CE 3243 Water Resources Engineering
Polytechnic Institute of New York University
Spring 2013

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Catalog description: This course provides a detailed overview of water resources engineering, including both analysis and design elements. Topics covered: open-channel flow; pipe networks; reservoir balances; hydrologic techniques; surface water and ground-water supplies; water demand; and development of water resources for multiple purposes.

Prerequisite: CE 2213 Fluid Mechanics or equivalent

Course objectives:
1. Understand fundamental principles of surface and groundwater hydrology
2. Understand open channel flow concepts
3. Understand water distribution system design requirements; able to analyze pipe networks and to size centrifugal pumps and storage facilities
4. Understand urban drainage design issues including awareness of new green infrastructure techniques for runoff reduction; able to design a drainage system using the Rational method

ABET competencies
c. Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
e. Ability to identify, formulate and solve engineering problems
f. Understanding of professional and ethical responsibility

Class Hours: W 1:30 to 2:50 p.m.; F 2:00 to 3:20 p.m., room tba

Course structure: The class is predominantly taught using a lecture format with a combination of Powerpoint lessons and handwritten notes on the whiteboard. All students are expected to be actively engaged during class by taking notes and participating in discussion and collaborative work on sample problems. Students should bring a calculator to class.

All homework assignments, Powerpoint lessons, and additional notes will be posted on MyPoly. Students are expected to check the class page on MyPoly and their NYU-Poly student email regularly throughout the term for newly posted material and class announcements.

Required text: *Water Resources Engineering, 2nd Edition*, Mays, L. W., John Wiley & Sons, Inc., 2011. ISBN: 978-0470460641. (1st edition 2005 printing is acceptable also; differences between versions will be noted in class)   Text is used more as a reference because its coverage is too extensive. Unfortunately, both editions have numerous typos. Errata sheets will be posted on MyPoly. Students are strongly encouraged to directly mark all corrections in their textbooks at the beginning of the term.

Homework assignments: Homework will be assigned weekly and most will be due at the beginning of class one week from the date assigned. Due dates will be explicitly announced in class and posted on MyPoly. Selected problems will be graded. See below for further information about expectations on homework assignments. **Late homework assignments will not be accepted unless due to unplanned**

student emergencies or by prior arrangements made at least two days before the due date. A completed "Late Homework Agreement" must be submitted on the original due date if arrangements are made for a late submittal of the work.

Computer use: Two assignments will require use of industry-standard computer software (HEC-RAS and EPANET). Fundamentals about these programs will be taught in class. Students will also use spreadsheets for assignments requiring tabulated and/or repetitive calculations.

Examinations: Two examinations will be given during class periods. Tentative dates are Mar. 1 and Apr. 17, 2013. Actual dates will be announced in class. Exams will be based on lecture material, homework assignments and projects. Specific topics for each exam will be announced in class in advance. The examinations may consist of short-answer questions, true/false questions, numerical problems and essay questions.

A comprehensive final examination will be given during finals week. The date is determined and announced by the Registrar's office.

Quizzes: Unannounced quizzes may be given at any time during the semester. Students who miss the quizzes will not be allowed make-up quizzes.

Polytechnic Institute of NYU Code of Conduct: All students are reminded that the Code of Conduct is enforced at all times. Please refer to the University website at: http://www.poly.edu/academics/code-of-conduct. Any incidents of academic dishonesty will be reported and appropriate sanctions issued. Remember, you are here to learn – trying to get away with cheating does not accomplish that goal.

Attendance: All students are expected to attend all scheduled lecture sessions, so a portion of your grade is based on your attendance. If you need to miss a class, please inform the instructor beforehand. Assignments must still be submitted on time unless prior arrangements are made. Unauthorized absence from more than five class periods can be basis for a failing grade for the course.

Use of electronic devices: No cell phone use is permitted during class, including for reading of text messages. Please be sure all cell phones are silenced and put away before class begins. Laptop computers can only be used for taking notes in class. Any student violating these cell phone and laptop rules will be asked to leave the classroom.

Grading: Grading will be based on the following breakdown.

Homework	20%
Projects	10% (5% each)
Midterm Exams	30% (15% each)
Final Exam	30%
Attendance, participation, effort	10%

Notes: This grade distribution may be altered slightly to account for quizzes.

Grades will be distributed on the basis of the following overall class averages.

       >90% = A+, A, A-
       >80% = B+, B, B-
       >70% = C+, C, C-
       >60% = D+, D
       <60% = F

Additional Information Regarding Homework Assignments:
Homework assignments are an important part of the learning process: they reinforce both concepts and computational skills. Be sure to allocate sufficient time. Although you are welcome and encouraged to discuss assignments with other students or with the instructor or graduate assistant, **you must first make an effort to solve each problem by yourself**. After any discussions about specific problems, you should prepare your assignment submittal independently – copied solutions violate the spirit of the learning process and the NYU-Poly Code of Conduct and appropriate academic dishonesty reporting will be implemented.

Students should view all homework assignments as exercises in presenting engineering design calculations. **Grading will be based on both the logic and clarity of the solution as well as the specific numerical results.** The following approach (adapted from *Fluid Mechanics with Engineering Applications, 10th ed.*, by Finnemore and Franzini) should be used:
1. Thoroughly read and ponder the problem statement for a few moments before writing anything on paper.
2. Summarize information to be used, both that given and that obtained elsewhere ("Given") and summarize quantities to be found ("Find"). Define notation clearly.
3. Draw neat figure or figures, fully labeled, of the situation to be analyzed.
4. State all assumptions you consider necessary.
5. Write relevant equations and solve the problem as far as possible algebraically (in terms of variables in equations) before inserting numbers.
6. Check the dimensions of the various terms for consistency.
7. Insert numerical values for the variables at the last possible stage, using a consistent set of units. Evaluate a numerical answer, with units, and report it to an appropriate precision. (A common practical rule in engineering is to report results to three significant figures or four figures if they begin with a "1," which yields a maximum error of 0.5%.) Do not round off values in your calculator, only do so when reporting your final answer.
8. Check your answer for reasonableness and accuracy by comparing it with expected results and by whatever other means you can devise.
9. Check that any assumptions you made initially are satisfied or appropriate.

In some cases, you will be asked to provide written commentary on the numerical values -- do not neglect to do this. Interpretation of design results is as important as obtaining the correct numerical solution.

Homework should be submitted on 8 1/2 by 11 inch paper - either engineering computation paper (preferred) or lightly-ruled graph paper. Looseleaf or other horizontally-ruled paper is not recommended as they are not standard in professional use. Computational problems can be done by hand as long as handwriting is legible. Occasional essays and projects should be typed. The first page must include the student's name, course number and name, assignment number and current date. All pages should be consecutively numbered and the entire assignment must be stapled.

If a spreadsheet is used for calculations, a printout must be fully annotated so someone familiar with the course material can follow your computations. At a minimum, all rows and columns should be labeled with both variable names and units, and relevant equations should be provided either on the tabular printout or on a separate sheet of paper. Hand-written sample calculations must also be provided for all numerical values in a typical row (not the first row) of the table – write the equation using variables, show all relevant numerical values plugged in, then calculate the answer using your calculator to make sure it agrees with the number calculated by the spreadsheet.

Spring 2013 Tentative Schedule

Dates		Topic	Mays Text Chapter*	HW assigned
Wed.	**Fri.**			
Jan. 30		•Course overview •Introduction to water resources	1, 11	1. WRE in civil engineering; fluid mechanics review
Feb. 6 Feb. 13	Feb. 1 Feb. 8 Feb. 15	**Hydrology** •Hydrologic cycle •Precipitation, evaporation, infiltration •Surface runoff •Groundwater •Probability concepts	7, 8, 6, 10	2. Mass balance, precipitation 3. Evaporation, infiltration, runoff 4. Unit hydrographs, groundwater
Feb. 20	Feb. 22	**Reservoirs and Dams**	11.7 9.1 - 9.2 17.1-17.3	5. Reservoirs – due on Wed. Feb. 27
Feb. 27		Review		
	Mar. 1	**MIDTERM #1**		
Mar. 6 Mar. 13	Mar. 8 Mar. 15	**Water Distribution Systems** •Water demands •Pressurized pipe flow; branched and looped systems •Pumps	12, 4	6. Pressurized pipes 7. Pumps Municipal water supply **project**
Mar. 27 Apr. 3 Apr. 10	Mar. 29 Apr. 5	**Open Channel Flow** •Definitions •Uniform flow •Gradually varied flow •Rapidly varied flow	5	8. Open channel flow 9. Gradually varied flow HEC-RAS **project**
	Apr. 12	Review		
Apr. 17		**MIDTERM #2**		
Apr. 24 May 1	Apr. 19 Apr. 26	**Urban Drainage Design** • Runoff generation and control •Storm sewer system components •Rational method	15, 16	10. Urban drainage design
	May 3	• NYC Water Supply • Course Summary		

* Specific sections of chapters will be assigned in class.