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

NJIT New Jersey Institute of Technology

ENE 262 (Section 104) –
INTRODUCTION TO ENVIRONMENTAL ENGINEERING COURSE SYLLABUS
Spring 2025

Instructor: **Wen Zhang, Ph.D., P.E., BCEE**
Office Hours: Monday from 4:00 pm to 5:30 pm (in-person) and Thursday from 10 am-11:30 (Zoom) or by appointment for in-person meetings
Office location: Room 211 Colton Hall
Contact information: Phone: (973) 596-5520; Email: wen.zhang@njit.edu
Lecture location/time: Colton Hall 210/6:00 pm – 9:00 pm Monday/Jan 27, 2025-May 12 2024

ENE Lab TAs:
Yajing Li, Ph.D. Student, Department of Civil and Environmental Engineering, Email: yl237@njit.edu
Santhoshi Chitthaluri (sc2779@njit.edu)

TA's Office location: Room 421, Colton Hall.

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:
- Provide students with the scientific background needed to assess environmental quality in terms of the physical, chemical and biological aspects.
- Provide students with the tools necessary to understand mass balance in environmental systems.
- Provide students with the basic scientific and engineering principles and technologies in water and wastewater treatment, air pollution control, noise pollution, and solid and hazardous waste management.
- Introduce students to technical writing, literature search and digestion and case studies.

Suggested Textbook(s)/Materials:
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
Note: Handouts/slides are the main materials that we use for homework and exams.
2. FE reference handbook (PDF version)
Class lecture materials are available via Canvas.

Grading:

Midterm exam	30%
Final Exam	30%
Lab sessions and reports	15%
Homework assignments	25%

A: >= 80
B+: 75-80
B:70-75
C+:65-70
C:60-65
D:55-60
F:55

No late homework is accepted (no exceptions). Students need to make proper arrangements to meet homework or project deadlines. However, additional assignments may be available for grade makeup. Bonus points are given for active participation (e.g., answering questions, responding to Canvas inquiries; class note-taking and sharing via Canvas), and timely homework submissions.

Participation/involvement: Many people get reasons for not being able to show up due to family issues, traffic issues or sickness. If you are absent, you need to send me a note in advance or as early as possible and join the class via Webex if that is feasible for you. If you are absent in class or Webex without an early communication, I will take it as absence and take points (one point per absence) off directly from final grades.

Bonus points to elevate the final grade are available. The assessment is based on the active class or laboratory participation, extra work such as sharing class notes and posting responses to other student's questions on canvas.

Midterm and final exams: multiple-choice questions format and exams are operated via Canvas; open book.

Final grade is calculated with the above breakdown that is assessed usually on a 100 point basis.
Your grade will be=if(>90,"A",
IF(>85,"B+",IF(>70,"B",IF(>65,"C+",IF(>55,"C",IF(>50,"D"))))))

Tentative course schedule or guideline (Subject to changes with advance notices)

Week	Date	Topics
1	01/27	Introduction to the roles of environmental engineering; microbiological challenges; mitigation measures; data analytics/unit for engineering
2	02/03	Research opportunities; Water chemistry fundamentals and water quality
3	02/10	Alkalinity, hardness, and treatment approaches to remove hardness.
4	02/17	Mass/energy balance and hydrology and hydraulics, pumps
5	02/24	Water Pollution and Water Treatment
6	03/03	First lab in Colton 414: Alkalinity and hardness measurement by titration
7	03/10	BOD, COD, TOC, DO sag, environmental monitoring
8	03/17	Spring Recess
9	03/24	Water treatment; Water Reuse
10	03/31	Second Lab in Colton 414: Jar tests-coagulation/flocculation to remove or reduce water turbidity
11	04/07	Midterm exam (25 multiple choice questions on Canvas and open book) proctored virtually via Zoom
12	04/14	Multi-media filtration and emerging contaminants such as microplastics
13	04/21	Third Lab in Colton 414: COD/TOC assays
14	04/28	Harmful algal bloom and mitigation approaches
15	05/05	Last class with selected topics on • Air flotation • Sludge treatment • Electrochemistry and microbial fuel cell • Air pollutant removal processes • Noise Pollution & Control
16	05/12	Final Exam (virtual from 6 to 8:30 pm)

"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: NJIT Academic Integrity Code.

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"

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

Program Educational 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	2	1	Class examples, and examinations.

principles of noise pollution and control.			
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.

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

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

- **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.
- **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.
- **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:

- an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
- 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
- an ability to communicate effectively with a range of audiences
- 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
- 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
- an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusion
- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Updated 1/6/2025