

# GEY 203

## SURFICIAL GEOLOGY

### Instructor:

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### Class meetings (Ricker 330):

Lecture: Mon, Wed, Fri 8 – 9:05,

Lab: Friday 1:10 - 4,



*Humans as geomorphic agents*

### Surficial Geology:

This course will focus primarily on the field of geomorphology, the study of landforms and landscape evolution. The landscape on which we exist is dynamic. Movement and redistribution of materials across this surface occur on timescales from seconds to thousands and millions of years. A study of landforms reveals an archive of these dynamic processes and changing environments. Investigation of landforms and surficial processes is crucial to many aspects of human habitation: risk assessment of structures in coastal and fluvial environments, distribution of sand and gravel for construction, spatial extent of high-flow aquifers. The long-term geomorphic record can be interpreted to determine the rate of landscape change in response to climate change, and to predict likely archeological sites.

### Course Objectives:

- Develop skills in field description and mapping
- Learn fundamental characteristics of landforms and associated environments
- Develop facility with quantitative data sets and analysis
- Develop significant synthesis and integration skills applied to interpretation of the geologic record

### Texts:

Surficial Geologic Map of the Farmington quadrangle, Thomas Weddle

Control of Nature, John McPhee

Process Geomorphology, Ritter et al., Waveland Press, 4<sup>th</sup> or 5<sup>th</sup> edition

Supplementary readings will also be assigned

**Other materials:** small notebook (for lab), colored pencils, simple calculator, small ruler

\*\*NOTE: we will also be using many online resources. If you do not have a fast connection at home, you will need to plan time to use computer facilities on campus to complete assignments. You should also plan to use campus computer resources to complete some assignments if you do not have compatible software on your personal computer.\*\*

## WHY SHOULD YOU TAKE THIS CLASS?

Some of the following questions or problems are addressed through the study of surficial processes:

- Why (geologically) is Poland Spring developing resources in Dallas Plantation?
- How fast will the beaches erode in the next century?
- Why did New Orleans flood? Can/should it be re-built?
- Why don't all glaciers respond similarly to climate change?

The common thread to many of these questions, and nearly all of the processes and landforms we will study, is **water**. In various forms, stored in various places, moving at different speeds, water is an element that is both crucial to our lives as organisms, and fundamental to shaping the environment we inhabit. Because we require water, and because it is such an important form of transportation for commerce, significant infrastructure exists at the coast, along rivers, and near lakes. The valuable proximity is tied to significant risk due to the dynamic nature of these environments. Risk assessment for many of these areas is based on investigation of the geologic record to determine frequency and magnitude of prior events. Similar investigations of glacial geology are used to construct paleoclimate records, and predict future trajectories for climate change.

This course emphasizes field experiences: observation, description, and interpretation. The field labs are designed to build a catalog of experience and exposure to geologic materials.

**The more you see in the field, the better your interpretations are in the future.**

Learning to decipher materials, contacts, and age relationships in the field is a skill that will transfer to subsequent geology classes, and personal and professional experiences beyond UMF.

### Assessment:

15 % **Portfolio:**

#### Contents

Location map

For each feature/stop:

Sketch (and optional photo)

Description

Regional/contextual

Outcrop/feature scale

Interpretation

Environment of formation

Comparison to other local features

5% **Synthesis** report (accompanies portfolio)

25% **Field write-ups** (3: fluvial, glacial, coastal)

Introduction

Methods

Results (including tables and figures, if appropriate)

Discussion

Ideas for future study

10 % **Homework / TMYN/ quizzes**

5 % **Google** project (details to come)

15 % **Prelim** exam

25 % **Final** exam

<b>Week beginning</b>	<b>Topic</b>	<b>LAB</b> <i>(italics = field lab)</i>	<i>Other notes</i>
8/29	Stream profiles	Short mtg during lab, place TBA	
9/5	Discharge	<i>Stream profiles: Avon</i>	TMYN graph
9/12	Sediment transport	<i>Stream mapping &amp; discharge</i>	TMYN eq.
9/19	Water policy & use	<i>NEIGC field trips</i>	NEIGC, Vermont Th. 9/29 – Sun 10/2
9/26	Deltas	<i>Chesterville</i>	Fluvial lab due TMYN topo.
10/3	Coastal landforms	<i>Norridgewock</i>	
10/10	Beach processes	<i>Striations</i>	No class Monday TMYN rates
10/17	Coastal management	<i>Avon</i>	PRELIM EXAM FRIDAY
10/24	Glacial processes	<i>Phillips</i>	Coastal lab due
10/31	Glacial landforms	Flubber workshop	
11/7	Surficial deposits	Analog models	
11/14	Tectonics and landforms	Sand box	Glacial lab due
11/21	Model runs	No lab	No class Wed, Fri
11/28	Humans and landforms	Tectonics II	
12/5	Synthesis	Google premier	
12/12	<b>FINALS!!</b>	FINAL EXAM MONDAY 8 AM, Ricker 330	Portfolio due

### The Math You Need

We will be using The Math You Need (TMYN), a web-based series of tutorials aimed at building quantitative literacy in earth science courses and providing a context rich in geologic content for understanding the application of quantitative skills in earth science. We will use several modules (indicated below in the “Notes” column) that provide an overview of a skill and you will be responsible for completing a web-based assignment at the end of the module to demonstrate mastery of the concept. The modules can be found here: <http://serc.carleton.edu/mathyouneed/index.html>; this link will also be posted on Blackboard. The link and comprehensive instructions for completing the assignments associated with each topic will also be posted on Blackboard.

### COURSE POLICIES

Please remember this is YOUR OWN WORK. Plagiarism, electronic or otherwise, will result in a grade of zero. If you are uncertain about using research material or how to cite an article, please come see me. A digital version of the UMF Code of Academic Integrity can be found on eCampus (under Policies) or in the online catalog:

<http://catalog.umf.maine.edu/show.php?type=subcategory&id=37&version=2004-2005>.

#### *Attendance & make-up policy*

Attendance in class and labs is required. There will be no scheduled lab make-ups. In an emergency (if you are sick, etc.), contact me as soon possible to discuss alternatives.

Equal educational opportunity is offered to students with special needs due to disability. Please notify me if a reasonable accommodation is needed to meet course