

GEOLOGY 377 –EARTH SURFACE PROCESSES
“Process Geomorphology”
Spring, 2020

Course Information:

Course Title: GEOL 377: Earth Surface Processes
Instructor: Dr. L. Scott Eaton
Office: Engineering/Geosciences 3220
E-mail: eatonls@jmu.edu
Office Hours: M, W: 11:00-13:15, F: 12:15-13:15, or by arrangement
Class Time: M W: 10:10–11:00; F: 10:10-12:05
Room: EnGeo Building 3009
Course Web Site: <http://csmgeo.csm.jmu.edu/geollab/eaton/web/eaton.htm>
Textbook: *Process Geomorphology*, Dale F. Ritter, R. Craig Kochel, Jerry R. Miller, (any edition is acceptable).

Goals of the Course:

- To provide students with an in-depth understanding of earth surface processes responsible for landscape evolution, geologic hazards, and current environmental challenges;
- To provide students with an introduction to the linkages between various processes (e.g., running water, gravity, ice, wind) and the resulting landforms;
- To provide students with hands-on introduction to field and laboratory techniques for characterizing and summarizing dominant earth surface processes, from interpreting topographic maps, aerial photography, and digital elevation models;
- To provide students with hands-on introduction to computational techniques for characterizing landscape properties, and how these properties can be used to infer processes;
- To provide students with opportunities for applying the scientific method;
- To provide students with opportunities for working in teams; and
- To provide students with opportunities for honing their communication and critical thinking skills.

Overview of the Course:

This three credit course is designed to introduce you to earth surface processes through lecture, laboratory, field, and computer-based activities. The variety and magnitude of geologic processes that have sculptured the earth’s surface is simply astounding! In the last hundred years, geomorphologists have made discoveries of ancient flood outbursts that scoured thousands of square miles, glacial deposits in the tropics, faulted Holocene-age soil horizons in areas that have been historically earthquake “quiet”, and other findings that we will discuss in lecture. Other studies have shown more subtle changes in the earth’s surface, including the incremental lowering of the water table and subsequent land subsidence, the gradual retreat of glaciers, and the slow but persistent breakdown of rock from chemical and physical weathering. We will examine these and other topics, and link them to other disciplines of geology that you will encounter in other courses.

Geomorphology began as a very descriptive science; it is currently making the transition to a more quantitative approach. We will utilize the strengths of both end members to achieve our goals. It is important that you master these concepts and tools that we develop this semester, for many of the “applied” problems in geology focus on one central theme: *How well do you understand the processes that have impacted and shaped a landscape in a given study area?* This will require you to synthesize together much of your other course work (e.g. soils, engineering, hydrogeology, stratigraphy, geochemistry, field camp). (If you haven’t had these courses, don’t despair!) In the instructor’s opinion, the synthesis of all of your geology knowledge is the core of Process Geomorphology!

Important Dates:

Tests:

Test 1:	Friday, February 21
Test 2:	Friday, April 3
Test 3:	Wednesday, May 6, 8:00-10:00 a.m.

Field Trips: held during Friday laboratory times.

Off site field trip (date TBA): Fluvial/Hillslope Processes (Grottoes) (half day)

Grading Structure:

Test 1:	25%
Test 2:	25%
Test 3:	25%
Lab/Projects	22%
Seminar Attendance and Reports	3%

Attendance/Participation:

What you derive from this course will depend on your investment in this endeavor. Attendance in lecture, laboratory, and field trips is expected; and unexcused absences for laboratory or field trips will result in a penalty of your grade. Excessive absences in the course will be reflected in your final grade.

Exams:

Exams will be held during the Friday laboratory time on the dates shown above. Make up exams will only be given for documentable medical or family emergencies, or arrangements previously made with the instructor.

Field Trip and Laboratory Reports:

Assignments are expected to demonstrate professionalism, and to be completed on time. Late assignments will be penalized 10% per day, and will not be accepted after five days of the due date unless previous arrangements have been made with the instructor.

Academic Honesty:

All incoming JMU students sign a pledge to abide by the JMU honor code, which includes, but not limited to, not presenting others' work as your own without proper acknowledgement. **This honesty also includes not accessing/borrowing/incorporating past course assignments, laboratories, tests, or other materials. In short, you are expected to do your own work unless otherwise instructed.** The spirit of this honor pledge will be implicit in all assignments. Violation of this pledge will be prosecuted vigorously by the instructor and the honor council; penalties in the past have included receiving a failing grade on assignments, the course, and expulsion from the University. For more information, see the link <http://www.jmu.edu/honor/code.shtml>.

Inclement Weather:

JMU's cancellation policy will apply for our lecture and laboratory meetings. Please check your email before coming to class in the morning in the event that the instructor has cancelled class due to unforeseen events. With regards to our field trips, the instructor will make a decision on whether or not the event will proceed no later than two hours from the planned meeting time. However, you should be prepared for (and dress appropriately for), inclement weather for ALL field trips. For more information, see the link <http://www.jmu.edu/JMUpolicy/1309.shtml>.

Religious Observation Accommodations:

All faculty are required to give reasonable and appropriate accommodations to students requesting them on grounds of religious observation. The faculty member determines what accommodations are appropriate for his/her course. Students should notify the faculty by no later than the end of the Drop-Add period the first week of the semester of potential scheduled absences and determine with the instructor if mutually acceptable alternative methods exist for completing the missed classroom time, lab or activity.

The Tentative Plan:

The Earth's Surface - An Introduction

Chapter 1

Cracking, Slipping and Sliding - Physical Weathering and Mass Movements

Chapter 4

Chemical Weathering and Dirt, (a.k.a. Soils)

Chapter 3

The Angry Earth: Internal Forces and the Impact of Climate

Chapter 2

A Week at the Beach - Coastal Processes and Landforms

Chapter 13

Your Friend, the Drainage Basin, and All of Its Secrets

Chapter 5

A River Bath - Fluvial Processes and Landforms

Chapters 6, 7

Black Holes and Sinking Fast - Karst Processes and Landforms

Chapter 12

Careening Glaciers - Glaciers and Glacial Mechanics

Chapters 9, 10, 11

On the Edge – Periglacial Processes and Landforms

Chapter 11

Landform Analysis—Learning the Tricks of the Trade

Geology 377 – Earth Surface Processes Overarching Goals

After completing this course, a student should be able to:

- Travel almost anywhere in the world and formulate realistic hypotheses of how the land surface came to be.
- Understand the importance of rock type, structure, tectonic history, and time in the evolution of landforms.
- Identify the origin of landforms using ground reconnaissance, topographic maps, aerial photographs, and satellite imagery.
- Comprehend how geomorphology ties into other aspects of geology (tectonics, sedimentology, stratigraphy, hydrogeology, environmental geology, etc.).
- Use present-day landforms to develop hypotheses about the past climates of landscapes.
- Identify areas of potential geologic hazards from information obtained from surficial deposits and landforms.