ATMS 338
Hydrology
Spring, 2007, MWF 10:25 – 11:15, RH 238

Dr. Paula Ann Hennon
phennon@unca.edu

http://facstaff.unca.edu/phennon/atms338/HYDRO/Welcome.html

Course Description:

Hydrology, "water knowledge", is the study of the occurrence and movement of water on and beneath the surface of the Earth, the properties of water, and water's relationship with the environment. The hydrologic cycle refers to the pathways of water in nature as it moves in its various phases through the atmosphere, down over and through the land, to the ocean, and back up to the atmosphere.

This course focuses on freshwater flow on and near the ground, including precipitation, evapo-transpiration, stream flow, soil moisture, watershed properties, and storm water. These facets of the hydrologic cycle are of research and operational use to the atmospheric scientist and are within the typical hydro-met forecasting domain of the NWS offices.

The main work of the course will be in-depth exposure to select topics in hydrology necessary to forecast flood events as well as an in-depth look at the characteristics of our own watershed resources in Asheville. Occasional hikes in our watershed area will be arranged as out-of-class enrichment experiences.

Course Details:

Reading Assignments:

The required course text is *Environmental Hydrology*, 2nd ed. By Andy D. Ward and Stanley W. Trimble, Lewis Publishers, 2004.

To gain the most benefit from the lectures, the students should read the assignments prior to the scheduled class day. A chapter-by-chapter reading guide, including questions for thought, will be available to encourage active rather than passive reading.

Problem Sets:

End of the chapter problems will be assigned to accompany the reading schedule. You should expect to have a short assignment due at each class session. In this way you will not lag behind in the material. The problem sets will be collected weekly.

Quizzes:

Occasionally, you may be asked to solve a problem extremely similar to the recently completed homework as a quiz at the beginning of class. Quizzes may alternatively be comprised of a short "thinking question." Your answer will show your ability to integrate the appropriate vocabulary and concepts encountered in your preparation for class sessions.

Watershed Labs:

On Fridays, the class will consist of guided lab experiences designed to culminate in a collaborative hydrologic study of our local watershed. These labs will begin in class however; the student may have work to complete on his or her own before the next lab session.

Exams:

The course includes three equally weighted examinations and a final case study. The exams will include problem solving, short answer and essay questions. The final case study is designed as an integrative experience for each student to use textbook knowledge to solve a "real" problem. Each student's solution to the case study will be presented and discussed during the time of the scheduled final exam.

Policies:

Points:

Problem Sets	360
Quizzes	40
Watershed Labs	360
3 Exams	180
Final Case Study	60
	1,000 points total

A	920 – 1,000
A-	900 – 919
B+	880 – 899
B	820 – 879
B-	800 – 819
C+	780 – 799
C	720 – 779
C-	700 – 719
D	600 – 699
F	<600

Attendance is extremely important for your personal success in this class. Examination dates will not change. Make-up examinations will only be given at the discretion of the instructor and may include an oral exam. Late homework will not be accepted. Watershed Labs may be turned in up to two days late, but at a penalty of 25% per day. No make-ups will be given for quizzes, please be in class on time.

Student Affairs Creed:

"The University of North Carolina at Asheville is a community of scholars dedicated to personal and academic excellence and growth. In joining this learning community, We commit to a code of civilized behavior.

- We will practice personal and academic integrity;
- We will respect the dignity of all persons, including ourselves;
- We will respect the rights of others;
- We will not condone bigotry;
- We will strive for the openness to learn from differences in people, ideas, and opinions;
- We will demonstrate concern for others, their feelings, and their need for conditions that support their work and development. Allegiance to these ideals requires us to refrain from behaviors that threaten the freedom and respect every individual deserves."

If you use any form of cheating, you will be subject to procedures outlined in Section 8.3 of the UNCA Faculty Handbook. Possible outcomes include receiving a zero for an assignment, dismissal from the course, and/or submission/dismissal from the university.

To respect the learning experience of others, please turn off all cell phones, pagers, beepers, etc....prior to class.

Please see the course website for a detailed schedule of exams, topics, reading assignments etc.

Day	Date	Topic	Reading
W	1/17	Class Introduction – The Water Cycle	Ch. 1 pp. 1 – 6
F	1/19	The Water Cycle & Environment	Ch. 1 pp. 6 – 11
M	1/22	Statistics: Distributions & Hypothesis Testing	Ch. 1 pp. 11 – 18
W	1/24	Statistics: Regression	Ch. 1 pp. 18 – 25
F	1/26	*Watershed Lab:* Precipitation time trends	
M	1/29	Rainfall frequency and magnitude	Ch. 2 pp. 29 – 41
W	1/31	Spatial distribution of rainfall and storm probabilities	Ch. 2 pp. 41 – 50
F	2/2	*Watershed Lab:* Precipitation frequency and magnitudes	
M	2/5	Soil properties, conditions and the Soil Water Balance	Ch. 3 pp. 55 – 71
W	2/7	Infiltration	Ch. 3 pp. 71 – 73
F	2/9	*Watershed Lab:* Soil maps and land use planning	
M	2/12	Evaporation processes and measurement	Ch. 4 pp. 83 – 85, 91 – 92
W	2/14	Transpiration – ET measurement	Ch. 4 pp. 85 – 94
F	2/16	*Watershed Lab:* Annual lake evaporation	
M	2/19	Weather data – temperature and wind speed	Ch. 4 pp. 95 – 99
W	2/21	Radiation	Ch. 4 pp. 98
F	2/23	*Watershed Lab:* Daily & Monthly Lake Evaporation	
M	2/26	Methods of Estimating Evapotranspiration	Ch. 4 pp. 100 – 109
W	2/28	**Exam #1**	
F	3/2	*Watershed Lab:* Estimating Evapotranspiration	
M	3/12	Factors affecting runoff	Ch. 5 pp. 119 – 125
W	3/14	Watershed factors affecting runoff	Ch. 5 pp. 125 – 129
F	3/16	*Watershed Lab:* Runoff	
M	3/19	Runoff characteristics & Hydrographs	Ch. 5 pp. 129 – 132
W	3/21	Flow duration	Ch. 5 pp. 132 – 135
F	3/23	*Watershed Lab:* Flow Duration	
M	3/26	Prediction of peak runoff rate	Ch. 5 pp. 135 – 147
W	3/28	Stormwater Hydrographs	Ch. 5 pp. 147 – 152
F	3/30	*Watershed Lab:* Storm Runoff, totals, peaks	
M	4/2	**Exam #2**	
W	4/4	Geomorphology & Stream Orders	Ch. 6 pp. 161 – 170
F	4/6	*Watershed Lab:* Regional Regression	
M	4/9	Stream Characteristics & Meanders	Ch. 6 pp. 170 – 182
W	4/11	Stream Classification	Ch. 6 pp. 182 – 194
F	4/13	*Watershed Lab:* Watershed Morphology	
M	4/16	Groundwater flows, aquifers	Ch. 11 pp. 321 – 327
W	4/18	Gaining/Losing streams	Ch. 11 pp. 327 – 331
F	4/20	*Watershed Lab:* Watershed Morphology cont.	
M	4/23	Flood Forecasting	Ch. 12 pp. 342 – 358
W	4/25	Flood Forecasting	online
F	4/27	*Watershed Lab:* Flood Forecasting Case Study	
M	4/30	**Exam #3**	
W	5/9	Final Exam Meeting – Case Study Presentations 8-10:30 am	

Note: This schedule and the reading assignments are subject to revision. However, the exam dates will not change. Please consult the course webpage for updates.