GEO 582.02: Tectonic Geomorphology

Andrew C. Wilcox  
*University of Montana - Missoula*, andrew.wilcox@umontana.edu

Rebecca O. Bendick Kier  
*University of Montana - Missoula*, r.bendick@umontana.edu

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Geosciences 582: Tectonic Geomorphology
Spring 2014
University of Montana
3 credits
MW 1:10 – 2 PM, CHCB 333

Instructors: Rebecca Bendick; bendick@mso.umt.edu
Office: CHCB 331; Phone: 243-5774
Office Hours: TW 9:10-10 AM, or by appointment
Andrew Wilcox; andrew.wilcox@umontana.edu
Office: CHCB 357; Phone: 243-4761
Office Hours: TW 3:10 – 4 PM, or by appointment

Tectonic Geomorphology will be a graduate seminar focused on reading, discussion, and analysis of journal papers. The course will focus on topics related to the broad themes of interactions among tectonics, geomorphology, and climate.

Goals: As a result of your experiences in GEO 582, you will have the opportunity to:
• gain understanding of feedbacks between surface processes and tectonic processes, current research in landscape evolution, and crustal mechanics and dynamics in the context of landscape evolution
• improve your skills in critically reading and interpreting journal papers
• communicate an understanding of the interrelationships among geomorphic and tectonic concepts and theories to peers and others
• develop your oral communication skills, including gaining confidence in speaking up with your ideas (and learning to hold back and let others contribute)

Prerequisites: Graduate standing or the consent of the instructor are prerequisites. Some background in calculus, physics, geomorphology and tectonics is expected.

Readings: We will read 2-4 papers each week; pdf’s will be posted on Moodle. Background material will come from the textbook.

Discussion responsibilities: Students are expected to carefully and critically read assigned papers; come to class prepared to discuss and demonstrate comprehension of the papers; and participate in discussions.

The following is a list of potential discussion questions and things to think about as you read each paper.
• What are a few key points / take-home messages from the paper?
• What was the major contribution of paper; why was it published?
• What were the objectives of the paper?
• Key hypotheses?
• What were the weaknesses of the paper?
• What methods were used, and were they appropriate for addressing the research objectives or hypotheses?
• Were the conclusions justified?
• Connections- how can we think about material in one paper based on what we’ve learned elsewhere (another paper / class / other experience)?
• Muddiest points- did you find any aspects of the paper unclear or confusing?

We also strongly recommend maintaining a cumulative annotated bibliography of notes on the papers as the semester goes along that you can refer back to in the future.

Grading: Grades will be based on class discussions (50%), a field trip related exercise (25%), and a final paper (25%).

Field trip: A field trip in Western Montana and project related to the field area will be included in the course.
**Housekeeping notes**

1. **Academic Integrity:** All students need to be familiar with and abide by the Student Conduct Code and its definitions of academic misconduct. The Code is available for review online at [http://life.umt.edu/vpsa/student_conduct.php](http://life.umt.edu/vpsa/student_conduct.php).

2. **Equal Access:** The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students (DSS). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with DSS, please contact DSS in Lommasson 154. I will work with you and DSS to provide an appropriate accommodation.

3. **Course website:** This course will use Moodle ([https://moodle.umt.edu/](https://moodle.umt.edu/)). Please check the course website regularly, especially before class, for announcements, notes, readings, assignments, and schedule updates.

**Textbook**

We will use a textbook to help provide background on course content, in lieu of lecturing.


You should purchase this book online; please be sure to get the 2nd edition.

**Schedule**

**January 27:** Introduction and background concepts.

**January 29:** Feedbacks and stability analysis


**February 3:** Feedbacks and stability analysis paper


**February 5:** Basic signals and interpretations 1

*readings:* Burbank and Anderson, Chapter 1

England, P., and P. Molnar (1990), Surface uplift, uplift of rocks, and exhumation of rocks, Geology, 18, 1173-1177.

**February 10:** Basic signals and interpretations 2


**February 12:** higher T geochronology

*reading:* Burbank and Anderson Chapter 3

**February 19:** higher T geochronology

February 24: cosmogenics and low T techniques
reading: Portenga, E. W., and P. R. Bierman (2011), Understanding Earth's eroding surface with 10 Be, GSA Today, 21(8), 4-10.


February 26: cosmogenics and low T techniques


March 3: terraces and other geomorphic features
reading: Burbank and Anderson Chapter 2

March 5: terraces and other geomorphic features

March 10: river networks, knickpoints, and evolution of relief
reading: Burbank and Anderson Chapter 8
Stream power derivation (handout)

March 12: river networks, knickpoints, and evolution of relief


assignment: River profile lab

March 17: bedrock incision

March 19: bedrock incision


March 24: landscape evolution & glacial buzzsaws (Brian Yanites)

March 26: landscape evolution & glacial buzzsaws


April 7: Bitterroot morphology lab

April 9: Bitterroot morphology


April 12: field trip

April 14: geophysical observations: geodesy, moment release, paleoseismology
*reading*: Burbank and Anderson Chapter 5

April 16: geophysical observations: geodesy, moment release, paleoseismology


April 21 & 23: case study: Himalaya
Readings TBD

April 28: steady state orogens


April 30: steady state orogens


May 5: other numerical simulations

May 7: other numerical simulations