

GY 260 Surface Processes and Geomorphology Block 1, 2007

Course Information

Professor
Eric Leonard -- Palmer 9C, x 6513

Paraprofessional
Phil Armstrong-- Palmer 9H, x 6515

This course is a one-block introduction to geomorphology -- the study of earth-surface processes and landforms. The course will emphasize physical and chemical *processes* acting at the surface of the earth, but we will also spend time looking at and interpreting landforms and landscapes in the lab and the field. Perhaps the most exciting developments in geomorphology over the last decade s have been a revival of interest in understanding the long term evolution of the landscape, making use of all sorts of new analytical and computational tools, and an emerging appreciation of the complex feedback relationships between tectonics, climate, and geomorphology. We will devote time to these topics late in the block.

The course subject matter is (obviously) geomorphology and surface processes, but we will also work on research design, sampling methodologies, data collection and analysis, and writing of scientific papers. We will work with several modern field instruments and Geographical Information Systems (GIS) computer programs. We will introduce this material in the context of geomorphology, but much of it should be useful in other aspects of geology, and beyond geology.

Class Schedule

When on campus we will meet each morning at 9:00 and will continue until 11:30-12:00. Most afternoons will involve field or lab work and we will meet at 1:15 except as noted on the schedule. There will be two overnight field trips (September 6-7 and 20-21), and several half-day trips.

Readings

The course textbook is Ritter, Kochel, and Miller *Process Geomorphology*, 4th ed., 2002 – reprinted by Waveland Press 2006. Other assigned readings will be handed out in class.

Field and Lab Supplies

For field work you will need a hand lens, acid bottle, field notebook, mechanical pencil (*not* a pen), and a clipboard or map board. A hammer, a trowel, and an old pocket knife would also be helpful, if not essential. For lab work you will need a scientific calculator, tracing paper, a few colored pencils, and a plastic ruler marked in tenths of inches and millimeters. The ruler will be helpful in the field too, if you can avoid losing it.

For our overnight field trip you will all of your normal camping gear (tent, sleeping bag, pad, warm clothes, day pack, water bottle). As always, we will arrange food as a group.

Evaluation

Grades in the course will be based on laboratory and field work write ups, two quizzes, one exam, and class participation. Below are the **approximate** weightings, which will undoubtedly change a bit as weather, instrument and computer glitches, etc. may keep us from finishing some projects.

Lab and Field Reports (other than Ark valley)	40% (3 -10%/project)
Arkansas Valley Project - talk and write-up	15%
Quizzes	15%
Take-home final exam	25%
Class Participation	5%

GEOMORPHOLOGY -- BLOCK 1, 2007

DAY	MORNING 9:00 unless otherwise noted	AFTERNOON 1:15 unless otherwise noted	READING
Mon 9/3	10:30 Course introduction; Surface process mechanics	1:00: FIELD TRIP - Mesa Road slump	
Tues 9/4	Mass movement I: Introduction, falls, landslides Slope stability problem.	Lab: Air photo introduction, complete slope stability problem	Ritter 93-103
Wed 9/5	Mass movement II: Creep processes, digression to ice flow	Lab: Four Mile/Horseshoe Cirque project	Ritter 103-113, 303-308
Thur 9/6	Mass movement III: debris flow processes	1:00 FIELD TRIP - Four Mile/Horseshoe Cirque (overnight)	Ritter 113-125; Meierding & Birkeland 165-173 or Pierce 63-76
Fri 9/7	FIELD TRIP Four Mile/Horseshoe Cirque (return about 5:30 PM)		Ritter 359-376, 387-395
Mon 9/10	QUIZ - Mass movement Class -- Fluvial geomorphology I: Runoff generation, stream hydrographs, flood frequency analysis	Complete Four Mile/Horseshoe Cirque projects	Ritter Ch 5 (esp. 135-173)
Tues 9/11	Fluvial geomorphology II: - Open channel flow, sediment transport, alluvial channels	Lab: GIS/DEM introduction	Ritter 190-200
Wed 9/12	Fluvial geomorphology III: Alluvial and bedrock channels	FIELD PROJECT: Monument Creek hydraulics	Ritter 200-225
Thur 9/13	Lab: Flood-frequency analysis	No class	
Fri 9/14	Fluvial geomorphology IV: Fluvial landforms, fluvial response to changing conditions	Lab: Sangre de Cristo GIS project	Ritter Ch 225-231, Ch 7 (esp. 242-264)
Mon 9/17	QUIZ -- Fluvial Geomorphology Class -- Tectonic geomorphology	Lab: Sangre de Cristo GIS project continuation	Ritter Ch 2
Tues 9/18	Weathering	1:00 FIELD TRIP: Weathering and soil genesis	Ritter 43-58, 80-92
Wed 9/19	Soil genesis	1:00 FIELD TRIP: Soil field project	Ritter 58-78
Thur 9/20	7:30 FIELD TRIP - Upper Arkansas River Valley (overnight)		Leonard et al.1-5
Friday 9/21	FIELD TRIP - Upper Arkansas River Valley (return about 5:30 PM)		
Mon 9/24	Work on Arkansas Valley Projects	Group Presentations - Arkansas Valley Projects, then work on project write-ups	
Tues 9/25	Landscape evolution models, Cenozoic geomorphic evolution of the Rocky Mountain region	TAKE-HOME FINAL handout	Ritter 173-187; Summerfield 457-468; Gregory and Chase 581-585.
Wed 9/26	FINAL EXAM due at 12:00		

PROJECTS AND DUE DATES

Slope stability problem - Due Wednesday 10/4 at 9:00 AM

4 Mile/Horseshoe Cirque

Rough maps must be completed before we leave for the field on Thursday 9/6 at 1:00 PM - we will check them

Final maps and map write up - Due Tuesday 9/11 at 9:00 AM

Field project write-up - Due Wednesday 9/12 at 9:00 AM

Intro GIS/DEM maps/charts - Due Tuesday 9/11 on leaving lab

Monument Creek write up - Due Friday 9/14 at 9:00 AM

Sangre de Cristo GIS project - Due Wednesday 9/19 at 9:00 AM

Soils field write-up - Due Thursday 9/20 at 7:30 AM

Upper Arkansas Valley Projects

Group talks with appropriate visual aids - Monday 9/24 at 1:00 PM

Individual write ups - Due Tuesday 9/25 at 1:00 PM

Take Home Final - Due Wednesday 9/26 at 12:00