

# **GEO1062: Geomorphology: Dynamic evolution of Earth's surface**

## **Basic information:**

Lecture: 132 Chevron Science Center, Mon-Wed, 10:00-11:15

Lab: Langley Hall (A202): Mon - 13:00-14:50 (once every few weeks)

Instructor: Dr. Eitan Shelef

Office: 311 SRCC

Email: shelef@pitt.edu

Office Hours location and time: SRCC 305, Wed 1:30-2:30.

## **Objectives:**

1. Introduce students to a set of geomorphologically related processes and their influence on topography.
2. Train student in using conservation and transport laws (and associated math and physics) to understand (and make predictions) regarding geomorphologically related phenomena across scales.

## **Content:**

This course will introduce students to the geomorphologic processes that shape the surface of Earth, the physical mechanisms by which they operate, and the landforms they create. It will combine qualitative and quantitative descriptions of land-shaping processes such as river erosion, glaciers motion, and landslides. The course builds on in class discussions and assignments to train students in applying basic physical and mathematical tools to explore geomorphological processes.

## **Reading:**

The class follows the book "Geomorphology: The Mechanics and Chemistry of Landscapes" by Anderson and Anderson. Students will be referred to specific chapters or additional literature if/when relevant/required. Reading is a key component of this class and students are expected to read the relevant material sections before each class.

## **Grading:**

60% Assignments

10% Midterm Exam

20% Final Exam

10% Class participation

## **Lectures:**

Most lecture will include a combination of lecture and group work session/s that focused on specific questions that rely on the assigned readings. Group answers to the questions will then be presented to the class and a feedback will be given. Students are expected to actively participate in lectures, to ask questions, and to actively participate in group work sessions.

## **In class group work sessions:**

In class group work aims to give you an opportunity to practice the concepts taught in class and described in the reading material, and receive some immediate feedback on your work in the classroom.

You will typically have between 5-10 minutes to work on these assignments in class (you may not always manage to complete them). Groups will be selected randomly to present their solution to the class and address feedback and questions from the class and instructor.

### **Labs:**

A lab assignment will be given every few weeks during lab time. Labs are designed to train students in topics taught in the class and in the reading material and to explore them in more depth. The lab session will introduce the lab questions in the context of the class material, and will provide students with guidance as they work on the lab assignment through canvas. Many of the lab assignment will take more time to complete than the time of the weekly lab meeting, so students are encouraged to skim over the questions first, identify things that they do not understand, and use the lab meeting time to ask for guidance regarding them. Students will have to **electronically submit a word document with their solution to the assignment through Canvas, where equations and answers are clearly written on the word document**. Assignments are due electronically at midnight at the allocated time, typically two weeks after they are assigned (i.e, if assigned on Monday's Lab, they are due on Monday at midnight two weeks after). Late submission of lab assignments (or final project) will be penalized by 10% (of the maximal grade per an assignment) grade reduction for each day of delay. Occasionally, labs will also be used to go over class group assignments that were not completed in class.

### **Attendance:**

Attendance is mandatory and will be recorded at the beginning of class. I recognize that sometimes "life happens" and hence each student can miss one class over the semester. In that case send me an email saying that you will be missing class because that "life happens". Missing any additional classes will result in a grade penalty.

### **Communication:**

I will typically rely on email to communicate with you and send class announcements through Canvas (I assume that you check your email at least once a day). Other communication will be conducted directly via email. Assignments will be posted and submitted through Canvas.

### **Schedule:**

Note: The schedule below is tentative and may change as class progress depends on the level of student's understanding as will be evaluated based on questions and class assignments. The class schedule may thus be subject to changes depending on the distribution of skills, background knowledge, and understanding level of the students in the class.

#### Week 1

Lecture: Why (and how) do we study Geomorphology? physics/math/stats/geology questions

Lecture: Whole Earth morphology (sphere, isostasy)

#### Week 2

Labor Day

Lecture: Large scale topography a (ocean depth)

#### Week 3

Lab 1: Whole earth topography and Isostasy

Lecture: Large scale topography b (plate velocity)

Lecture: Atmospheric processes and geomorphology

Week 4

Lecture: Dating methods a

Lecture: Dating methods b, Lecture video

Week 5

Lecture: Weathering a (physical)

Lecture: Weathering b (chemical)

Week 6

Lab 2: Atmospheric processes, dating methods, and weathering

Lecture: Glacial Processes a (glacial flow)

Lecture: Glacial Processes b (glacial erosion)

Week 7

Lecture: Periglacial processes a (permafrost)

Lecture: Periglacial processes b (landforms)

Week 8

Lab 3: Glacial and periglacial processes

Lecture: Hillslopes a (hillslope diffusion, soil creep)

Lecture: Hillslopes b (landslides)

Week 9

Lecture: Review for midterm

Midterm

Week 10

Lecture: Water in the landscape a (groundwater)

Lecture: Water in the landscape b (overland flow and erosion)

Week 11

Lab 4: Hillslopes and water

Lecture: Rivers a (laminar and turbulent flow)

Lecture: Rivers b (river shapes)

Week 12

Lecture: Bedrock channels a (stream power)

Lecture: Bedrock channels b (knickpoint migration)

Week 13

Lab 5: Rivers, bedrock channels, and sediment transport

Lecture: Sediment transport a (entrainment and torque)

Lecture: Sediment transport b (suspension + saltation)

Week 14

Lecture: Summary lecture/whole landscape

Lecture: Preparation for exam

Week 15

-Final exam.

### **Classroom Environment:**

Throughout the semester, please be courteous to all of your fellow students and to your instructor so we can create a positive learning environment. This means that our classroom, our virtual spaces, our practices, and our interactions be as inclusive as possible. Mutual respect, civility, and the ability to listen and observe others carefully are crucial to universal learning. Active, thoughtful, and respectful participation in all aspects of the course will make our time together as productive and engaging as possible.

### **Academic Integrity (from Pitt UCTL):**

Students in this course will be expected to comply with the [University of Pittsburgh's Policy on Academic Integrity](#). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the Academic Integrity Guide for an overview of the topic. For hands-on practice, complete the Academic Integrity Modules.

### **Disability Services (from Pitt UCTL):**

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, [drsrecep@pitt.edu](mailto:drsrecep@pitt.edu), (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

### **Student Well-being (from Pitt UCTL):**

College/Graduate school can be an exciting and challenging time for students. Taking time to maintain your well-being and seek appropriate support can help you achieve your goals and lead a fulfilling life. It can be helpful to remember that we all benefit from assistance and guidance at times, and there are many resources available to support your well-being while you are at Pitt. You are encouraged to visit [Thrive@Pitt](#) to learn more about well-being and the many campus resources available to help you thrive.

If you or anyone you know experiences overwhelming academic stress, persistent difficult feelings and/or challenging life events, you are strongly encouraged to seek support. In addition to reaching out to friends and loved ones, consider connecting with a faculty member you trust for assistance connecting to helpful resources.

The University Counseling Center is also here for you. You can call 412-648-7930 at any time to connect with a clinician. If you or someone you know is feeling suicidal, please call the University Counseling Center at any time at 412-648-7930. You can also contact Resolve Crisis Network at 888-796-8226. If the situation is life threatening, call Pitt Police at 412-624-2121 or dial 911.

**Gender Inclusive Language Statement (from Pitt UCTL):**

Language is gender-inclusive and non-sexist when we use words that affirm and respect how people describe, express, and experience their gender. Just as sexist language excludes women's experiences, non-gender-inclusive language excludes the experiences of individuals whose identities may not fit the gender binary, and/or who may not identify with the sex they were assigned at birth. Identities including trans, intersex, and genderqueer reflect personal descriptions, expressions, and experiences. Gender-inclusive/non-sexist language acknowledges people of any gender (for example, first year student versus freshman, chair versus chairman, humankind versus mankind, etc.). It also affirms non-binary gender identifications, and recognizes the difference between biological sex and gender expression. Students, faculty, and staff may share their preferred pronouns and names, and these gender identities and gender expressions should be honored.