JOHN A. REIF, JR. DEPARTMENT OF
CIVIL AND ENVIRONMENTAL ENGINEERING

NJIT New Jersey Institute of Technology

CE 321 - Water Resources Engineering - Spring 2018

Text: Wurbs and James, Water Resources Engineering, 1st. Edition, Prentice Hall, 2002
ISBN: 0-13-0812935 - Other references for Water Quality Topics of Interest
READING ASSIGNMENTS: Will be given during the conduct of course

Instructor: Prof. Yuan Ding, Office: 235 Colton Hall, 973-642-7046, ding@njit.edu

***Prerequisite**: CE 200, CE 200A, CE 260, Math 225. Training in methods of developing water supplies under normal and extreme (i.e., droughts, floods) conditions. Covers hydrologic techniques such as surface and ground water yield, hydrograph analysis and routing (detention, reservoir) analyses, probabilistic methods related to hydrologic studies. Water quality issues are briefly discussed.*

Week	Topics
1	Introduction-Hydrologic Cycle, Random Nature of Rainfall (Normal Distribution).
2,3,4	Chapter 2 Hydrology
5	Chapter 5 Open Channel Hydraulics
6	Exam-1
7	Chapter 7 Hydrologic Frequency Analysis
8, 9,10	Chapter 8 Modeling Watershed Hydrology
11	Exam-2
12, 13, 14	Chapter 9 Groundwater Engineering
15	Final exam

Note: Certain homework assignments may require computer-utilized solutions (e.g. probability problems, reservoir routing problems, etc.). There are 2 exams (tentatively given at 5 week intervals) and a final exam in the course. Homework will be reviewed but not graded.

Exam 1 30 points
Exam 2 30 points
Final 20 points
Project 20 points

*The NJIT Honor Code will be upheld and any violations will be brought to the immediate attention of the Dean of Students.
*Students will be consulted with by the instructor to any major modifications or deviations from the syllabus throughout the course of the semester.

CE 321 - Water Resources Engineering

Description:

The objective of the course is to train the student in methods of developing water supplies and to briefly describe the means to treat water for consumptive use. Hydrologic techniques such as surface and ground water yields, stormwater management, hydrograph and touting analyses, and probabilistic methods related to hydrologic studies for extreme cases (e.g. droughts and floods) are treated in the course.

Prerequisites:

CE 200 – Surveying

CE 200A – Surveying Lab

CE 260 – Civil Engineering Methods

Math 225 – Survey of Probability and Statistics

Textbook(s) Materials Required:

Wurbs and James, Water Resources Engineering, 1st. Edition, Prentice Hall, 2002, ISBN: 0-13-0812935.

Course Objectives:

1. Understand how water resources are developed and how needs are quantified.
2. Learn how the potential for extreme hydrologic events (e.g. floods and droughts) are analyzed and quantified.
3. Understand the importance of insuring water resources that are adequate from both a quantitative and qualitative standpoint.
4. Gain the ability to utilize state of the art techniques employed in the discipline.

Topics:

Introduction-Hydrologic Cycle, Random Nature of Rainfall (Normal Distribution)

Droughts, Floods, Return Values for Extreme Flows (Gumbel's Techniques

Rainfall-Runoff Relationships, Intensity-Duration Curves; Rational Method

Reservoirs-Storage

Outcomes Course Matrix – 321 Water Resources Engineering

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Identify how water supply needs are quantified and how water resources are developed.			
Discuss source of information and time horizons utilized for water resource planning.	1, 2, 7	1,2	Discussions, homework, and quizzes.
Discuss various options associated with developing water resources.	1, 2, 7	1, 2, 3	Discussions, homework, and quizzes.
Student Learning Outcome 2: Demonstrate how the potential for extreme hydrologic events (e.g. floods and droughs) are analyzed and quantified.			
Discuss floods and droughts as well as data sources.	1, 2, 4	1, 2, 3	Discussions and quizzes.
Discuss methodologies for assessing return periods associated with droughts and floods of interests	1, 2	1	Homework and quizzes.
Student Learning Outcome 3: Demonstrate the importance of insuring water resources that are adequate from both a quantitative and qualitative standpoint.			
Discuss the importance of water quality from a safety and aesthetic standpoint.	2, 4	1, 2, 3	Discussions and quizzes.
Provide examples of water quality standards and their rationale	4, 7	1, 2, 3	Discussions and quizzes.
Student Learning Outcome 4: Utilize state of the art techniques employed in the discipline.			
Present techniques utilized to assess safe yield of surface water supply sources, and potential draw down effects for groundwater supplies.	1, 2, 7	1, 2	Discussions, homework, and quizzes.
Discuss reservoir design. Reservoir and detention basin routing and hydrograph analysis.	1, 2, 7	1, 2	Discussions, homework, and quizzes.

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program educational objectives are reflected in the achievements of our recent alumni:

1 – Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Alumni will advance their skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Revised: 2/13/18