NJIT
CIVIL AND ENVIRONMENTAL ENGINEERING

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

Spring 2024

Instructor: Wen Zhang, Ph.D., P.E., BCEE
Office Hours: Every Monday 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: Colton hall 416/6:00 pm – 10:05 pm Monday/January 16, 2024-May 9, 2023

**ENE Lab TAs:** TBD
**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 | 01/22 | Introduction to the roles of environmental engineering; microbiological challenges; mitigation measures; research opportunities; data analytics/unit for engineering |
| 2 | 01/29 | Water chemistry fundamentals and water quality |
| 3 | 02/05 | Alkalinity, hardness, dissolution, etc.<br>Mass/energy balance and hydrology and hydraulics<br>Pumps |
| 4 | 02/12 | Alkalinity, hardness, dissolution, etc. |
| 5 | 02/19 | First lab in Colton 414 |
| 6 | 02/26 | Mass/energy balance and hydrology and hydraulics<br>Pumps |
| 7 | 03/04 | Water Treatment and Water Pollution<br>BOD, DO sag, environmental monitoring, |
| 8 | 03/11 | Spring break |
| 9 | 03/18 | Water treatment; Water Reuse |
| 10 | 03/25 | Midterm exam |
| 11 | 04/01 | Multi-media filtration |
| 12 | 04/08 | Second Lab in Colton 414: jar tests or adsorption test |
| 13 | 04/15 | Emerging contaminants: Microplastics and HABs |
| 14 | 04/22 | Membrane filtration +special topics such as HAB |
| 15 | 04/29 | Sludge treatment<br>Electrochemistry and microbial fuel cell Air flotation<br>Air pollutant removal processes<br>Noise Pollution & Control |
| 16 | 05/06 | Possible Final Exam (TBD) |

**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. |

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|---|---|---|---|
| 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

Our program educational objectives are reflected in the achievements of our recent alumni:

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 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.

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 conclusions
an ability to acquire and apply new knowledge as needed, using appropriate learning strategies
Revised: 2/20/2024

Accessibility:
Any student who has a need for accommodation based on the impact of a disability should contact the Instructor privately to discuss the specific situation as soon as possible. Contact Disability Resources and Services to coordinate reasonable accommodations for students with documented disabilities. The NJIT web site below provides additional information: http://www.njit.edu/counseling/services/disabilities.php

Participation:
Your participation in this class is important. Occasionally we will have in-class example problems and quizzes. Thus, you should always bring a calculator with you to class. In addition, students are expected to come to class to learn and no extra assistance on lecture content could be offered through e-mailing, text messaging, or phone calling. Cell phones should also be completely turned off or placed in vibrate mode.

Thinking critically and independently:
It is my sincere hope that as a graduate of Engineering, each student will be a thoughtful citizen as well as a fundamentally sound engineer. Your questions, thoughts, and comments are valuable and encouraged throughout this course.

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/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"