GEO 460.01: Process Geomorphology

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Geosciences 460: Process Geomorphology
Spring 2013
University of Montana
4 credits

Instructor: Andrew Wilcox
email: andrew.wilcox@umontana.edu
Office: CHCB 357
Phone: 243-4761

Class Meetings: TR 9:10 -11 AM, CHCB 348
Office Hours: M 3:10 – 4 PM, W 4:10 – 5 PM, or by appointment

Process Geomorphology will provide an in-depth investigation of the processes that determine
the form and evolution of landscapes, starting with tectonic geomorphology and then focusing on
hillslopes, rivers, and glaciers. 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

Course Website: This course will use Moodle (https://umonline.mrooms3.net/login/index.php).
Please be in the habit of checking the course website regularly, especially before class, for course
announcements, notes, and assignments. Some of the class lecture notes will be posted. For
instructions on using Moodle and on obtaining your NetID, which is required to access Moodle,
go to: http://umonline.umt.edu/Moodle%20Tip%20Sheets/tipsheetandvideosstudents.aspx
Moodle allows you to send email or instant messages to me; please use this when you need to
contact me about course-related matters.

Course Evaluation:
30% In-class and lab exercises, other homework, class participation, quizzes
40% Field project reports
10% Midterm
20% Final exam
Field trips: The field trips are required. The data collected on these field trips will be the basis for much of your work in this class. See me right away if you have scheduling conflict. You will need a field book, so purchase one now if you don’t have one.

- March 16: Sleeping Child Creek hillslope process field trip
- April 13: Mattie V Creek fluvial processes / river restoration
- There may be a 3rd, optional field trip, stay tuned

Readings: We will use the following textbook:

It is challenging, very good, and essential to your learning in the course, so I encourage you to devote more time and attention to it than you normally might for textbooks. Journal papers and supplemental readings will also be assigned.

Other notes
1. Prerequisites: Calculus and physics are co-requisites and 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).
2. Attendance: Much of the material covered in class will not be in the assigned reading. There will often be in-class activities that contribute to your grade. All exams are open note, so taking good and organized notes will be beneficial.
3. Email. Feel free to communicate with me by email, keeping the following in mind: 1) if you are stuck on a assignment question, please come to office hours or ask questions at the beginning of class rather than emailing me; 2) if you miss class, please check Moodle and/or talk to classmates about what you missed; 3) assignments submitted electronically must be well organized, consolidated into at most two files, and have your name in the file name; 4) use your UM email account and/or email via Moodle.
4. Late policy: 1 assignment can be handed in late without penalty, reason, or prior communication. Otherwise 2% of total points are deducted per day late. No credit allowed for assignments handed in > 1 week after due date or after answer key posted, whichever comes first.
5. 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/documents/StudentConductCode1.pdf.
6. 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.
Course schedule:

- *Class meeting topics are subject to change*
- Readings must be completed before class on the day listed
- Any updates to the syllabus will be announced in class and posted on Moodle
- Supplemental readings from journal papers and other sources will be assigned; a partial / example list is below

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Class meeting topic</th>
<th>Textbook reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/29</td>
<td>Introduction</td>
<td>A&amp;A 1</td>
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<tr>
<td></td>
<td>1/31</td>
<td>Introduction continued; Lab 1: Landscape attributes and metrics</td>
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<tr>
<td>2</td>
<td>2/5</td>
<td>Large-scale geomorphology</td>
<td>A&amp;A 2,3</td>
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<td></td>
<td>2/7</td>
<td>Tectonic geomorphology</td>
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<tr>
<td>3</td>
<td>2/12</td>
<td>Tectonics &amp; climate</td>
<td>A&amp;A 4,5</td>
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<td></td>
<td>2/14</td>
<td>Lab 2: Surveying and GPS</td>
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<tr>
<td>4</td>
<td>2/19</td>
<td>Climatic geomorphology, Mega floods, Glacial Lake Missoula</td>
<td>A&amp;A 17, 6</td>
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<tr>
<td></td>
<td>2/21</td>
<td>Dating methods, cosmogenic nuclides</td>
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<tr>
<td>5</td>
<td>2/26</td>
<td>Weathering</td>
<td>A&amp;A 7</td>
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<tr>
<td></td>
<td>2/28</td>
<td>Sediment budgets</td>
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<td>6</td>
<td>3/5</td>
<td>Landslides &amp; debris flows</td>
<td>A&amp;A 10</td>
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<td></td>
<td>3/7</td>
<td>Landslide mechanics</td>
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<td>7</td>
<td>3/12</td>
<td>Slope stability</td>
<td>A&amp;A 10</td>
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<tr>
<td></td>
<td>3/14</td>
<td>Hillslope processes wrap-up</td>
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<td><em>Midterm</em></td>
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<td><em>Saturday, March 16: Field trip to Sleeping Child Creek</em></td>
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<tr>
<td>8</td>
<td>3/19</td>
<td>Water in the landscape; Channel networks and drainage basins</td>
<td>A&amp;A 11</td>
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<tr>
<td></td>
<td>3/21</td>
<td>Hillslope hydrology</td>
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<tr>
<td>9</td>
<td>3/26</td>
<td>Fluvial processes: alluvial rivers</td>
<td>A&amp;A 12</td>
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<td></td>
<td>3/28</td>
<td>Fluvial processes: flow and sediment transport</td>
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<tr>
<td>10</td>
<td>4/9</td>
<td>Fluvial processes: Hydraulic geometry, channel patterns, long profiles</td>
<td>A&amp;A 12,14</td>
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<tr>
<td></td>
<td>4/11</td>
<td>Fluvial processes: floods, dominant Q, channel adjustments, classification</td>
<td><em>Sleeping Child Creek project reports due</em></td>
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<td><em>Saturday, April 13: Field trip to Mattie V Creek</em></td>
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<tr>
<td>11</td>
<td>4/16</td>
<td>Glacial processes: intro, mass balance</td>
<td>A&amp;A 8</td>
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<td></td>
<td>4/18</td>
<td>Glacial processes: flow mechanics</td>
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<tr>
<td>12</td>
<td>4/23</td>
<td>Glacial processes: erosion, landforms</td>
<td>A&amp;A 8</td>
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<td></td>
<td>4/25</td>
<td>Glacial processes: jokulhaups, glacial hydrology</td>
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<tr>
<td>13</td>
<td>4/30</td>
<td>Periglacial processes, climate change &amp; geomorphology</td>
<td>A&amp;A 9</td>
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<td></td>
<td>5/2</td>
<td>Biotic effects on geomorphic processes</td>
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<td>14</td>
<td>5/7</td>
<td>Human effects on geomorphic processes</td>
<td>TBA</td>
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<td>5/9</td>
<td>Course wrap-up</td>
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<tr>
<td>15</td>
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<td><em>Final exam</em></td>
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Journal papers


Molnar, P., and England, P., 1990, Late Cenozoic uplift of mountain ranges and global climate change: Chicken or egg?: *Nature*, v. 346, p. 29-34, doi: 10.1038/346029a0.


