

## **WATS 4490/6490: Small Watershed Hydrology**

Spring Semester 2016

**Instructors:** Patrick Belmont, Associate Professor  
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Office hours: MF 10:30 – 12:00 or by appointment

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Office: JQL 222  
Office hours: TR 10:30 – 12:00 or by appointment

**Lectures:** MWF, 9:30 – 10:20, BNR 112b

**Lab:** W, 10:30-12:20, BNR 004

### **Teaching Assistants:**

Mitchell Donovan (mdonovan@aggiemail.usu.edu): labs 5, 6, 7, 9

Angus Vaughan (angus.a.vaughan@gmail.com): labs 1, 2

Patrick Belmont and Karthik Kumarasamy: labs 3, 4, 8, and 10

For questions and submission of labs, email **usubelmontlab@gmail.com**

Office Hours: M, 10:30 – 11:30 in BNR 272

### **Course Objectives:**

This course will help you develop a comprehensive understanding of the hydrologic cycle and each of its primary components at the scale of small ( $< 1000 \text{ km}^2$ ) wildland watersheds. We will use conceptual and mathematical models to understand hydrologic processes and quantitatively predict stocks and fluxes of water. Throughout the course we will cover precipitation, evaporation, transpiration, surface and subsurface hillslope hydrology, groundwater hydrology, open channel flow, hydrograph separation, flood frequency analysis, and riparian zone hydrology.

### **Textbook Required:**

Ward, A. D., S. W. Trimble, S. R. Burckhard, J. G. Lyon, 2015. Environmental Hydrology, 3<sup>rd</sup> Edition. CRC Press.

### **Other Texts for References:**

Shaw, E. M. et al., 2011. Hydrology in Practice. Spoon Press.

Brooks, K. N. et al., 1997. Hydrology and the Management of Watersheds. Iowa State University Press

Hornberger, G.H. et al., 1998. Elements of Physical Hydrology. Johns Hopkins Press.

Dingman, S. L., 2002. Physical Hydrology, 2<sup>nd</sup> Edition. Prentice Hall

Hewlett, J. D., 1982. Principles of Forest Hydrology. University of Georgia Press

Bedient, B.B. and W.C. Huber. 1992. Hydrology and Floodplain analysis.

Viessman, W., and G.L. Lewis. 1996. Introduction to Hydrology.

### Class Policies:

- Please arrive on time, leave when adjourned
- Bring a calculator to class every day...we will use them! You may use the calculator on your cell phone, but you will need a regular calculator for exams, so I suggest 'practicing' with the calculator you plan to use for exams.
- Except for occasional calculations, keep cell phones off during class.
- All labs are due *at the beginning of lab* one week after they are assigned and lecture problem sets are due *at the beginning of the following lecture*, unless otherwise instructed.
- Late assignments will be penalized at a rate of 10% of the total possible points per day. All late labs must be submitted to the instructor, rather than the TA. If extraordinary circumstances arise that prevent you from completing an assignment on time, please contact me asap.
- I will post partial lecture material, reading and homework assignments on the course Canvas site. For complete course notes, plan on participating in class and taking notes.
- It is your responsibility to contact me **PRIOR** to any absences on an exam day.
- Graduate students will be held to a higher standard for written assignments, presentations, and exams.
- Midterms will cover relevant lecture and lab material. Quizzes can be announced or spontaneous.
- Participation grade will be based on attendance, in-class answering of questions and offering of comments, as well as contributions to online forums.
- If you have a disability that requires note-takers, interpreters for the deaf, extended testing time, etc., tell me or contact the Disability Resource Center (DRC) directly (room 101 of the University Inn (797-2444, [discenter@cc.usu.edu](mailto:discenter@cc.usu.edu))). Course material can be provided in alternative formats such as large print, audio, diskette, or Braille in cooperation with the DRC. Disabilities must be documented by the DRC.
- Academic Freedom and Professional Responsibilities: Academic freedom is the right to teach, study, discuss, investigate, discover, create, and publish freely. Academic freedom protects rights of faculty in teaching and of students in learning. Freedom in research is fundamental to the advancement of truth. Faculty members are entitled to full freedom in teaching, research, and creative activities, subject to the limitations imposed by professional responsibility.
- On all assignments, students are expected to produce their own, original work. Plagiarism, falsification, and cheating will be subject to disciplinary action, which can include failing the entire course.

### Grading:

Participation	5%
Assignments, Pop-ups, Quizzes	15%
Final Project	10%
Final Exam	15%
Midterms	20%
Labs	35%

**Small Watershed Hydrology – Spring 2016**  
*Tentative Schedule of Lectures, Labs, and Readings*

Month	Day	Topic	Text Reading	Lab
January	<del>11</del> , 13, 15	Introduction, Water Budgets, Finding Hydrologic Data	Sec. 1.1 - 1.4	Pre-test
	<del>18</del> , 20, 22	Energy Balance, Precipitation	Ch 2, Sec. 10.5	Lab 1
	25, 27, 29	Precipitation, Probability and Statistics in Hydrology	Ch 2, Sec. 1.5	Lab 2
February	01, 03, 05	Probability, Infiltration	Ch 3	Lab 3
	08, 10, 12	Infiltration, Soil Moisture	Ch 3	Lab 4
		Midterm Celebration of Knowledge and Understanding #1		
	<del>15</del> , 16	Review of Midterm 1, Evaporation		
	17, 19	Evaporation, Transpiration	Ch 4	Lab 5
	22, 24, 26	Groundwater	Ch 11	Lab 6
	29	Snow Hydrology	Brooks Chapter	
02, 04	Snow Hydrology	Lab 7		
March	<del>07, 09, 11</del>	No class: SPRING BREAK		
	14, 16, 18	Runoff and Subsurface Drainage, Review for Midterm 2	Ch 5	
	21	Midterm Celebration of Knowledge and Understanding #2		
	23	Section Review		
	25	Hydrographs		
	28, 30, 01	Streamflow metrics, Regional Curves, Flow Duration Curves		Lab 8
	April	04, 06, 08	Flood Frequency Analysis	
11, 13, 15		Unit Hydrographs, Intro to Fluid Mechanics		
18, 20, 22		Open Channel Flow	Ch 5	Lab 10
25, 27, 29		Open Channel Flow	Ch 7, 8	Final Projects
May	02	Final Festival of Knowledge and Understanding: 9:30 – 11:20 AM		