

# Physical Hydrology for Ecosystems

BEE 3710

[www.hydrology.bee.cornell.edu/BEE371Index.htm](http://www.hydrology.bee.cornell.edu/BEE371Index.htm)
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Office Hours: Tuesday after class, RR student lounge

**Text:** *Physical Hydrology, second edition*. S. Lawrence Dingman. 2002. Prentice Hall. pp. 600.

**Meeting:** TR 9:05-9:55 a.m. RR B15, R 2:30-4:25 p.m. RR B15  
 Thursday afternoon sessions will be for field trips, lab exercises, guest speakers, and to discuss case studies.

**Overview:** This is an introduction to fundamental hydrology emphasizing physical hydrological processes and the interactions among hydrology, ecology, biogeochemistry, and human activities.

After taking this class, you will be able to:

**Learning Outcomes:**

- Explain the components of the hydrological cycle and calculate the major fluxes
- Create a simple watershed model
- Manipulate and analyze basic hydrologic data
- Make basic hydrologic field measurements such as snow-water equivalent, stream discharge, and infiltration (weather depending)
- Connect hydrologic processes with ecological and chemical processes in the landscape
- Assess impacts and risk to water resources due to climate change & human-activities

**Prerequisite:** One calculus course is recommended, e.g., MATH 192 for engineering students

<b>Outline: (Proposed)</b>	<b><u>Week (approx.)</u></b>	<b><u>Topic</u></b>	<b><u>Text</u></b>
	1	Hydrological Cycle & Us	1-5, 36-83
	2	Watersheds, Creeks & Rivers	7-24, 432-433,
	3	Precipitation	94-62
	4	Infiltration & Soil Water	221-268
	5	Interflow, Runoff, & Overland Flow	389-427
	6	Evapotranspiration	272-311
	7	Soil Water Balance	311-332
	8	Groundwater (brief introduction)	325-387, 470-473
	9	Stream and Catchment Hydrology	389-432, 473-488, 500-519
	11	Snow Hydrology	166-219
	10	Topics in Ecohydrology	e.g., 83-93
	12	Erosion & Hydrogeomorphology	Handouts
	13	Floods, Disease, Pollution	Handouts
	14	Other Topics as Time Allows	Handouts

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**Assessment:** 30% Assignments, 40% Quizzes & Exams, 30% Projects

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**Lab & Assignments:** There are approximately 10 (+/-) assignments that will constitute 30% of your final grade. These stem from activities during the lab period and are designed to provide hands-on experience in various aspects of professional and research hydrology. Most assignments will be designed to answer a specific question by analyzing and manipulating actual hydrological data. There will also be several extra credit assignments to provide opportunities to investigate advanced or unique topics.

A short supplemental reading assignment will be distributed for most topics as a case study or as an example of interesting relevant issues or research. These readings will be used to facilitate discussions and will constitute periodic questions on pop-quizzes.

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**Quizzes and Exams:** Exams and quizzes will be worth 40% of your final grade. There will be 2 formal exams, each announced at least a week in advance; these will each be worth 15% of your final grade. There will also be approximately 5 very short pop-quizzes whose primary purpose is to ensure that everybody is staying current with terminology and concepts. The pop-quizzes will constitute 10% of your final grade.

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**Projects:** You will be expected to complete one course project worth 30% of your final grade. The project must utilize hydrological concepts covered in the course and must be summarized in final report; the form of the final is debatable, e.g., webpage, poster, etc. The purpose of the final project is to provide an opportunity to apply concepts and analysis tools learned in the class to a region or topic of particular personal interest.

From year-to-year there are opportunities for additional, group projects and participants may receive substantial extra credit for their involvement.

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**Other Good Texts:** *Water in Environmental Planning.*  
T. Dunne and L. Leopold. 1978. W.H. Freeman and Co. San Francisco. pp. 818.

*Environmental Hydrology (2<sup>nd</sup> ed).*  
Ward & Trimble. 2004. Lewis Publishers. pp. 475.

*Elements of Physical Hydrology.*  
Hornberger & others. 1998. Johns Hopkins University Press. pp. 302.

*Hydrology, An Introduction.*  
Brutsaert. 2005. Cambridge University Press. pp. 605.

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