

## INTRODUCTION TO GEOMORPHOLOGY

### LECTURE, LABORATORY TOPICS AND READING ASSIGNMENTS

#### Week 1: What is this course about?

- Logistics, organization, and topics
- Review of basic geological concepts
- Historical conceptions of the landscape (Davis, Gilbert, Leopold, Wolman, modern era)

*Readings:* Review of geological concepts from GEOG 111 and/or EASC 101 textbooks.

*Textbook Readings:* Chapters 1 & 2 in Bierman and Montgomery, 1<sup>st</sup> edition.  
or  
Chapters 1 & 2 in Bierman and Montgomery, 2<sup>nd</sup> edition.

#### Week 2: What is the fundamental basis of geomorphology?

- The delicate balance
- Mass conservation and geomorphic transport laws

*Readings:* Wolman, M.G. and W.P Miller, 1960, Magnitude and frequency of forces in geomorphic processes, *Journal of Geology*, 68: 54-74.

*Textbook Readings:* Chapters 1 & 2 in Bierman and Montgomery, 1<sup>st</sup> edition.  
or  
Chapters 1 & 2 in Bierman and Montgomery, 2<sup>nd</sup> edition.

*Suggested further readings:* Dietrich et al. 2003. Geomorphic transport laws for predicting landscape form and dynamics. In: *Prediction in Geomorphology* edited by P.R. Wilcock and R.M. Iverson, American Geophysical Union, Washington DC, pp. 103-132.

Lab 1: Introduction to Google Earth.

#### Week 3: What controls topographic relief?

- Coupling of climate and topography
- Structurally-controlled and igneous landforms

*Readings:* Molnar and England, 1990, Late Cenozoic uplift of mountain ranges and climate change, *Nature* 346: 29-34.

*Textbook Readings:* Chapter 11, 12 & 14 in Bierman and Montgomery, 1<sup>st</sup> edition.

or  
Chapters 12, 15 & 16 in Bierman and Montgomery, 2<sup>nd</sup> edition.

Lab 2: Tectonically-controlled and volcanic terrain.

**Week 4: Where do landscape materials come from?**

- Weathering, soil production, and bedrock erosion

*Textbook Readings:* Chapter 3 in Bierman and Montgomery, 1<sup>st</sup> edition.

or  
Chapter 5 & 6 in Bierman and Montgomery, 2<sup>nd</sup> edition.

No lab exercise

**Weeks 5 & 6: How do landscape materials get down from mountain tops to valley floors?**

- Hillslope morphology and transport (slips, slides, flows, and falls)

*Textbook Readings:* Chapter 5 in Bierman and Montgomery, 1<sup>st</sup> edition.

or  
Chapter 7 in Bierman and Montgomery, 2<sup>nd</sup> edition.

Lab 3: Landforms of mass wasting.

Lab 4: Slope stability analysis.

**Virtual Fraser River Field Trip**

**A playlist of videos will be released on Nov 1, 2020 to be viewed at your leisure.  
This is a mandatory field trip (you must watch the videos).**

**MIDTERM EXAM: November 1, 2020, 12:30-14:20**

**Week 8 & 9: How do landscape materials get from valley floors to their ultimate sink (oceans or lakes)**

- River valley morphology and fluvial transport (Transition between hillslope and fluvial processes, Longitudinal valley profiles, sediment yield)

*Textbook Readings:* Chapters 4, 6 & 7 in Bierman and Montgomery, 1<sup>st</sup> edition.

or  
Chapter 4, 8 & 9 in Bierman and Montgomery, 2<sup>nd</sup> edition.

*Suggested Further Reading:* Church, M., 2006, Bed Material Transport and the Morphology of Alluvial River Channels, *Annual Reviews of Earth & Planetary Science*, 34: 325–354.

Lab 5: Sediment mobility in rivers.

**Week 10 & 11: How do glaciers modulate landscape development?**

- Glacial processes and landforms
- Differentiation between landscapes formed by rivers and glaciers
- Glacial history & paraglacial landscapes of British Columbia

*Reading:* Church and Slaymaker, 1989, Disequilibrium of Holocene sediment yield in glaciated British Columbia, *Nature* 337: 452 – 454.

*Textbook Readings:* Chapter 9 in Bierman and Montgomery, 1<sup>st</sup> edition.

or

Chapter 13 in Bierman and Montgomery, 2<sup>nd</sup> edition.

*Suggested further readings:* Clague, J.J. et al. 1989, Quaternary geology of the Canadian Cordillera. In: Fulton, R.J. (Ed.), *Quaternary Geology of Canada and Greenland*. Geology of Canada, No. 1. Geological Survey of Canada, pp. 15–96.

Lab 6: Geomorphology of glaciated terrain

**Week 12: Has the emergence of life on this planet affected the large scale topographic organization of the Earth?**

*Reading:* Dietrich, W.E and J.T. Perron, 2006, The search for a topographic signature of life. *Nature*, 439, 411-418.

**Field Essay due November 29, 2020 @ 12:30**

**FINAL EXAM: Time and date to be announced in Mid-October 2020  
The exam will be held remotely in Canvas**

## Tentative Lecture and Laboratory Exercise Schedule

Week	Lecture	Lecture Topic	Lab Dates	Assigned Lab	Due	Returned
1	Sept. 13	Introduction	–	–	–	
2	Sept. 20	Fundamentals	Sept. 20-21	Lab 1: Introduction to Google Earth	–	
3	Sept. 27	Tectonic Geomorphology	Sept. 27-28	Lab 2: Structurally-controlled and volcanic landforms	Lab 1	
4	Oct. 4	Weathering	–	–	Lab 2	
–	Oct. 11	Thanksgiving	–	–	–	
5	Oct. 18	Mass Wasting I	Oct 18-19	Lab 3: Landforms of mass wasting	–	Lab 1 & 2
6	Oct. 25	Mass wasting II	Oct. 25-26	Lab 4: Slope stability analysis	Lab 3	
7	Nov. 1	MIDTERM	–	–	–	
8	Nov. 8	Rivers I	Nov. 8-9	Graded exams returned to students with answers	Lab 4	
9	Nov. 15	Rivers II	Nov. 15-16	Lab 5: Sediment mobility in rivers	–	Lab 3 & 4
10	Nov. 22	Glaciers I	–	–	Lab 5	
11	Nov. 29	Glaciers II	Nov. 29-30	Lab 6: Geomorphology of glaciated terrain	–	Lab 5
12	Dec. 6	Geomorph. & Life	–	–	Lab 6	
–	TBD	FINAL EXAM	–	–	–	Lab 6

Note: We do not provide students with a numerical grade for GEOG 213 laboratory exercises. Students receive a letter grade (A, B, C, D, F) for each exercise to indicate the quality of their work. No plus minus grades are assigned. TAs record the numeric grade (%) in a spreadsheet for accurate calculation of the final grade.