CEE 321 – 141: Water Resources Engineering

(3 credits)

Lectures	Hybrid: Monday 6:00pm – 8:50pm (Virtual) Wednesday 6:00pm – 8:50pm (Central King Building 317)
Instructor	Nicole Del Monaco, PE, CFM, ENV SP Office Hours: By Appointment nicole.delmonaco@njit.edu
Prerequisite	CE 200 AND CEE 200A AND MATH 279 OR MATH 305

Required Textbook

None

Other Recommended Texts & Reading

Hydrology and Floodplain Analysis, Sixth Edition, by Philip B. Bedient, Wayne C. Huber, and Baxter E. Vieux

Course Description *(from NJIT's course catalog)*

Training in methods of developing water supplies and the means to treat supplies for consumptive use. Covers hydrologic techniques such as surface and ground water yield, hydrograph and routing analyses, and probabilistic methods related to hydrologic studies.

Course Objectives (General)
By the end of this course, the student will be able to:

Course Topic 1: Analyze flow in closed conduit and open channel systems.

Course Topic 2: Calculate probability and statistics for storm events.

Course Topic 3: Analyze rainfall, runoff, and abstractions.

Course Topic 4: Preliminary design of hydraulic structures, stormwater collection systems, and stormwater management systems.

Course Topic 5: Examine groundwater governing equations and applications.

POLICIES & PROCEDURES

Academic Integrity: It is expected that NJIT's University Code on Academic Integrity will be followed in all matters related to this course. Refer to NJIT's Dean of Students website to become familiar with the Code on Academic Integrity and how to avoid Code violations.

https://www.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf

Communication: Communication for the class will be primarily through email or announcements on Canvas.

Lectures/Class: While not graded or required, I highly encourage you all to attend class. The material taught is not directly from the textbook, and therefore being in-person is the best way for you to understand the material being presented. In addition, participation is highly encouraged and will help me to see who is really trying to understand the material!

Handouts: Handouts will be made available on Canvas for relevant topics. Expect for all relevant materials to be uploaded to Canvas at least 1 day before the lecture.

Homework: Homework will be assigned weekly to help with the understanding of the material. It will not be collected. I encourage intellectual collaboration on the homework. The objective of homework assignments is learning, and working together is an excellent way of doing that. But note that the exams will not be collaborative, so make sure you understand the material!

Homework Format: The homework will be posted weekly on Canvas the day after class. I will also offer some additional homework problems from the optional course textbook for those that would like more practice problems.

Late Homework: Homework is not collected, so therefore late homework does not apply. However, if you are using the homework to study, please do not email me the night before an exam asking for help on how to solve all homework problems we've done to date. Try to pace your learning with the course progression.

Homework Solutions: I will not post homework solutions. I will include the answers on the homework, but if you want help on solving please reach out to me directly.

Quizzes: There will be quizzes given to test your understanding of the material. If you find yourself struggling with the material and don't perform well on the first quiz, please see me.

Exams: There will be a midterm and final exam. A reference sheet with equations will be included as part of your exam packet. You may only bring a calculator and pencil/pen/highlighter. I would also encourage bringing a ruler or an edged-surface for graph extractions.

Project: There will be a project due at the end of the semester. We will discuss during Week 2.

Calculation of Course Grade: A weighted average grade will be calculated as follows:

Quizzes	20%
Midterm	25%
Project	30%
Final Exam	25%

The minimum requirements for final letter grades are as follows:

A = 90%, B+ = 85%, B = 80%, C+ = 70%, C = 60%, D = 50%, F < 49%

While the final grades will not be curved, I do factor in many elements (participation, attendance, etc.) when giving a final grade. It can only help you!

Instructor Commitment: You can expect the instructor to be courteous, punctual, organized, and prepared for lecture and other class activities; to answer questions clearly; to be available during office hours or to notify you beforehand if office hours are moved; to provide a suitable guest lecturer or pre-recorded lecture when they are traveling or unavailable; and to grade uniformly and consistently.

AI statement: The use of artificial intelligence (AI) is 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.

Students with Documented Disabilities: NJIT is committed to providing students with documented disabilities equal access to programs and activities. If you have, or believe that you may have, a physical, medical, psychological, or learning disability that may require accommodations, please contact the Coordinator of Student Disability Services located in the Center for Counseling and Psychological Services, in Campbell Hall, Room 205, (973) 596-3414. Further information on disability services related to the self-identification, documentation and accommodation processes can be found on the webpage at: (http://www.njit.edu/counseling/services/disabilities.php)

Course Schedule:

WEEK	DATE	LECTURE	TOPIC
1	5/28	In-person	Welcome! Syllabus
2	6/2	Virtual	Fundamentals of Flow in Closed Conduits
2	6/4	In-person	***Quiz***, Fundamentals of Flow in Closed Conduits
3	6/9	Virtual	Fundamentals of Flow in Open Channel
3	6/11	In-person	***Quiz***, Fundamentals of Flow in Open Channel
4	6/16	Virtual	Probability and Statistics in Water Resources
4	6/18	In-person	***Quiz***, Rainfall & Abstractions
5	6/23	Virtual	Runoff
5	6/25	In-person	***Midterm***
6	6/30	Virtual	Design of Hydraulic Structures
6	7/2	In-person	***Quiz,*** Design of Hydraulic Structures
7	7/7	Virtual	Design of Stormwater Management/Collection
7	7/9	In-person	***Quiz,*** Groundwater
8	7/14	N/A	Project Time
8	7/16	N/A	Project Time
9	7/21	In-person	***Final Exam***

Course Objectives Matrix – 321 – 141

Strategies and Actions	Course Student Learning Outcomes	**Student Outcomes (1-7)**	Program Educational Objectives	Assessment Methods/Metrics
Course Objective 1: Understand the basic principles of hydrology, including the hydrological cycle, precipitation, infiltration, and runoff				
Provide comprehensive lectures on hydrology principles and assign relevant textbook readings.	Students will develop the ability to interpret hydrological data and use calculations to analyze and predict water movement within various components of the hydrological cycle.	1, 2, 7	1, 2	Discussions, quizzes, and homework
Course Objective 2: Learn the concepts of fluid mechanics as applied to closed and open channels, including pipe flow and river hydraulics.				
Introduce students to hydraulic simulation tools like HEC-RAS.	Understand how water flows through an open-channel environment as it results from runoff in the hydrological cycle	1, 2, 6, 7	1, 2, 3	Discussions and software introduction
Review and analyze case studies of urban drainage systems and their performance during extreme rainfall events.	Develop the ability to assess the effectiveness of urban drainage systems	1, 2, 3, 7	1, 2, 3	Discussions, readings
Course Objective 3: Develop skills in designing hydraulic structures such as dams, spillways, weirs, and culverts.				
Assign key chapters from textbooks focused on hydraulic structure design.	Enhance understanding of hydraulic structure design principles	1, 2, 3, 7	1, 2	Discussions, quizzes, and homework
Regularly assign exercises focused on different components of hydraulic structures.	Develop practical skills and deepen knowledge of hydraulic structures	1, 2, 4	1, 2, 3	Quizzes and homework
Course Objective 4: Understand the principles and practices of stormwater management, including the design and implementation of stormwater control measures such as detention basins, retention ponds, infiltration systems, and green infrastructure.				
Teach students about stormwater regulations and BMPs.	Students will understand stormwater regulations and be able to identify and apply appropriate best management practices (BMPs) for effective stormwater management.	1, 2, 7	1, 2	Discussions, quizzes, and homework
Assign project where students learn about designing stormwater management systems.	Students will be able to design effective stormwater management systems by applying theoretical knowledge and practical techniques gained through project-based learning	1, 2, 3, 5	1, 2, 3	Project

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

Updated 4/22/2025