

EESC 5630 Hydrology

Syllabus: Fall 2025

(short version)

Textbook: Bedient, Huber, & Vieux, *HYDROLOGY and Floodplain Analysis*, 6th Ed., 2019, Pearson

Required Reading: Healy et al., *Water Budgets: Foundations for Effective Water-Resources and Environmental Management*, 2007, USGS Circular 1308, available online: <http://pubs.usgs.gov/circ/2007/1308/>

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Weeks, Chapters and Lecture Topics:

Week 1 Ch.1.1, 1.4, 1.8 WB: pgs 1-35	<u>1. The Hydrologic Cycle and Hydrologic Measurements</u> Introduce the study of hydrology; water cycle and budget (balance); description of hydrologic parameters and measurements
Week 2 Ch. 1.2, 1.3, 1.5 WB: pgs 8,9,36-39	<u>2. Precipitation and Rainfall-Runoff Relationships</u> Weather systems, distribution of rainfall; point and areal precipitation; hyetographs, intensity-duration-frequency, Rational Method
Week 3 Ch. 1.6, 1.7, 2.1 WB: pg 19-21,43-45	<u>3. Runoff and Hydrograph Analysis</u> Defining and measuring stream flow (including Manning's Equation) and watershed characteristics; runoff and rational method; hydrograph shape and components; baseflow separation; time-area relationships; Unit hydrographs
Week 4 Ch. 2.2-2.4	<u>4. Using Unit Hydrographs</u> S-hydrograph methods; synthetic unit hydrograph development; SCS Method, creating storm hydrographs
Week 5 Ch. 2.7, 2.8 WB: pgs 4,24-27,40	<u>5. Infiltration</u> Initial abstractions; interception; calculating infiltration rates using Horton's equation; soil properties; Green-Ampt model. <i>Review for midterm</i>
Week 6 (short) Handouts, online sources	<u>6. Topics in Watershed Management (short lecture)</u> Major rivers in world and the Delaware River Basin Commission Midterm #1 (online open book, open notes, Ses. 1 to 4)
Week 7 Ch.2.6; WB: pgs 10,26,27, 41,42	<u>7. Evaporation and Transpiration</u> Water, energy, and mass transfer techniques for estimating evaporation; methods for estimating transpiration; potential evapotranspiration.
Week 8 Ch. 3.1-3.6 WB: pg 46-54	<u>8. Statistical Methods and Frequency Analysis</u> Probability concepts, return periods for storms & floods, graphical frequency analysis Review for Midterm
Week 9 Ch.-6.1-6.6;7.1, 7.2	<u>9. Urban Hydrology and Green Infrastructure</u> Estimating time of concentration; estimating runoff with the rational formula; Stormwater management, review of Best Management Practices and green urban design, applying Manning's equation to open channel flow
Week 10 (Carl) Handouts WB: pgs 55-60	<u>10. Water Quality</u> Water chemistry and reaction mechanisms; surface and groundwater quality problems; chemical partitioning
Week 11 (short) Handouts, online sources	<u>11. Community Environmental Issues in Hydrology and Water Infrastructure</u> Midterm #2 : (online open book, open notes, Ses. 5 to 9)
Week 12 Ch. 8.1-8.8 WB: pgs 43-45, 54	<u>12. Subsurface and Groundwater Flow</u> Darcy's Law; flow in porous media; permeability; hydraulic conductivity; Dupuit Equation; flow nets
Week 13 Ch. 8.9-8.11	<u>13. Well Hydraulics</u> transmissivity; aquifer storage; flow equations; anisotropy, flow to wells; steady flow in confined and unconfined aquifers; unsteady flow; pump test analysis
Week 14 Ch. 5.1-5.5, 8.12, 10.1-5 WB: 61-85	<u>14. Hydrologic Simulation, Computer Modeling and GIS</u> Conceptual models, stormwater management, surface water HEC models, groundwater MODFLOW, GIS Final Exam Review
	FINAL EXAM (online open book, open notes)

Grading policy: Homework 35%

Midterms 30% (15% each)

Final 25%,

Online class participation 10% (Includes weekly discussions)