1-2014

GEO 228.01: Geosphere Surface Processes

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GEO228: Earth Surface Processes
Spring 2014
University of Montana
Instructor: Marco Maneta
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Office: CHCB 304
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Class meetings: Tuesday-Thursday 10:10pm-11:00pm

Teaching Assistant: Douglas Brugger (douglas.brugger@umontana.edu)
Room:

Overarching goals: In this course students will develop the skills to

- Understand the mechanisms that drive the processes that shape the surface of the Earth
- Apply technical knowledge to quantitatively describe these processes

Ancillary goals: Along with the overarching goals, in this course students will learn how to think of processes in geosciences in terms of the fundamental laws of physics and how to analyze them quantitatively. Students will learn that processes on Earth are bound by the conservation of physical quantities. In addition, students will improve their quantitative and computer skills, will learn how to present information in a graphical format and how to interpret graphs containing scientific information.

Text Books (Chapters and excerpts available on Moodle):

- Allen, P. Earth Surface Processes. Blackwell Science. 1997 (Chapter 1 and 3)
- White, I. D., Mottershead, D. N. and Harrison , S. J. Environmental Systems: An Introductory Text. Chapman & Hall, 1992 (Excerpts)

Prerequisites: GEO101/102, College algebra.

Office hours: Office hours will be the next hour after class.

Grades: 40% Assignments - 40% Final - 20% midterm with highest grade

Attendance is mandatory and material not included in the readings will be covered. Make sure mandatory readings are supplemented with clean and accurate class notes. Bring a calculator to class.

During the semester, and if the students find it useful, one or two after hour review session may be scheduled to provide further support on specific topics. Attendance to these review sessions is optional.

Assignments:
Assignment 1: Units and dimensions
Assignment 2: Planetary energy balance
Assignment 3: Mass balance, residence time and equilibrium
Assignment 4: Isostatic balance
Assignment 5: Rainsplash erosion
Assignment 6: Numerical modeling of diffusion process in a hillslope

Course Content (next page):

Date	Topic	Readings	Activity
01/28	Intro. Numbers in geosciences		
01/30	Dimensional analysis	Physical Quantities and DA	Problem set 1
02/04	Systems, conservation, Residence time		
02/06	Earth System as a thermodynamic system	White et al: Sytems	
02/11	Physics of Radiation		
02/13	Energy balance of the Earth	Allen: Sections 1.1 and 1.2	Problem set 2
02/18	Distribution of energy within the Earth		
02/20	Hydrologic cycle. Stores and fluxes	Allen: Sections 1.3	
02/25	Hydrologic cycle. Ocean circulation		
02/27	Hydrologic cycle. Atmospheric circulation		Problem set 3
03/04	Carbon Cycle	Allen: Sections 1.4	
03/06	Mid term 1		
03/11	Earth's internal energy	White et al:	
03/13	The shape of the earth	Earth's internal energy	
03/18	Isostatic Topography	Allen: Section 1.5,	
03/20	Class experiment on isostasy	1.5.1 and 1.5.2	Problem set 4
03/25	Production of sediment. Weathering I		
03/27	Production of sediment. Weathering II	Allen: Sections 3.1, 3.2.1	
04/08	Gravity and gravitational potential	and 3.2.2	
04/10	Soil erosion by water		Problem set 5
04/15	Excel workshop		
04/17	Mid term 2		
04/22	Diffusion process I (fluxes and erosion)		
04/24	Modeling diffusion		
04/29	Class experiment of diffusion	Allen: Section 3.3.2	
		(to Stream Incision)	Problem set 6
05/01	Sediment fluxes I	Allen: Section 3.4, 3.4.1,	
05/06	Sediment fluxes II	3.4.2, 3.4.3, 3.4.4, 3.5.1,3.5.2	
05/08	Review session before final		