



蘇州大學
Soochow University

CEN 406 Advanced Topics in Environmental Engineering Winter 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email:TBA

COURSE OBJECTIVES

This advanced course in Environmental Engineering delves into intricate aspects of water quality management, microbiology at the cellular level, bacterial energetics, and the design intricacies of various wastewater treatment systems. Students will explore the fundamental principles and advanced techniques employed in the field of environmental engineering to address contemporary challenges related to water quality and treatment. Topics include water quality objectives, cell microbiology, bacterial energetics and more.

Upon Completion of this Course, students will be able to:

1. Understand and articulate the significance of water quality objectives in environmental engineering;
2. Explore and analyze advanced technologies for water and wastewater treatment, including emerging trends and innovative solutions;
3. Learn the principles and methodologies of conducting Environmental Impact Assessments for various engineering projects, and understand regulatory frameworks;
4. Explore and promote sustainable engineering practices that balance environmental, social, and economic considerations in engineering projects.

PREREQUISITES

CEN 260 Introduction to Environmental Engineering



GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
2 Group Projects	20 Points
3 Homework	30 Points
Midterm	25 Points
Final Presentation and Exam	25 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

1. Juan M. Lema, *Innovative Wastewater Treatment & Resource Recovery Technologies*, 1st Edition, IWA Publishing, 2017.
2. Michael T. Madigan; Kelly S. Bender, *Brock Biology of Microorganisms*, 16th Edition, Pearson, 2021.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
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Module 1	<p>Topics: Topic 1: Microbial fuel cells Topic 2: Microbial electrolysis cell Topic 3: Microbial desalination cells (MDC) – anionic and cationic exchange membranes Topic 4: Bioenergetics and Enzymology of Ammonia and Nitrite Oxidation</p> <p>Assessments: Group Project#1</p>
Module 2	<p>Topics: Topic 5: Ecological Diversity of Bacteria Topic 6: Reaction kinetics and process modelling Topic 7: Primary and Secondary Wastewater Treatment Topic 8: Public Health and Water Quality</p> <p>Assessments: Homework#1</p>
Module 3	<p>Topics: Topic 9: Wastewater and Drinking Water Treatment Topic 10: Biological Containment and Biosafety Levels Topic 11: Analysis and optimisation of a conventional wastewater treatment Topic 12: Activated sludge diffusion</p> <p>Assessments: Midterm Group Project#2</p>
Module 4	<p>Topics: Topic 13: Activated sludge and oxidized ammonium recycling Topic 14: Design requirements of potable water reuse schemes/ energy potential Topic 15: Design of a greenfield WWTP under different condition Topic 16: Superstructure-based optimization tool for plant design and retrofitting</p> <p>Assessments: Homework#2</p>
Module 5	<p>Topics: Topic 17: Membrane bioreactors Topic 18: Innovative use of membranes in wastewater treatment Topic 19: Environmental decision support systems Topic 20: Expanded granular sludge bed reactor (EGSB)</p> <p>Assessments: Homework#3 Final Presentation and Exam</p>



ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).



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ACADEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.