Fall 2023
GEOL 3410: **SL: Geomorphology** (4 credit hours)
TR 8:30-9:45am, Lafayette 102. Labs T, W 2:50-5:50, Delahanty 101 or Lafayette 203

Instructor:	Dr. Beverley Wemple	Graduate Teaching Assistant: Garnet Williams
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Office hours:	Thursdays 10:00am-12:00pm in Old Mill 213,	office hours: TBD
	Fridays 9:00-10:00 on MSTeams by appt.	

Course Description & Learning Outcomes:

This course explores the dynamic nature of the Earth's surface through the study of landscape-shaping processes. We'll begin the course with an overview of the role of past climate conditions, and particularly ice, in shaping Earth's surface, then consider how change in the physical surface of the Earth occurs over time. Our study will concentrate on the integral role of water in landscape evolution and will consider how humans alter landscapes by modifying the rate, magnitude and form of geomorphic processes. We'll also consider why demand for expertise in this subfield of geography and geology is on the rise and how you can position yourself for a future in this very exciting arena of environmental change. Through participation in this course you will:

- improve your understanding of how the Earth's surface changes in response to natural and anthropogenic forces

- use measurement techniques in the field and lab to quantify rates and magnitudes of key geomorphic processes

- gain skills in using simple models and calculations to solve problems and make predictions

- learn how to apply geospatial technologies to understanding landscape form and geomorphic processes

- execute a service-learning project for community partners in collaboration with your classmates

This course can be used as one of the introductory courses for the Geospatial Technologies minor. I recognize that some of you will come to the course with some experience using Geographic Information Systems, and for some of you this material will be new. I will attempt to provide adequate background for the latter group and will ask students with some background in these areas to occasionally team with novices on lab assignments.

Service Learning:

The service-learning component of this course is designed to give students an opportunity to gain exposure to the conservation of natural landscapes while developing field, mapping, and data interpretation skills. Our service learning partners, the Vermont Land Trust (VLT) and Vermont's chapter of The Nature Conservancy (TNC), will work with us to introduce their conservation work and the role that geomorphic process understanding can play in conservation and restoration projects. For our service project, we will use a consultancy model, performing geomorphic measurements and assessments at a stream restoration site in Colchester. The project builds on an initial effort by UVM students in Fall 2021 and provides both an opportunity to serve these non-profit organizations and hone professional skills. You will be asked to engage in some reflective writing exercises throughout the semester as part of this experience.

Class Schedule & Structure

Our class meetings will be divided into lectures and discussions on Tuesday and Thursday mornings in Lafayette 102 and weekly lab exercises on Tuesday and Wednesday afternoons. Labs will meet at Delahanty Hall 101 or behind the building on days with field excursions. Labs will meet in Lafayette 203 on days focusing on GIS and computational exercises. Weekly lab meet up locations will be posted on Brightspace no later than 10:15am on Tuesdays. Students are expected to show up on time for lab sessions, particularly those involving trips to remote field sites.

Course modality and attendance expectations

This course is structured as an in-person offering with the expectation that students will attend class in-person regularly. If you are ill or unable to attend class due to Covid-19 quarantine restrictions or other illnesses, please contact Student Health Services. In appropriate cases, they will contact your college's student services staff, who will alert your professors. In cases of illness, I can provide an option to participate in class remotely, but my expectation is that you will only use this if necessary for health reasons and not for purposes of convenience (e.g. lack of desire to make the trek to campus) or out of reluctance to actively engage in the course. I will take periodic attendance at class sessions and will be monitoring your engagement through attendance, asking questions, responding to my inquiries, and engaging in discussion. If you attend class remotely, you are still expected to engage, ask questions, and respond to discussion prompts.

Readings:

Required text: Bierman, P.R. and D. R. Montgomery. 2020. Key Concepts in Geomorphology, 2nd edition.
   Macmillan Learning, New York, NY. ISBN-13: 978-1-319-05980-4.
Additional readings to be posted on Brightspace (https://brightspace.uvm.edu)

You should come to class each Tuesday having read the assigned reading for context.

Grading:

Grades for the course will be based on the following assignments (with percentages of your course grade given in parentheses):
- **Labs** (40%) will be due on Fridays at noon one week after they are assigned. Labs submitted late will receive a 10% reduction per day. These deadlines are intended to push you to develop the professional skill of meeting target dates for work assignments. This is a critical skill to carry into the workplace and one that prospective employers will want to know that you can meet.
- **Tests** (15% each) will be given on Thursdays in weeks 7 and 14. Tests are intended to assess your understanding of course content. The second test will be cumulative, covering some content from the first part of the course. Lab sessions during test weeks will be used for content review.
- **Service-learning project** (20%) will include participation in two preparatory class sessions with our partners during weeks 7 and 8, field data collection during week 8, data synthesis during week 12, and a final presentation to our partners in the final week of class. More details on the project will come during weeks 7 and 8 of the semester.
- **Attendance and participation** (10%) will be assessed based on your regular attendance of class sessions and labs and active engagement in the course through responses to my prompts, participation in discussion, and questions you bring to class. If you feel hesitant or uncomfortable responding to questions or speaking in class, I urge you to visit with me during office hours so I can gauge your understanding of

and engagement in course content. After weeks 5, 10 and 15, I will post a numerical grade on Brightspace for your attendance and participation, using the following guidelines:

> Attends class sessions consistently, participates actively = 95%
> Attends class sessions regularly, participates somewhat = 90%
> Attends class sessions regularly, participates minimally = 85%
> Attends class sessions irregularly, participates minimally = 80%
> Attendance and participation at less than expected level = 75% or less

A note on assignment collaboration:

Many of the lab assignments for the class will be conducted collaboratively, with students working together to collect data and conduct analysis. Although this collaborative work is an important element of the class, you will be expected to hand in work that represents your effort. Examples of unacceptable products are equation solutions, data tables, figures or other responses on labs that are copied from another student without your active engagement in constructing them. I strongly encourage you to review UVM's policy on academic integrity available online at http://www.uvm.edu/policies/student/acadintegrity.pdf.

Academic Support and Success / Technology Resources

Academic support is available to students at UVM through a set of academic success programs described at https://www.uvm.edu/academicsuccess. If you are a student with a learning or physical disability, a student interested in tutoring support, or a first-generation college student (i.e. your parents did not complete a 4-year college degree)[1], there are special services available to help you succeed at UVM. If you are a student registered with ACCESS with documented accommodation needs, please visit with the instructor during office hours or at a scheduled time so that we can make a plan to address those needs. In particular, if you need additional time to complete tests, I would like to be sure we have a plan in place by the end of the second week of classes (Sept 8). We will be using Brightspace for all course content and MS Teams to connect if virtual class sessions are needed. If you are not familiar with these platforms, you will find helpful resources at https://www.uvm.edu/it/kb/student-technology-resources/.

Field Labs

Geomorphologists commonly work in field settings collecting data and making landscape interpretations. The field labs in this course will help you develop skills in measurement, observation, and interpretation. You should come to each field lab equipped for exposure to sun, bugs, wet ground, and harmful plants (e.g. poison ivy). I encourage you to wear long pants, close-toed shoes (not sandals), and a hat. Gardening gloves can also be helpful to protect your hands. You should always bring a bottle of water, and I encourage you to bring snacks. Please watch the weather forecast and bring a rain coat or warm jacket as appropriate. You will be asked to sign an acknowledgement of risk prior to the first field lab. Students with physical disabilities that would limit their ability to participate in field labs involving hiking and traversing sloped terrain are asked to discuss accommodations with the instructor by the end of week 2 of the semester (Sept 8). Most of our field trips will occur in locations where there are not restroom facilities. We will attempt to stop at a restroom facility before and after trips.

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[1] I am a first-generation student from an economically limited background. I welcome opportunities to support First Gen students as they navigate the college experience. Please reach out to me if you would like to connect around this common experience.

Course Schedule & Readings

Sequencing of labs is subject to change with weather conditions (field locations in parentheses)

Week	Topic/assignments	Reading[2]
1 (Aug 29-31)	Course introduction; interpreting the landscape	pp. 4-28
2 (Sept 5-7)	Geomorphic hydrology lab 1: Measuring infiltration (Centennial Woods)	pp. 86-100
3 (Sept 12-14)	Glacial and periglacial processes lab 2: Geospatial data analysis for geomorphology	pp. 374-383, 405-406
4 (Sept 19-21)	Mass wasting and erosion lab 3: Landslides (Barre/Montpelier)	pp. 166-186, 193-197
5 (Sept 26-28)	Hydraulics and the mechanics of flow in open channels lab 4: Stream flow (Ranch Brook, Stowe)	pp. 101-109
6 (Oct 3-5)	Fluvial processes and landforms lab 5: Floodplain morphology (location TBD)	pp. 200-229
7 (Oct 10-12)	Restoring river form and process with Shayne Jacquith, TNC lab sessions: review; Test #1 – Thursday, Oct 12	See Brightspace
8 (Oct 17-19)	Introduction to service-learning project with Allaire Diamond, VLT lab sessions: Service-learning project field work (Colchester)	No reading this week
9 (Oct 24-26)	Floods, droughts, and geomorphic resilience lab 6: Flood frequency analysis	See Brightspace
10 (Oct 31-Nov 2)	Basin morphology and river networks lab 7: GIS analysis for river networks	pp. 236, 241-262
11 (Nov 7-9)	Sediment and solute transport in rivers lab 8: Estimating material yields	pp. 214-219, 237-241, 263-265
12 (Nov 14-16)	Wood in rivers Lab session: Service-learning project data synthesis	See Brightspace
13 (Nov 21-23)	Thanksgiving break (no class)	
14 (Nov 28-30)	Geomorphic responses to changing climate lab sessions: review; Test #2 – Thursday, Nov 30	pp. 418-448
15 (Dec 5-7)	Course synthesis & wrap up Project presentations, December 7	No reading this week

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[2] Readings are page numbers from *Key Concepts in Geomorphology* text, unless otherwise noted.