

Course Outline

College of Engineering

Petroleum Engineering Department

CHEE424 / Wastewater Treatment

PETR 22

Bachelor of Engineering Technology - Petroleum

- Prerequisites: 30 CH
- Co-Requisites: NA
- Credit Hours: 3
- Course Coordinator:
- Instructors' Names:
- Instructors' Office Hours:
- Instructors' Office Location:
- Instructors' telephone extension:
- Instructors' email addresses:
- Classroom Location and timings¹: As per EduGate (On-Campus)

This course is part of the mentioned above program which is accredited by Engineers Australia.

Catalog Description

This course overviews engineering approaches to protecting water quality, emphasizing fundamental principles. It examines wastewater quality and treatment methods and testing for physical, chemical, and biological parameters. Systems theory and conceptual design for treating wastewater and drinking water and reactor theory, process kinetics, and models are covered. In addition, sedimentation, filtration, biological treatment, disinfection, and sludge processing are discussed.

Course Objectives and Student Learning Outcomes

Upon completion of this course, students should be able to:

- L.O.1.** *Define fundamental principles of engineering approaches to protecting water quality and recall wastewater treatment methods for physical, chemical, and biological parameters.*

¹ Classroom timings and location are tentative, please refer to EduGate for the up to date information.

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- L.O.2.** Recognize the importance of conceptual design, reactor theory, process kinetics, and models in treating wastewater.
- L.O.3.** Apply principles of sedimentation, filtration, biological treatment, disinfection, and sludge processing to address wastewater treatment challenges.
- L.O.4.** Analyze wastewater quality, emphasizing physical, chemical, and biological parameters.
- L.O.5.** Evaluate the efficiency and effectiveness of wastewater treatment methods, including sedimentation, filtration, biological treatment, disinfection, and sludge processing.
- L.O.6.** Design innovative, effective, and sustainable wastewater treatment solutions.

Engineers Australia Stage 1 Competencies

Achieving the student learning outcomes of this course partially fulfills the following EA Stage 1 Competencies for Engineering Technologist.

Knowledge and Skills	1.1 Systematic, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the technology domain.
	1.2 Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the technology domain.
	1.3 In-depth understanding of specialist bodies of knowledge within the technology domain.
	1.4 Discernment of knowledge development within the technology domain.
	1.5 Knowledge of engineering design practice and contextual factors impacting the technology domain.
	1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the technology domain.
Engineering Application Ability	2.1 Application of established engineering methods to broadly-defined problem solving within the technology domain.
	2.2 Application of engineering techniques, tools and resources within the technology domain.
	2.3 Application of systematic synthesis and design processes within the technology domain.
	2.4 Application of systematic approaches to the conduct and management of projects within the technology domain.
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.
	3.2 Effective oral and written communication in professional and lay domains.

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	3.3 Creative, innovative and pro-active demeanor.
	3.4 Professional use and management of information.
	3.5 Orderly management of self, and professional conduct.
	3.6 Effective team membership and team leadership.

Course Content

Below are the topics that will be covered during this course². Please note that the topics are tentative to change.

#	Topic	Resources required	Learning Outcome
1	Introduction to Wastewater Treatment		LO1
2	Physical, Chemical, and Biological Characteristics of Wastewater		LO1
3	Regulatory Standards and Environmental Guidelines		LO1
4	Primary Treatment Processes		LO2,3
5	Secondary Treatment Processes		LO2,3
6	Tertiary and Advanced Wastewater Treatment		LO2,3
7	Industrial Wastewater Treatment		LO2,3
8	Sludge Treatment and Disposal		LO2,3
9	Water Reuse and Recycling		LO4,5
10	Emerging Technologies in Wastewater Treatment		LO5,6
11	Sustainable and Green Wastewater Treatment Practices		LO6
12	Wastewater Treatment Plant Design and Operation		LO6

Methods of Delivery

Classroom-Based delivery. Lecture notes will be uploaded on EduLearn. Any updates about the method of delivery will be communicated with the students via the official communication platforms.

Extent and Nature of Use of Technology

All the lectures' slides, and other learning material for this course are available online on the CHEE424 webpage on EduLearn. Students are required to visit this page regularly to check for any update.

² For the Summer Sessions, number of lectures per week is doubled and number of weeks is halved.

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Course related announcements are sent by email. Students are required to check their email daily.

Textbook/s

1. Wastewater Engineering: Treatment and Resource Recovery, 5th Edition by Metcalf & Eddy, Inc.; George Tchobanoglous; H. David Stensel; Ryujiro Tsuchihashi; Franklin Burton, 2014, ISBN-13: 978-0073401188

Attendance

The student is required to attend designated live sessions on campus. A student who fails to do so will be marked as absent from that class.

Please refer to the AU Student Attendance Policy and Procedure on the [AU portal](#).

Submission of Work

Please refer to the AU Code of Academic Integrity on the [AU Portal](#).

Assessment Plan

The assessments dates are subjected to change according to the material coverage page.

#	Assessment Title	Method of Assessment	Learning Outcomes Covered	Week	Weight
1	Midterm	Written Exam		Midterm Exams Period	25%
2	Continuous Assessment*	Quizzes & Assignment		TBA	25%
3	Attendance/Participation	In Class Participation/Attendance		1-14	10%
4	Final Exam	Written Exam		Final Exam Period	40%

* A student who misses an in-class assessment (quiz, in-class group work, in-class assignment, etc.) of a weight of 10% or less will not be eligible for makeup and will be automatically awarded a zero mark.

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Students must refer to the AU Student Assessment Policy on the [AU Portal](#) with regards to assessments and re-assessment.

Grading Scale

Please refer to the AU Grading Policy on the [AU Portal](#).