Fall 9-1-2018

GEO 460.01: Process Geomorphology

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Course Information

- Instructors: Andrew Wilcox, Luke Fisher (Teaching Assistant)
- Office: CHCB 357, CHCB 338
- Email: andrew.wilcox@umontana.edu, luke.fisher@umconnect.umt.edu
- Office Hours: M 3-4 pm, or by appointment, W 11-12
- Class meetings: TR 9-10:50, CHCB 348
- Website: Moodle umonline.umt.edu

Overview

Process Geomorphology will provide an in-depth investigation of the processes that determine the form and evolution of landscapes, starting with rivers and then focusing on hillslopes, glaciers, and tectonic geomorphology. The course will combine lectures, discussions, field data collection, calculations, and other activities. Active learning and student participation will be an essential component.

Course Objectives

To provide students with:

- a strong understanding of the linkages between landscape form and process
- familiarity and experience applying fundamental concepts in physical systems
- experience collecting and analyzing field data
- opportunities for developing scientific writing skills
- opportunities to develop and apply skills in physics and mathematics
- experience in interpreting and analyzing literature from both secondary and primary sources
- practice in using models, data, and logical reasoning to critically evaluate and connect information about geomorphic processes
- experience communicating an understanding of the interrelationships among geomorphic concepts and theories to peers and others
- experience working as members of productive, collaborative teams

Assessment

- 30% Lab exercises
- 30% Field project reports
- 15% In-class exercises and class participation
- 25% Exam

Course Information, Guidelines and Policies

Field Trips

We will have one required Saturday field trip, October 27 (all day), in addition to in-class field trips and a self-guided, team field project. The data collected on these field trips will be the basis for a substantial amount of your work in this class.

Labs

There is no formal lab for this class, but we will do some lab and field activities during class time; these will provide active-learning opportunities and will often take time beyond the regular class time to
complete. Topics will include GIS and Python analysis of geomorphic processes and high-resolution topography.

Prerequisites
One semester calculus and one semester physics are firm prerequisites. Calculus and physics will be used in the class. Computer literacy is also expected; assignments will be given involving computations, the use of spreadsheets and retrieval of data over the internet. The most important requirement is to be prepared to devote time and effort to this class (I will too).

Attendance
In addition to lab exercises, there will often be short in-class activities that contribute to your grade. All exams are open note, so taking good and organized notes will be beneficial. If you miss class, it is your responsibility to find out what you missed, which should involve consulting the course website and your peers (rather than the instructor).

Readings
There is no required textbook. Readings will primarily consist of journal papers. An excellent, challenging textbook that I recommend, if you wish to have a textbook resource to refer to and to develop a deeper understanding of the topics we will treat, is:


A more accessible textbook that I also recommend is:
For e-book or paperback purchase, cheapest option is Amazon:
https://www.amazon.com/Key-Concepts-Geomorphology-Paul-Bierman-ebook/dp/B00UY1TEBG/ref=mt_kindle?_encoding=UTF8&me=

Journal papers and supplemental readings will also be assigned each week, with occasional quizzes on readings. A partial / example list of journal papers is as follows:


Course website
Please check Moodle regularly, especially before class, for announcements, notes, readings, assignments, and schedule updates. Some of the class lecture notes will be posted.

Email
Feel free to communicate with me by email, and note that: 1) I’m likely to read your email fairly soon after I receive it but I may not respond immediately; 2) if you have questions that others are also likely to have, please save them for class; 3) if you need to miss class for any reason, please let me know in advance by email; 4) assignments submitted electronically must be well organized, consolidated into at most 2 files, and contain your last name in the file name (often I will have you submit these via Moodle).

Late Policy
Assignments handed in late will have 2% of total points are deducted per day late (starting at the time when the assignment is due). But, for assignments other than the 2 primary field projects, you get 1 “mulligan”: 1 assignment can be handed in late without penalty, reason, or prior communication, up to 1 week after due date. No credit allowed for assignments handed in > 1 week after due date or after answer key / grading rubric posted, whichever comes first.

Student Conduct Code
The Student Conduct Code at the University of Montana embodies and promotes honesty, integrity, accountability, rights, and responsibilities associated with constructive citizenship in our academic community. This Code describes expected standards of behavior for all students, including academic conduct and general conduct, and it outlines students’ rights, responsibilities, and the campus processes for adjudicating alleged violations. A link to the Code is here: http://www.umt.edu/student-affairs/dean-of-students/default.php

Course Withdrawal
Students may use Cyberbear to drop courses through the first 15 instructional days of the semester. Beginning the 16th instructional day of the semester through the 45th instructional day, students use paper forms to drop, add and make changes of section, grading option or credit. GEO460 may not be taken as credit/no-credit.
Disability Modifications
The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students. If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work with you and Disability Services to provide an appropriate modification.

Schedule (next page)
- Class meeting topics are subject to change
- The readings listed below are a partial list. Readings will be announced each week (and posted on Moodle) and must be completed before the following class.
- Updates to the syllabus will be announced in class and posted on Moodle
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Class meeting topic</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28-Aug</td>
<td>Introduction</td>
<td>A&amp;A 1</td>
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<tr>
<td></td>
<td>30-Aug</td>
<td>Introduction continued; Lab exercise</td>
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<tr>
<td>2</td>
<td>4-Sep</td>
<td>Fluvial processes: alluvial rivers</td>
<td>Montgomery &amp; Buffington 1997</td>
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<td></td>
<td>6-Sep</td>
<td>Fluvial processes: flow and sediment transport; Lab exercise</td>
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<tr>
<td>3</td>
<td>11-Sep</td>
<td>Fluvial processes: flow and sediment transport</td>
<td>Dietrich et al. 2003</td>
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<td></td>
<td>13-Sep</td>
<td>Fluvial processes: Hydraulic geometry, channel patterns, long profiles; possible in-class field exercise</td>
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<td>4</td>
<td>18-Sep</td>
<td>Fluvial processes: floods, dominant Q, channel adjustments, classification</td>
<td>Trush et al. 2000</td>
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<td></td>
<td>20-Sep</td>
<td>Fluvial processes wrap-up</td>
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<td>5</td>
<td>25-Sep</td>
<td>Water in the landscape; Channel networks and drainage basins, hillslope hydrology</td>
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<td></td>
<td>27-Sep</td>
<td>Fluvial processes: flow and sediment transport; Lab exercise</td>
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<td></td>
<td>4-Oct</td>
<td>Landslides &amp; debris flows</td>
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<td>7</td>
<td>9-Oct</td>
<td>Landslide mechanics</td>
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<td></td>
<td>11-Oct</td>
<td>Hillslope erosion / transport laws</td>
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<td>8</td>
<td>16-Oct</td>
<td>Slope stability</td>
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<tr>
<td></td>
<td>18-Oct</td>
<td>Slope stability; lab</td>
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<tr>
<td>9</td>
<td>23-Oct</td>
<td>Hillslope processes wrap-up</td>
<td>Granger and Schaller 2014</td>
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<td></td>
<td>25-Oct</td>
<td>Large-scale geomorphology</td>
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<td>10</td>
<td>30-Oct</td>
<td>Tectonic geomorphology</td>
<td>Pinter &amp; Brandon 1997; Kirchner 2002; Molnar &amp; England 1990</td>
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<td></td>
<td>1-Nov</td>
<td>Tectonic geomorphology</td>
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<td>11</td>
<td>6-Nov</td>
<td>Election Day, no class</td>
<td>Naylor &amp; Gabet 2007</td>
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<td></td>
<td>8-Nov</td>
<td>Glacial processes: intro, mass balance, flow mechanics</td>
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<td>12</td>
<td>13-Nov</td>
<td>Glacial processes: erosion, landforms; Student presentations</td>
<td>Egholm et al. 2009</td>
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<td>15-Nov</td>
<td>Glacial processes: glaciers &amp; climate, jokulhlaups, glacial hydrology</td>
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<td>13</td>
<td>20-Nov</td>
<td>Megafloods, Glacial Lake Missoula, Dating methods</td>
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<td>22-Nov</td>
<td>no class, Thanksgiving</td>
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<td>14</td>
<td>27-Nov</td>
<td>Climate change &amp; geomorphology</td>
<td>Dietrich &amp; Perron 2006</td>
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<td></td>
<td>29-Nov</td>
<td>Ecogeomorphology, restoration</td>
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<tr>
<td>15</td>
<td>4-Dec</td>
<td>Human effects on geomorphic processes</td>
<td>Brown et al. 2016</td>
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<td>6-Dec</td>
<td>Course wrap-up</td>
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<tr>
<td>16</td>
<td>12-Dec</td>
<td>Final exam, 10:10-12:10</td>
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<td></td>
<td>Saturday, October 27: Field trip (hillslope processes)</td>
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