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

NJIT New Jersey Institute of Technology

ENE 262 – INTRODUCTION TO ENVIRONMENTAL ENGINEERING FALL 2025

Instructor: Prof. Arjun Venkatesan, Ph.D.

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Office Hours: By appointment (Zoom or In-Person)
Tuesdays and Wednesdays: 10:30 am to 11:30 am

Room: CULM LECT 2 **Day and Time:** Tuesdays 6:00 PM - 10:05 PM
Teaching Assistant: TBD

Description:

To introduce students to the interdisciplinary science, engineering, design and management concepts of engineered environmental systems. The course will cover environmental parameters, mass balance and natural systems, water quality management, water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management. Background material and laboratories in the environmental sciences and management areas will be covered. Group-term papers and presentations will be required.

Prerequisites: Chem 125, Math 112, and Phys. 121

Course Objectives:

1. Provide students with the most relevant environmental regulations and standards, the driving forces behind environmental science and engineering projects.
2. Provide students with the scientific background needed to assess environmental quality in terms of the physical, chemical and biological aspects.
3. Provide students with the tools necessary to understand mass balance in environmental systems.
4. Provide students with the basic scientific and engineering principles of water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management.
5. Introducing students to environmental report writing.

Textbook(s)/Materials Required:

1) Davis, M.L. and Cornwell, D.A., Introduction to Environmental Engineering, 5th Edition, McGraw Hill Companies, New York, NY, 2013, ISBN 978-0-07-340114-0
2) Handouts/slides

The final letter grades are computed as follows:

A = > 90.0%, B+ = 85.0% - 89.9%, B = 80.0% - 84.9%, C+ = 75.0% - 79.9%, C = 70.0% - 74.9%, D = 60.0% - 69.9%, F < 60.0%

Grading:

Midterm exam	20%
Final Exam	20%
Two lab sessions and reports	20%
Homework assignments/quiz	15%
Projects and oral presentations	15%
Attendance and class participation (random sign-in sheet)	10%

Tentative class schedule

Week	Date	Topics	Reading Assignments	Deliverables
1	09/02	Introduction, meet & greet What is environmental engineering? Dimensions, units and conversions Group projects	Chapter 1	
2	09/09	Library Resources for Environmental Engineering (Guest Lecture: Ms. Jill Lagerstrom) Mass balances, energy fundamentals	Chapter 2	Group project topics due
3	09/16	Hydrology and hydraulics: water sources & movement Water chemistry fundamentals, chemical reactions	Chapter 4 Chapter 5	Homework 1 Due
4	09/23	Reaction kinetics Carbonate system and alkalinity	Chapter 5 Chapter 5	Outline of project due
5	09/30	**First lab: pH, alkalinity, and hardness**		Homework 2 Due
6	10/07	Risk assessment Emerging contaminants: PFAS, 1,4-dioxane, etc.	Chapter 3	Lab 1 Report Due Homework 3 Due
7	10/14	**Midterm exam**		
8	10/21	Water treatment – filtration, disinfection, adsorption	Chapter 6	
9	10/28	Water treatment – coagulation, flocculation, sedimentation	Chapter 6	Homework 4 Due
10	11/04	**Second lab: jar test**		
11	11/11	Water quality and pollution Wastewater treatment	Chapter 7 Chapter 8	Group project update presentations
12	11/18	Wastewater treatment	Chapter 8	Lab 2 Report Due
13	11/25	No Class (Thursday Classes Meet)		Homework 5 Due
14	12/02	**Group project presentations**		
15	12/09	Air pollution & control Solid & hazardous waste management	Chapters 9, 11, 12	Final Project Report Due
16	**TBD**	**Final Exam**		

Professional Component: Engineering Topics

Program Objectives Addressed: 1, 2

Course Objectives Matrix – ENE 262 Introduction to Environmental Engineering

Strategies, Actions and Assignments	ABET Student Outcomes (1-7)	Program Educational Objectives	Assessment Measures
Student Learning Outcome 1: Describe and discuss relevant environmental regulations ethics and standards; the driving forces behind environmental science and engineering projects.			
Define environmental science and engineering	4, 7	1	Homework, class, discussions and examinations.
Explain and discuss current and proposed relevant regulations, standards and ethical rules.	4	1	Homework and examinations.
Student Learning Outcome 2: Assess environmental quality in terms of the physical, chemical and biological aspects.			
Provide an overview of environmental sciences and parameters.	1, 2	1, 2	Homework, class discussions, and examinations.
Conduct experiments in the environmental sciences.	6, 5	1, 2	Laboratory group discussions and laboratory reports.
Student Learning Outcome 3: Illustrate mass balance in environmental systems.			
Illustrate the mass balance approach.	1, 2	1, 2	Homework, class examples and examinations.
Student Learning Outcome 4: Recognize the basic scientific and engineering principles of water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management.			
Introduce the scientific and engineering principles of water treatment.	2	1, 2	Homework, class discussions and examinations.
Introduce the scientific and engineering principles of wastewater treatment.	2	1	Homework, class discussions, and examinations.
Introduce the scientific and engineering principles of air pollution and control	2	1	Homework, class discussions and examinations.

Introduce the scientific and engineering principles of noise pollution and control.	2	1	Class examples, and examinations.
Introduce the scientific and engineering principles of solid and hazardous waste management.	2	1	Homework, class discussions, and examinations.
Course Objective 5: Practice environmental report writing.			
Provide the mechanisms of environmental report writing.	3	1, 2	Class discussions and case study paper.

POLICIES & PROCEDURES

Academic Integrity:
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/academicintegrity-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

Generative AI:
This course expects students to work on homework problems without artificial intelligence (AI) assistance in order to better develop their skills in this content area. As such, AI usage is not permitted for solving homework problems. However, student use of AI is permitted for the term project. The extent of usage will be discussed in class when students are assigned term projects. Additionally, if and when students use AI in this course, the AI must be cited as is shown within the NJIT Library AI citation page for AI. If you have any questions or concerns about AI technology use in this class, please reach out to your instructor prior to submitting any assignments.

Communication: All communications by the instructor will be during the class and via NJIT e-mail. It is your responsibility to check your NJIT e-mail regularly. Expect an e-mail response/reply from the instructor only on Monday - Friday between 9am - 5pm.

Lectures/Class: Some weekly lectures will start with quizzes. During the class, the instructor can often ask you to work on a problem or brainstorm ideas with the people next to you and you will be called on to provide one or more of your answers. The goal of this in-class work and discussion is to get you started on a problem (not necessarily to finish) and improve how you think about the problem which will then be discussed. Lectures will NOT be recorded for subsequent access to students; therefore, students have the burden of making up for missed lectures. Please be respectful

to the course instructor and your classmates. You should always bring a pencil and calculator with you to class. Please put your cell phones on silent or turned off during class.

No late homework is accepted (no exceptions): Laboratory and homework assignments must be handed in or submitted before the beginning of the class. Assignments must be typed, however, hand sketches (as necessary) may be submitted. If plots or calculations are required, either use hand calculations of the problem in your submitted HW solution or you can use Excel program and attach the solution excel files along with pdf homework submissions. Begin each problem on a new page and number all pages; collate all homework pages together and have your name written clearly on the front page. It is your responsibility to make sure you understand how to solve the problems by attending office hours with the instructor/TA and/or asking questions in class. As with many conceptual problems, multiple solutions may be possible. This means that all rational solutions to the assignments may be considered for acceptance. Homework will be due at the beginning of class on the date it is due. Late Homework will NOT be accepted after the due date. The homework should be turned in as instructed before 6 pm.

Exams: There will be two exams held during class time: midterm and final exam. All exams in this course will be in-person. No electronic devices (such as laptops/cellphones/tablets/smart watches, etc.) are allowed during quizzes/exams. No recording devices shall be allowed during class or examinations.

Term Project and Presentation: There will be a term project/assignment for this course that must be carried out as a group. This term project is made up of two parts: (1) term project paper/report, and (2) term project presentation. Necessary background information and knowledge, in addition to the expectations and format of the term project will be provided during class lectures throughout the semester.

Quizzes. There will be short (15 - 25 min.) quizzes given during class. These quizzes primarily cover recent material. Quizzes will require both essay and mathematical proficiency and will be based largely on homework problems and reading. Quizzes are in the closed-book/closed-notes format.

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, fairly, and consistently.

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).

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

Updated 8/2025