CE 321 – 001, 101: Water Resources Engineering

(Revised July 25, 2025)

Lectures Section 001: (Tuesdays & Thursdays) *11:30 AM – 1:35 PM - KUPF 202*
Section 101: (Tuesdays) *6:00 PM – 1:35 PM – CKB 215*

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Office Hours: Any day from 9 am to 9 pm
Zoom: Personal meeting ID: 983 351 0906
Pass code 647 860; Appointments
in person or zoom via email

Required Textbook

Water Resources Engineering by David Chin, 4th edition, Pearson Publishing. Access Card, 4/e 9780135357705; available from NJIT bookstore or online at the *MyPearsonStore*, Recommended, not required.

Additional class resources (Required): NJDEP Stormwater regulations and Best Management Practices (BMP) manual; HEC-RAS programs; Hydraflow Hydrographs and Storm sewer design software imbedded in Civil 3D 2021 or later date (educational version that is available to all students at no charge) (Required for each student)

Course Description

This course is designed to present the fundamental laws relating to the static and dynamic behavior of fluids. The emphasis is placed on applications dealing with the flow of water and other incompressible fluids. These include flow in pipe systems and natural channels.

Course Objectives:

Engineering analysis of:

1. Development of surface water supplies.
2. Drought prevention.
3. Flood protection according to Army Corps of Engineers (ACOE) and New Jersey Department of Environmental Protection (NJDEP) standards.
4. Storm water Management (flowrate, volume, groundwater recharge, water quality enhancement and storm sewer design) according to current NJDEP standards.
5. Groundwater supplies.

The techniques utilized in the course will include statistical analysis, hydrograph development and the use of available design software that is common in the consulting

engineering field. Students are required to have Civil 3D downloads to access design software to do the class project (requires a serious effort).

COURSE ASSIGNMENTS Reading Assignments Textbook Assignments
Chapter 1(all) 1.1 Chapter 8- pages 496-510 8.1, 8.7 Chapter 9-pages 566-576, 591-599, 9.3 606-614, 629-636 Chapter 10- pages 669-681, 688-715 10.5, 10.9, 10.48 Chapter 11- pages 764-815 11.1, 11.25, 11.27 Chapter 12- pages 824-903 12.5 Chapter 14-pages 959-971 Chapter 16- pages 1082-1102 Other individual assignments (design project) will be presented in class that will require the use of the additional resources listed above.

GRADING: Project 200 points; Midterm 100 points; Final Exam 100 points

Final Grades: A= 90 to 100 per cent; B+= 85 to 89; B= 80 to 84; C+= 70 to 79; C= 60 to 69; D= 50 to 59; F= below 50%

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the

university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.

The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students.

AI statement: The use of artificial intelligence (AI) is **not** permitted in this course only when explicitly stated in assignments. If students use AI for any course-related work, they must cite it according to the guidelines provided on the **NJIT Library AI Citation page**. If you have any questions about AI use in this course, please contact the course instructor before submitting any assignments. In cases where AI use is not allowed, students are expected to complete work without AI assistance to develop their skills in this subject area.

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. NJDEP website
Discuss various options associated with developing water resources.	1, 2, 7	1, 2, 3	Discussions, homework, and quizzes. Software analysis
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. NJDEP website; Army Corps of Engineers flood control projects

Discuss methodologies for assessing return periods associated with droughts and floods of interests	1, 2	1	Homework and quizzes; project
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, project.
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 project. Design Software, NJDEP website

Stormwater Management

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 scholarships among our faculty and students
- to promote service to the engineering profession and society

Program Educational Objectives

Our **Program Educational Objectives** are reflected in the achievements of our recent alumni:

1. **Engineering Practice:** Alumni will successfully engage in the ethical practice of civil engineering within industry, government, and private practice, working towards safe, practical, resilient and 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 technical and interpersonal 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 academia, 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.

Student Outcomes

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 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 conclusion
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies