NJIT
CIVIL AND ENVIRONMENTAL ENGINEERING

ENE 262 (Section 101) – INTRODUCTION TO ENVIRONMENTAL ENGINEERING
COURSE SYLLABUS

Fall 2024

Instructor: Wen Zhang, Ph.D., P.E., BCEE
Office Hours: Every Tuesday from 4:00 pm to 5:30 pm (in-person) and Thursday from 10 am-11:30 (Webex) or by appointment for any meetings
Office location: Room 211 Colton Hall
Contact information: Phone: (973) 596-5520; Email: wen.zhang@njit.edu
Lecture location/time: CULM 111/6:00 pm – 9:00 pm Tuesday/Sep 3, 2024-Dec, 2024

ENE Lab TAs:
Yajing Li, Ph.D. Student, Department of Civil and Environmental Engineering
yl237@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)

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 arrangement to meet homework or project deadlines. However, additional assignment may be available for grade makeup. Bonus points are given for active participation (e.g., answer 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.

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	09/03	Introduction to the roles of environmental engineering; microbiological challenges; mitigation measures; data analytics/unit for engineering
2	09/10	Research opportunities; Water chemistry fundamentals and water quality
3	09/17	Alkalinity, hardness, and treatment approaches to remove hardness.
4	09/04	Mass/energy balance and hydrology and hydraulics Pumps
5	10/01	First lab in Colton 414: alkalinity and hardness measurement by titration
6	10/08	Mass/energy balance, hydrology and hydraulics, Pumps
7	10/15	Water Pollution and Water Treatment BOD, DO sag, environmental monitoring
8	10/22	Water treatment; Water Reuse
9	10/29	Second Lab in Colton 414: jar tests-coagulation/flocculation to remove or reduce water turbidity
10	11/05	Midterm exam+QA session for exam questions (8-9 pm)
11	11/12	Multi-media filtration and emerging contaminants such as microplastics
12	11/19	Third Lab in Colton 414: Microscopic observation and counting of microplastics or COD/TOC assays
13	11/26	Thursday class meet
14	12/03	Harmful algal bloom and mitigation approaches
15	12/10	Last class with selected topics on ● Air flotation ● Sludge treatment ● Electrochemistry and microbial fuel cell ● Air pollutant removal processes ● Noise Pollution & Control
16	12/17	Final Exam (CULM 111 or virtual from 6 to 8:30 pm)

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	2	1	Class examples, and

and engineering principles of noise pollution and control.			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.

CE Program Educational Objectives

The undergraduate program leads to a Bachelor of Science degree in Civil Engineering (CE), producing graduates who will, within 3-5 years:

1. Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward safe, practical, resilient, 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 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.

CE Student Outcomes

Students from the CE program will attain (by the time of 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 conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.