Spring 2-1-2018

GEO 391.01: ST: Surface Processes

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Geosciences 391: Surface Processes  Spring 2018

Course Information
- Instructors: Payton Gardner  Andrew Wilcox
- Office: CHCB 353  CHCB 357
- Email: payton.gardner@umontana.edu  andrew.wilcox@umontana.edu
- Office Hours: T/Th 10-11  M 11-12 or by appointment
- Class meetings: MWF 10-10:50, CHCB 304
- Website: Moodle umonline.umt.edu

Overview
Surface Processes will introduce students to the study of the earth’s surface and near surface using the laws and principles of physics. The course will describe the mechanisms underlying the processes that shape the earth’s surface and drive its evolution, including climate, hydrology, geomorphology, and geochemistry. The course will combine lectures, field data collection, data analysis, and lab activities. Active learning and student participation will be an essential component.

Course Objectives
To provide students with:
- familiarity and experience applying fundamental concepts in physical systems
- an understanding of the linkages among surface processes
- experience collecting and analyzing surface-processes data
- opportunities for developing scientific writing skills
- opportunities to develop and apply physics, mathematics, and computational skills
- 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 earth-surface processes
- experience communicating an understanding of the interrelationships among earth science concepts and theories to peers and others
- experience working as members of productive, collaborative teams

Assessment
20% Lab exercises and other homework
20% Field project reports
25% Midterm
10% In-class exercises and class participation
25% Final exam

Course Information, Guidelines and Policies
Field Trips
We will have two required Saturday field trips, March 10th and April 7th (all day), in addition to in-class field trips. Field trips will entail data collection and associated project reports.
Labs
There is no separate lab section for this class, but we will do regular lab (including computer lab) and field activities during class time, typically on Fridays. These will provide active-learning opportunities and will often take time beyond the regular class time to complete (in those cases, they will be due at the beginning of class the following Friday). Computer lab activities will include introductions to Python and GIS applications to surface processes (no prior knowledge is expected).

Prerequisites
The following are prerequisites: GEO 101N/102N or GEO 103N/104N, M 122 or M 151.

Attendance
In addition to lab exercises, there will often be short in-class activities that contribute to your grade. 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
Required textbook:
Cheapest option is e-book rental ($27.99 for semester):
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=

Supplemental readings (e.g., journal papers or popular media) will also be assigned.

Course website
Please check the course website (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 the instructors by email. But please do not email with homework questions; instead please ask homework questions in class (others are also likely to have similar questions) or at office hours.

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). 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

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. GEO391 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. We will work with you and Disability Services to provide an appropriate modification.

Schedule
- Class meeting topics are subject to change
- Readings listed for a given week should be completed by Monday’s class (except for week 1).
- Readings denoted “Key Concepts” refer to the textbook, and the chapter number to read that week.
- The readings listed below are a partial list. Additional readings will be announced each week (and posted on Moodle) and must be completed before the following class.
- Most Fridays are set aside for lab activities, which will often meet in the computer lab. Additional details will be provided in advance of any lab activity.
- 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>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>22-Jan</td>
<td>Course introduction, Introduction to earth systems &amp; the Critical Zone</td>
<td>Key Concepts 1 (pp. 5 – 30)</td>
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<td></td>
<td>24-Jan</td>
<td>Introduction continued; unifying concepts</td>
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<td></td>
<td>26-Jan</td>
<td>Lab</td>
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<tr>
<td>2</td>
<td>29-Jan</td>
<td>Unifying concepts, tools &amp; approaches for studying surface processes</td>
<td>Key Concepts 2</td>
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<td></td>
<td>31-Jan</td>
<td>Tools &amp; approaches</td>
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<td></td>
<td>2-Feb</td>
<td>Lab</td>
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<tr>
<td>3</td>
<td>5-Feb</td>
<td>Climate processes</td>
<td>Key Concepts 13</td>
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<td></td>
<td>7-Feb</td>
<td>Climate processes &amp; climate change</td>
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<td>9-Feb</td>
<td>Lab</td>
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<td>4</td>
<td>12-Feb</td>
<td>Water transfers in the Critical Zone</td>
<td>Key Concepts 4</td>
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<td></td>
<td>14-Feb</td>
<td>Water transfers in the Critical Zone</td>
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<td>16-Feb</td>
<td>Lab</td>
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<td>5</td>
<td>19-Feb</td>
<td>Presidents Day, no class</td>
<td>TBD</td>
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<td></td>
<td>21-Feb</td>
<td>Snow hydrology</td>
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<tr>
<td></td>
<td>23-Feb</td>
<td>Snow hydrology</td>
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<td>Date</td>
<td>Topic</td>
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<tr>
<td>26-Feb</td>
<td>Weathering</td>
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<td>28-Feb</td>
<td>Soils &amp; sediment fluxes</td>
<td>Key Concepts 3</td>
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<td>2-Mar</td>
<td>Lab</td>
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<td>5-Mar</td>
<td>Drainage basins</td>
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<td>7-Mar</td>
<td>Midterm</td>
<td>Key Concepts 7</td>
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<td>9-Mar</td>
<td>Lab</td>
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<tr>
<td>12-Mar</td>
<td>Geochemistry &amp; biogeochemistry</td>
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<td>14-Mar</td>
<td>Geochemistry &amp; biogeochemistry</td>
<td>TBD</td>
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<td>16-Mar</td>
<td>Lab</td>
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<td>19-Mar</td>
<td>Geochemistry &amp; biogeochemistry</td>
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<td>21-Mar</td>
<td>Geochemistry &amp; biogeochemistry</td>
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<td>23-Mar</td>
<td>Lab</td>
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<td>Spring break</td>
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<td>2-Apr</td>
<td>Water &amp; transport processes</td>
<td>TBD</td>
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<td>4-Apr</td>
<td>Water &amp; transport processes</td>
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<td>6-Apr</td>
<td>Lab</td>
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<td>9-Apr</td>
<td>Ecological-geological-hydrological interactions in the Critical Zone</td>
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<td>11-Apr</td>
<td>Ecological-geological-hydrological interactions in the Critical Zone</td>
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<td>13-Apr</td>
<td>Lab</td>
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<td>16-Apr</td>
<td>The nexus of water, energy, and food systems</td>
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<td>18-Apr</td>
<td>Surface processes in the Anthropocene</td>
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<td>20-Apr</td>
<td>Lab</td>
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<tr>
<td>23-Apr</td>
<td>The Anthropocene &amp; engineering geology</td>
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<tr>
<td>25-Apr</td>
<td>The Anthropocene &amp; engineering geology</td>
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<tr>
<td>27-Apr</td>
<td>Lab</td>
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<td>30-Apr</td>
<td>Restoration and management in the Anthropocene</td>
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<td>2-May</td>
<td>Restoration and management; Future directions</td>
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<td>4-May</td>
<td>Course wrap-up</td>
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<td>9-May</td>
<td>Final exam (10:10-12:10)</td>
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