Spring 2011
HWR 519 – Fundamentals of Surface Water Hydrology

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Office hours: by appointment

Class hours: TTh 14:00-15:15, 206 Harshbarger Bldg

Pre-requisites: CE 218, SIE 305, or permission of the instructor. You must be familiar with the basics of fluid mechanics (hydrostatics, fluid kinematics, finite control volume analysis, differential analysis of fluid flow).

Purpose: The objective of HWR 519 is to study the hydrological processes at and immediately beneath the land surface that are responsible for the partitioning of water and energy into hydrological fluxes (infiltration, runoff, recharge, evaporation, sensible heat, ground heat) and to introduce methods to extrapolate point scale information about these processes to hillslope and catchment scales.

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

1. explain the different land surface hydrological processes and how they are affected by land surface conditions and states;
2. describe these hydrological processes by means of conservation equations;
3. solve (analytically as well as numerically) these conservation equations in order to quantify the hydrological fluxes;
4. synthesize the acquired knowledge into a water and energy balance model for complex terrain.
5. analyze scientific literature on surface water 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). Recommended (but not compulsory) text books are: Hydrology, An introduction by W. Brutsaert, Cambridge University Press (2005) and Physical Hydrology by S.L. Dingman, Prentice-Hall (1994).
Grading:

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<th>GRADED EVENT</th>
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<td>In-class presentation</td>
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<td>Course project</td>
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Topics: The following topics (chapters) will be discussed during standard lectures.

1. Introduction
2. Fluid Mechanics of the Lower Atmosphere
3. Precipitation (rainfall/snow)
4. Evaporation
5. Fluid Mechanics of Free Surface Flow
6. Overland Flow
7. Midterm
8. Streamflow Routing
9. Fluid Mechanics in porous materials
10. Infiltration
11. Groundwater outflow and Baseflow
12. Streamflow Generation: Mechanisms and Parameterizations
13. Streamflow Response at the Catchment Scale
14. Frequency Analysis

Class websites: available via d2l