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GEO 391.01: ST: Surface Processes

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Geosciences 391: Surface Processes Spring 2018

Course Information

- Instructors: Payton Gardner | Andrew Wilcox
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- Office Hours: T/Th 10-11 | M 11-12 or by appointment
- Class meetings: MWF 10-10:50, CHCB 304
- Website: Moodle umonline.umt.edu

Overview

Surface Processes will introduce students to the study of the earth's surface and near surface using the laws and principles of physics. The course will describe the mechanisms underlying the processes that shape the earth's surface and drive its evolution, including climate, hydrology, geomorphology, and geochemistry. The course will combine lectures, field data collection, data analysis, and lab activities. Active learning and student participation will be an essential component.

Course Objectives

To provide students with:

- familiarity and experience applying fundamental concepts in physical systems
- an understanding of the linkages among surface processes
- experience collecting and analyzing surface-processes data
- opportunities for developing scientific writing skills
- opportunities to develop and apply physics, mathematics, and computational skills
- experience in interpreting and analyzing literature from both secondary and primary sources
- practice in using models, data, and logical reasoning to critically evaluate and connect information about earth-surface processes
- experience communicating an understanding of the interrelationships among earth science concepts and theories to peers and others
- experience working as members of productive, collaborative teams

Assessment

20% Lab exercises and other homework
20% Field project reports
25% Midterm
10% In-class exercises and class participation
25% Final exam

Course Information, Guidelines and Policies

Field Trips

We will have two required Saturday field trips, March 10th and April 7th (all day), in addition to in-class field trips. Field trips will entail data collection and associated project reports.

Labs

There is no separate lab section for this class, but we will do regular lab (including computer lab) and field activities during class time, typically on Fridays. These will provide active-learning opportunities and will often take time beyond the regular class time to complete (in those cases, they will be due at the beginning of class the following Friday). Computer lab activities will include introductions to Python and GIS applications to surface processes (no prior knowledge is expected).

Prerequisites

The following are prerequisites: GEO 101N/102N or GEO 103N/104N, M 122 or M 151.

Attendance

In addition to lab exercises, there will often be short in-class activities that contribute to your grade. If you miss class, it is your responsibility to find out what you missed, which should involve consulting the course website and your peers (rather than the instructor).

Readings

Required textbook:

Bierman, P.R. and D.R. Montgomery, 2014, Key Concepts in Geomorphology. W.H. Freeman and Co.

Cheapest option is e-book rental ($27.99 for semester):
https://store.macmillanlearning.com/us/product/Key-Concepts-in-Geomorphology/p/1429238607

For e-book or paperback purchase, cheapest option is Amazon:
https://www.amazon.com/Key-Concepts-Geomorphology-Paul-Bierman-ebook/dp/B00UY1TEBG/ref=mt_kindle?_encoding=UTF8&me=

Supplemental readings (e.g., journal papers or popular media) will also be assigned.

Course website

Please check the course website (Moodle) regularly, especially before class, for announcements, notes, readings, assignments, and schedule updates. Some of the class lecture notes will be posted.

Email

Feel free to communicate with the instructors by email. But please do not email with homework questions; instead please ask homework questions in class (others are also likely to have similar questions) or at office hours.

Late Policy

Assignments handed in late will have 2% of total points are deducted per day late (starting at the time when the assignment is due). No credit allowed for assignments handed in > 1 week after due date or after answer key / grading rubric posted, whichever comes first.

Student Conduct Code

The Student Conduct Code at the University of Montana embodies and promotes honesty, integrity, accountability, rights, and responsibilities associated with constructive citizenship in our academic community. This Code describes expected standards of behavior for all students, including academic conduct and general conduct, and it outlines students' rights, responsibilities, and the campus processes

for adjudicating alleged violations. Full student conduct code.
http://www.umt.edu/vpsa/policies/student_conduct.php

Course Withdrawal

Students may use Cyberbear to drop courses through the first 15 instructional days of the semester. Beginning the 16th instructional day of the semester through the 45th instructional day, students use paper forms to drop, add and make changes of section, grading option or credit. GEO391 may not be taken as credit/no-credit.

Disability Modifications

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. We will work with you and Disability Services to provide an appropriate modification.

Schedule

- Class meeting topics are subject to change
- Readings listed for a given week should be completed by Monday's class (except for week 1).
- Readings denoted "Key Concepts" refer to the textbook, and the chapter number to read that week.
- The readings listed below are a partial list. Additional readings will be announced each week (and posted on Moodle) and must be completed before the following class.
- Most Fridays are set aside for lab activities, which will often meet in the computer lab. Additional details will be provided in advance of any lab activity.
- Updates to the syllabus will be announced in class and posted on Moodle

Week	Date	Class meeting topic	Reading
1	22-Jan	Course introduction, Introduction to earth systems & the Critical Zone	Key Concepts 1 (pp. 5 – 30)
	24-Jan	Introduction continued; unifying concepts	
	26-Jan	Lab	
2	29-Jan	Unifying concepts, tools & approaches for studying surface processes	Key Concepts 2
	31-Jan	Tools & approaches	
	2-Feb	Lab	
3	5-Feb	Climate processes	Key Concepts 13
	7-Feb	Climate processes & climate change	
	9-Feb	Lab	
4	12-Feb	Water transfers in the Critical Zone	Key Concepts 4
	14-Feb	Water transfers in the Critical Zone	
	16-Feb	Lab	
5	19-Feb	Presidents Day, no class	TBD
	21-Feb	Snow hydrology	
	23-Feb	Snow hydrology	

6	26-Feb	Weathering	Key Concepts 3
	28-Feb	Soils & sediment fluxes	
	2-Mar	Lab	
7	5-Mar	Drainage basins	Key Concepts 7
	7-Mar	*Midterm*	
	9-Mar	Lab	
8	12-Mar	Geochemistry & biogeochemistry	TBD
	14-Mar	Geochemistry & biogeochemistry	
	16-Mar	Lab	
9	19-Mar	Geochemistry & biogeochemistry	TBD
	21-Mar	Geochemistry & biogeochemistry	
	23-Mar	Lab	
Spring break			
10	2-Apr	Water & transport processes	TBD
	4-Apr	Water & transport processes	
	6-Apr	Lab	
11	9-Apr	Ecological-geological-hydrological interactions in the Critical Zone	TBD
	11-Apr	Ecological-geological-hydrological interactions in the Critical Zone	
	13-Apr	Lab	
12	16-Apr	The nexus of water, energy, and food systems	TBD
	18-Apr	Surface processes in the Anthropocene	
	20-Apr	Lab	
13	23-Apr	The Anthropocene & engineering geology	TBD
	25-Apr	The Anthropocene & engineering geology	
	27-Apr	Lab	
14	30-Apr	Restoration and management in the Anthropocene	TBD
	2-May	Restoration and management; Future directions	
	4-May	Course wrap-up	
15	9-May	Final exam (10:10-12:10)	