Engineering Hydrology & Hydraulics
Example Syllabus

Instructor: Dr. Ted A. Endreny, 423 Baker Labs, te@esf.edu, 470-6565, Office hours posted
Course Meeting: Baker 148, T & H 9:30 – 10:50 AM
Lab Meeting: Monday & Wednesday 106 Baker and other venues, 1:50 to 4:50 PM
Course Web Page: Materials maintained at blackboard.syr.edu

Content

This course exposes the student to an expansive suite of topics and methods within the field of water resources engineering. Hydrologic and hydraulic concepts are explored using fundamental conservation laws and ecologically-based design theory. Concepts include watershed analysis, precipitation, infiltration, evaporation, runoff, detention, hydrograph routing, water delivery, pressurized flow in pipe networks, open channel flow, flow control devices, flood routing, groundwater flow, and management. FEG 340 students complete a guided design project, and ERE 540 students complete a research project and additional problems.

Course Text & Materials

1. Wurbs & James, 2002. *Water Resources Engineering*, New Jersey, Prentice Hall.
2. Weisman, A., 1998. *Gaviotas: A Village to Reinvent the World*, Chelsea Green Publishing
3. Recommended: Fundamentals of Engineering Supplied-Reference Handbook, NCEES
4. Computer access with class based software & calculator with solver function

Agenda for Class & Laboratory

Week 1	Water Resource Systems & Hydrologic Cycle
Week 2	Watershed Precipitation & Evaporation Processes
Week 3	Hydrologic Flow Components & Water Quality
Week 4	Rainfall-Runoff Models, Infiltration; Unit-Synthetic Hydrographs
Week 5	Fluid Mechanics, Conservation Laws, Pressurized Flow Hydraulics
Week 6	Hydraulics of Pumps, Pressurized Pipelines, & Reservoir Systems
Week 7	Hydraulics of Pipe Networks and Flows
Week 8	Open Channel Hydraulics – Flow Classification
Spring Break	
Week 9	Open Channel Hydraulics – Water Surface Profiles
Week 10	Open Channel Hydraulics – Rapidly Varied Flow
Week 11	Hydrologic and Kinematic Flood Routing & Dam Break Analysis
Week 12	Hydrologic Frequency Analysis & Random Variable Prediction
Week 13	Groundwater Engineering – Saturation and Flow
Week 14	Groundwater Engineering – Flow Nets & Quality
Week 15	Discussion of Engineering Hydrology & Hydraulics Applications

Assignments

Class Activities: Regular participation in class, presentation of up to 2 assigned readings.
Homework: 10 quantitative problem sets solved using MathCAD or similar program, literature review of relevant technical journals (1 for undergraduates, 5 for graduates).
Laboratory: 10 quantitative and qualitative lab reports that build toward the design project and follow recommended writing style and format; 1 corrected lab report that addresses noted areas.
Design/Research: Approved proposal memorandum, 2 drafts of report, 1 final report.

Tests: Quizzes; 1 mid-term examination; 1 final-examination.

Evaluation System

For homework and laboratory, the quality of your work will be based on restating problem goal, describing solution approach, application of appropriate software or tools, completeness, neatness in presentation, and correct answers. For the design project, the quality of your work will be based on demonstration of engineering design concepts, detail in analysis of hydraulics and hydrologic components, safety in design, clarity, completeness, thoughtfulness, amount of supporting material, and organization.

FEG 340 Point Allocation

- Homework Assignments (redo options) 25%
- Laboratory Assignments 25%
- In Class Participation 05%
- Quizzes, Mid-Term and Final Examination 25%
- Design Project and Report 20%

ERE 540 Point Allocation

- Homework Assignments (redo options) 45%
- In Class Participation 05%
- Quizzes, Mid-Term and Final Examination 25%
- Research Project and Report 25%

Outcomes

Upon completion of this course, the student will have (bold indicates greater depth):

- An ability to apply knowledge of mathematics, science, and engineering to solve water resources engineering problems (a, e);
- An ability to design, conduct, analyze, and interpret water resources engineering experiments (b);
- **An ability to design a water resources engineering system, component, or process to meet desired goals (c);**
- An ability to function on a multi-disciplinary team, an understanding of professional and ethical responsibility, and effective communication (d, f, g);
- **The broad education necessary to understand the impact of water resources engineering solutions in a global, economic, environmental, and societal context (h);**
- A recognition of the need for, and be able to engage in, life-long learning and knowledge of contemporary water resources engineering issues (i, j); and
- **An ability to use the techniques, skills, and modern engineering tools necessary for water resources engineering practice (k).**

Policy

Class discussion may not cover all reading material, yet the students should seek, and then seek more, to understand all assigned material. Students work independently on submitted work.

Needs for test taking, note taking and tutoring need to be discussed with ESF's Office of Student Life, located in Bray Hall and http://www.esf.edu/catalog/studentlife.htm

Creative suggestions on ways to improve the course will be rewarded with free coffee or tea.

Policy may change, but only for the better.

Instructor Responsibilities

1. Develop & present coherent lectures to introduce new learning material;
2. Facilitate group discussions that stimulate learning of class material;
3. Illustrate the use of techniques or tools asked of the students;
4. Assess & provide feedback on student learning and work products;
5. Provide opportunities for contact with students via class time, office, & email;
6. Encourage students to take ownership and control of the course.

Student Responsibilities

1. Read & strive to understand (e.g., re-read, ponder) the materials assigned;
2. Illustrate interest & dedication to the course activities & deliverables;
3. Participate & respond to instructor feedback sessions;
4. Strive to improve self-assessment, critical thinking & lifelong learning skills;
5. Complete course preparations and deliverables.