

School of Civil and Environmental Engineering UNSW Engineering

CVEN9857

Wastewater Treatment

Term 1, 2023



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
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School Contact Information

<u>Engineering Student Support Services</u> – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

<u>UNSW Study Abroad</u> – study abroad student enquiries (for inbound students)

<u>UNSW Exchange</u> – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 - Nucleus Student Hub

(+61 2) 9385 7661 - Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

Course Details

Units of Credit 6

Summary of the Course

Principles and applications of aerobic and anaerobic biological processes on treatment of wastewaters and sludges. Design of integrated systems of biological, physical, chemical and sludge treatment processes to satisfy effluent quality objectives. Effluent disposal and reuse. Stabilisation, processing, disposal and utilisation of treatment residuals.

Course Aims

To examine the principles of physical, chemical, and biological processes for treating wastewater and their treatment residuals, and to apply these processes to the design of sewage treatment plants.

Course Learning Outcomes

- 1. Describe typical physical, chemical and biological unit processes within municipal wastewater treatment systems.
- 2. Improve efficiency and correct operational issues of wastewater treatment systems.
- 3. Produce conceptual designs of wastewater treatment processes that meet effluent quality and design requirements.
- 4. Model wastewater treatment designs, processes and industry operations.
- 5. Describe emerging technologies and sustainability considerations in wastewater treatment.

Learning Outcome		EA Stage 1 Competencies
1.	Understand typical physical, chemical unit operations and biological	PE1.1
	unit processes that operate within domestic wastewater treatment	
	systems (including fundamental principles and relevant applications)	
2.	Appreciate the challenges in wastewater treatment system operation	PE1.1, PE1.5, PE2.1
	and gain knowledge and problem-solving skills to address operational	
	issues and improve operation efficiency	
3.	Produce conceptual designs of wastewater treatment trains to meet the	PE1.5, PE2.1, PE2.3, PE3.2
	effluent quality requirements and design requirement criteria	
4.	Become familiar with process modelling and software used in the	PE2.2, PE2.3, PE3.2
	wastewater treatment design and operation industry	
5.	Appreciate availability of new technologies as alternative options to	PE1.4
	traditional wastewater treatment systems and understand how these	
	technologies can improve the existing treatment performance	

Teaching Strategies

Please refer to the information in Moodle

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Presentation interview	10%	Not Applicable	1, 2, 3, 4, 5
2. Assignment 1	20%	03/03/2023 05:00 PM	1, 5
3. Assignment 2	20%	31/03/2023 05:00 PM	2, 3, 4
4. Exam	50%	Exam period	1, 2, 3, 4, 5

Assessment 1: Presentation interview

Assessment length: 10 minutes

Attend an individual online meeting with the course lecturers to give a 3 min pre-prepared presentation on an aspect of the weekly lecture material, and respond to follow up questions.

Assessment criteria

Presentation: Was the student punctual, professional and clear?

Appropriateness: Did the presentation and question responses reflect understanding?

Correctness: Was the presentation and the responses to the questions factually correct?

Engagement: Has the student engaged with the subject matter beyond lecture materials?

Assessment 2: Assignment 1

Assessment length: 5 pages Due date: 03/03/2023 05:00 PM

Select a domestic wastewater treatment plant in New South Wales and respond to the following four tasks (equal weighting). Assess the tasks below before deciding on a specific treatment plant to ensure relevant information is available.

- What volume of effluent does the wastewater treatment plant treat per day and what is the size of the population it was built to serve? When is it expected to reach capacity? Present an aerial image of the plant and a process flow diagram linking all treatment units. Include figure legends. Identify the physical, chemical and biological units and classify them as primary, secondary or tertiary treatment processes where relevant.
- 2. Where is treated water from the plant discharged? What regulations govern the discharge? What are the consequences to the plant operator of not meeting discharge limits? What are the environmental consequences of not meeting discharge limits?
- 3. Which units generate solid waste streams and what is the nature of the solid waste? How much solid waste does each stream generate per unit time? How is the solid waste processed? Where does it end up?
- 4. Describe upgrades that are planned, ongoing or complete for the facility? Describe what the

upgrades are/were designed to achieve. If the facility is not upgrading, propose an upgrade and describe the purpose of the upgrade.

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Assessment criteria

Presentation - Is the writing quality, tone and report aesthetic professional?

Appropriateness - Has the student understood what was expected from the task?

Correctness - Does the information presented reflect reality?

Engagement - Has the student delivered above basic requirements?

Assessment 3: Assignment 2

Assessment length: 8 pages Due date: 31/03/2023 05:00 PM

Provide a design appraisal for the inclusion of secondary biological treatment at a WWTP that is currently primary treatment only. Validate the design using BioWin modelling and discuss the results.

Assessment 4: Exam

Start date: Exam Period Assessment length: 2 hours Due date: Exam period

2 hr closed book exam during the scheduled exam period. exam will test student ability to: (1) Describe and explain the fundamental principles and applications of wastewater treatment unit operations or processes. (2) Identify and compare different process configurations and technologies available/relevant to meet certain wastewater treatment objectives. (3) Calculate sizes and specs of wastewater treatment unit operations or processes. (4) Identify and explain relevant issues associated with process operations and discuss potential solutions

This is not a Turnitin assignment

Attendance Requirements

For courses with Workshops and/or Labs, attendance for those classes is a necessary part of the course. You must **attend at least 80% of the workshop/lab** in which you are enrolled for the duration of the session.

Course Schedule

View class timetable

Timetable

Date	Туре	Content	
Week 1: 13 February - 17 February	Торіс	Unit operations and Physical treatment processes	
Week 2: 20 February - 24 February	Торіс	Biological treatment processes	
Week 3: 27 February -	Торіс	Activated sludge principles and design	
3 March	Assessment	Assignment 1	
Week 4: 6 March - 10 March	Торіс	Biological nutrient removal and process modelling	
Week 5: 13 March - 17 March	Торіс	Process modelling	
Week 6: 20 March - 24 March	Homework	Non-teaching week. Time to catch up!	
Week 7: 27 March - 31	Торіс	Membrane bioreactors and process modelling	
March	Assessment	Assignment 2	
Week 8: 3 April - 7 April	Торіс	Biofilm systems	
Week 9: 10 April - 14 April	Торіс	Anaerobic systems	
Week 10: 17 April - 21 April	Торіс	Resource recovery	

Resources

Prescribed Resources

 Metcalf & Eddy (2014) Wastewater Engineering – Treatment and Reuse, 5th Edition, McGraw-Hill

https://www.bookshop.unsw.edu.au/details.cgi?ITEMNO=9780073401188

- Additional materials provided on Moodle.
- BioWin process modelling simulator (http://envirosim.com)

Course Evaluation and Development

Student feedback is gathered directly through interactions with students and through the student MyExperience survey deployed at the end of term. Students in 2021 indicated the quiz assessments were not useful and requested additional help with understanding calculations, so this has been a major focus of revisions this year.

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

UNSW has a standard late submission penalty of:

• 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

Academic Honesty and Plagiarism

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person's work or ideas as if they were your own. When it is necessary or desirable to use other people's material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

https://student.unsw.edu.au/plagiarism

Academic Information

Final Examinations:

Final Exams in T1 2023 will be held on campus between the 28th of April and the11th of May, and Supplementary Exams between the 22nd of May and the 26th of May. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

ACADEMIC ADVICE

- Key Staff to Contact for Academic Advice (log in with your zID and password): <u>https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw</u>
- <u>Key UNSW Dates</u> eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.
- CVEN Student Intranet (log in with your zID and password): <u>https://intranet.civeng.unsw.edu.au/student-intranet</u>
- Student Life at CVEN, including Student Societies: <u>https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life</u>
- Special Consideration: https://student.unsw.edu.au/special-consideration
- General and Program-Specific Questions: The Nucleus: Student Hub
- Book an Academic Advising session: https://unswengacademicadvising.as.me/schedule.php

Disclaimer

This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

Mike Gal.

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.