

**DEPARTMENT OF GEOLOGY
UNIVERSITY OF MARYLAND
WATERSHED AND WETLAND HYDROLOGY: 452/652**

Professor: Dr. Karen Prestegaard, Office 3117 Geology
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Class Time and Place: Tu, Th 3:30-4:45, 1130 Plant Sciences

Scope: The course is an introduction to hydrological processes in watersheds and wetlands. Topics include: a) watershed hydrological cycle, b) surface-groundwater interactions; c) hydrological controls on nutrient and biogeochemical fluxes in watersheds; d) evaluating the effects of land use and climate change on hydrological processes, Two optional field trips will be scheduled.

Required Texts: No text is required. Class lecture notes will be posted online through ELMS. <https://elms.umd.edu>. Readings from the current literature will be posted online as pdf files. Graduate students (Geology 652) have additional assigned readings.

Recommended Texts: Any recent Hydrology Text. (See list on last page). The older text by Dunne and Leopold, 1978, Water in Environmental Planning, is an excellent text and you may be able to purchase a used copy cheaply.

Problem sets: You will complete 5-6 problem sets over the course of the semester. These are designed to provide experience in standard methods in the acquisition and analysis of hydrological data. We will acquire data from USGS, NOAA, and other agencies that collect and present data. Problem sets will be assigned approximately every 2 weeks.

Research Project

All students will do an independent research project. Independent research (not a literature review) can be based on your own field work or on the analysis of existing data bases (USGS, NWS, NOAA). The research project can be compiled from analysis of data originally conducted as part of assigned problem sets. Field projects can be done individually or as small groups of 2-3 people.

Grading: Grades will be based on: Problem sets (30%); 2 Exams (25% each), and an Independent Research Project (20%).

Syllabus

<u>Dates</u>	<u>Topics</u>	<u>Dunne and Leopold*</u>
<i>*Suggested readings in Dunne and Leopold or other hydrology text. Required readings are posted online.</i>		
Aug. 30	Introduction: Watershed definitions	Ch. 1, 14
Sept 4	Precipitation Processes	Ch. 2
Sept. 6	Precipitation probability analysis	Ch. 2
Sept 11	Drought Probability	online papers
Sept. 13	Interception, evaporation	Ch. 3, papers
Sept 18	Rainfall-Runoff	Ch. 6
Sept 20	Infiltration Processes	Ch. 5
Sept. 25	Runoff Processes	Ch. 9
Sept. 27	Controls on Hydrologic response	papers
Oct 2	Flood Magnitude and Frequency	Ch. 11
Oct 4	Connecting Runoff Processes to floods	Ch. 16, 19
Oct 6	Optional Field Trip 10am Greenbelt Park	
Oct 9	Effects of urbanization on stream channels	Ch. 11,16,18
Oct 11	Daily discharge probability 1 paragraph research proposal due	Ch. 7,
Oct 16	****EXAM 1*****	
Oct 18	Evapotranspiration	Ch. 4,5
Oct 23	Water Balances	Ch. 8
Oct 25	Urban Water Balances	readings
Oct 30:	Watershed and wetland Water Balances	Ch. 8
Nov. 1	Wetland position in the landscape	assigned readings
Nov. 6	Hydraulic properties of wetland soils	assigned readings
Nov 8	Groundwater flow in wetlands	assigned readings
Nov. 10	Wetland Field Trip (Nov. 10 or 11)	
Nov. 13	Riparian and floodplain hydrology	assigned readings
Nov 15	Riparian wetlands and nutrient fluxes	assigned readings
Nov. 20	Closed basin wetlands (prairie potholes, etc.)	assigned readings

Nov. 22	*****Thanksgiving Recess*****	
Nov. 27	Tidal wetlands: hydrology & hydraulics	assigned readings
Nov. 29	Tidal wetland nutrient fluxes	assigned readings
Dec. 4	Review	
Dec. 6	****Exam II*****	
Dec. 11	Exam II returned; 652 Oral presentations (~ 10 minutes each) <i>Optional <u>Rough draft</u> of Research Project Due</i> (via email)	
Dec. 19	Written Research Report Due by 12 noon (They can be submitted Via email or hard copy at any time before this date)	

Required Problem Sets: (will drop lowest grade in calculation of final grade)

1. Probability of Annual Precipitation
2. Rainfall –Runoff Analysis
3. Flood Frequency Analysis and Regional Flood Frequency Analysis
4. Daily Discharge probability (Flow duration analysis)
5. Annual ET analysis
6. Monthly Water balance analysis
7. Groundwater flow and solute fluxes in wetlands (take home problem with Exam II)

Recommended texts: Most are expensive if purchased new, I would suggest buying used copies of any of the texts listed here, or any recent hydrology textbook. It helps to have a textbook if you have trouble following the lecture material and find the assigned readings too concise.

Brutsaert, Wilf, 2005, Hydrology: Cambridge University Press: Written for an upper level course in engineering or hydrology. I use this book extensively, but it does not cover some of the geochemical and other approaches that help inform hydrological processes.

Dingman, L. Physical Hydrology (any edition) MacMillian Publishing Company. An excellent book, covers many of the physical hydrology issues that we discuss.

Dunne, T. and Leopold, L.B., Freeman and Co., Water in Environmental Planning.

Hornberger, Raffensberger, Wiberg, Eschleman,: Physical Hydrology, : Johns Hopkins University Press: This is a good, inexpensive book that covers much of the material in the 1st half of the course. You can buy this book used and sell it back for almost the same price.

Academic Integrity, Special Needs, Religious observances, etc.

Academic integrity: The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.shc.umd.edu>. To exhibit your commitment to academic integrity, remember to sign the Honor Pledge on all examinations and assignments: "*I pledge on my honor that I have not given or received any unauthorized assistance on this examination (assignment).*"

Special Needs: I will make every possible effort to accommodate your request for special accommodations. Any requests must be submitted as soon as possible but no later than the end of the schedule adjustment period

Students with Disabilities: If you have a documented disability, you should contact Disability Support Services 0126 Shoemaker Hall. Each semester students with documented disabilities should apply to DSS for accommodation request forms, which you can provide to your professors as proof of your eligibility for accommodations. The rules for eligibility and the types of accommodations a student may request can be reviewed on the DSS web site.

Religious Observances: The University System of Maryland policy provides that students should not be penalized because of observances of their religious beliefs, students shall be given an opportunity, whenever feasible, to make up within a reasonable time any academic assignment that is missed due to individual participation in religious observances. *It is the responsibility of the student to inform the instructor of any intended absences for religious observances in advance.*

Course Evaluation: CourseEvalUM will be open for students to complete their evaluations. Students can go directly to the "<http://www.courseevalum.umd.edu/>" website to complete their evaluations. You will be alerted about open dates and provided more information closer to that time, and students will be alerted via their official university e-mail account. All students will complete these, please use this opportunity! Students who complete evaluations for all of their courses in the previous semester (excluding summer), can access the posted results via Testudo's CourseEvalUM, which provides a link for any course on campus that has at least a 70% response rate.