Fall 2011
HWR 630 – Advanced Catchment Hydrology

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Office hours: Tuesday 2:00 – 4:00 PM

Class hours: Tue/Thu 12:30-14:00, 316F Harshbarger Bldg

Pre-requisites: HWR 518 and HWR 519, or permission of the instructor. You must be familiar with the fundamentals of surface and subsurface hydrology. Computer programming skills (e.g. MATLAB, C++)

Purpose: The objective of HWR 630 is to study different methods and approaches to extrapolate (upscale) point to hillslope scale near-surface hydrologic processes to catchment and river basin scales and to apply this knowledge to develop watershed models to study hydrologic response given atmospheric forcing and how this response depends on landscape characteristics (soil, geomorphology, vegetation) in different climates.

Course activities: The following course activities are planned:

1. Brief lectures providing background information about reading material
2. In-class presentations: every other week several articles related to the different topics of the course will be studied by the students and will be presented by the students (content and main findings) in class. His/her fellow students will ask questions and will also evaluate the presentation (on style and content, as well as how the questions were addressed). The level of participation of all students will be evaluated by the instructor and will affect the final grade.
3. Class Project: students will have the opportunity to learn different tools and techniques commonly used in catchment hydrology (dem-based geomorphologic analysis of catchments, distributed water and energy balance modeling, runoff routing, hydrologic analysis across climate gradients)

Class goals: The class has the following specific educational goals. By the end of the course, the student should be able to:

4. explain how landscape structure and climate affect hydrologic response at watershed scales;
5. develop conceptual and physically-based models that explicitly take account of quantifiable landscape features (drainage network, drainage density, soil heterogeneity);
6. build/use computer models based on those conceptual and physically-based models and the digital elevation models that contain geomorphological information about the catchment at hand;
7. analyze scientific literature on watershed hydrology and discuss the approach and main conclusions of the papers with fellow hydrologists.

**Text:** Most reading material as well as the lecture notes will be made available through the internet (see first class for website addresses and passwords).

**Grading:**

<table>
<thead>
<tr>
<th>GRADED EVENT</th>
<th>PERCENTAGE</th>
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<tbody>
<tr>
<td>Homework</td>
<td>60%</td>
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<tr>
<td>In-class presentation</td>
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**Topics:** The following topics (chapters) will be discussed during standard lectures and in-class discussions of relevant literature.

1. Introduction
2. Challenges in Catchment Hydrology
3. River Basin Geomorphology
4. Vegetation and the Hydrologic Cycle
5. Runoff Generation Processes
6. Catchment-scale Modeling Concepts
7. Baseflow Recession Analysis
8. Catchment Water Residence Times
9. Catchment Solute Transport
10. Hydrologic Similarity

**Class websites:** available through d2l