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.

Department of Civil and Environmental Engineering

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-

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: Recent 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: Recent alumni will advance their skills through professional growth and development activities such as graduate study in engineering, professional registration, and continuing education; some graduates will transition into other professional fields such as business and law through further education.
3 – Service: Recent alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civil organizations, and humanitarian endeavors.
Our student outcomes are what students are expected to know and be able to do by the time of their graduation:

(a) an ability to apply knowledge of math, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an 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
(d) an ability to function on multi-disciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of ethical and professional responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global,
(i) a recognition, of need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use techniques, skills and modern engineering tools necessary for engineering practice

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Course Objectives Matrix –CE 321 Water Resources Engineering

Strategies and Actions	Student Learning Objectives	Student Outcomes (a-k)	Program Educational Objectives	Assessment Methods/Matrics
Course Objective 1:Understand how water supply needs ae quantified, and how water resources are developed.				
Discuss source of information and time horizons utilized for water resource planning.	Learn the sources of data related to water resources and appreciate the rationale for planning 50 years in advance for major surface water supply development.	a,e,h,k	1,2	Discussions, homework, and quizzes.
Discuss various options associated	Understand the criteria utilized in	a,e,g,k	1,2,3	Discussions, homework, and

with developing water resources.	ranking potential sources and learn concepts related to reliable yields associated with specific sources of interest.			quizzes.
Course Objective 2: Learn 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.	Recognize that water resource engineers must plan for normal situations as well as extreme events to adequately protect the public at large.	a,,e,f,g,j	1,2,3	Discussions and quizzes.
Discuss methodologies for assessing return periods associated with droughts and floods of interests	Ability to apply methodologies for assessing return periods associated with droughts and floods of interest.	a,e,f,h,k	1	Homework and quizzes.
Course Objective 3: Understand 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.	Learn that potential water supply sources must be initially investigated from both a quantitative and qualitative viewpoint.	e,f,h,j	1,2,3	Discussions and quizzes.
Provide examples of water quality standards and their rationale	Gain insights as to how to assess raw water quality. Learn the differences in raw water quality between ground water and surface water, and the methods to treat same.	a,e,h,k	1,2,3	Discussions and quizzes.
Course Objective 4: Gain the ability to utilize state of the art techniques employed in the discipline.				
Present techniques utilized to assess safe yield of	Knowledge of the current techniques used to assess	a,e,k	1,2	Discussions, homework, and quizzes.

surface water supply sources, and potential draw down effects for groundwater supplies.	resource and impacts associated with development of specific sources of water			
Discuss reservoir design. Reservoir and detention basin routing and hydrograph analysis.	Ability to use state-of-the art methodologies utilized in the water resources field.	a,e,f,h,j,k	1,2	Discussions, homework, and quizzes.