplift	Chapter 16	
	Apr 15	Marine terraces		
	Apr 17	Missoula floods <i>Quiz 3</i>		Lab 12: Final project
15	Apr 20	Climate change and geomorphology	TBD	
	Apr 22	Climate change and geomorphology		
	Apr 24	TBD		Lab 12: Final project (continued)
16	Apr 27	Landuse and geomorphology	TBD	
	Apr 29	Landuse and geomorphology		
	May 1	TBD		Final project presentations