CVEN9857

Wastewater Treatment

Term 1, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Michael Manefield	manefield@unsw.edu.au			0405477066
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School Contact Information

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

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – 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. Provide an appreciation of the principles and applications of aerobic and anaerobic unit processes to the treatment of waste water.
2. Understand the nature and functionality of these unit processes in treatment, disposal and utilisation.
3. Provide an understanding of the physical, chemical and biological processes and principles used for the treatment of wastewater and treatment residuals (i.e. biosolids)
4. Be able to prepare and apply common functional unit processes to the design of wastewater treatment plants to satisfy effluent quality objectives.
5. Be able to prepare an integrated design of biological, chemical, physical and biosolid treatment processes so that optimal systems can be designed.
6. Require the application of skills for collaborative team work, a respect for ethical and social responsibility, and to demonstrate good report writing.

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

Teaching Strategies

Private Study	• Download materials from Moodle • Review lecture presentations, course and reading materials before and after each lecture/workshop

	• Do set problems and assignments • Reflect on class problems and assignments • Participate in interactive e-learning modules integrated in Moodle • Join Moodle or group discussions of problems and learning materials • Keep up with notices and find out marks via Moodle • Identify and explore materials from other useful resources
Lectures/workshop	• Find out what you must learn • Hear announcements on course changes • Summarise essential course material from lectures and associated reading • Follow worked examples and understand the applications of theoretical knowledge in practical contexts • Participate in group discussions related to lecture materials
Assessments and Examinations	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving • Demonstrate ability to present your findings and solutions in professional format (using appropriate references and report structure) • Demonstrate ability to work in groups or as an individual
Activities	• You should regularly check your UNSW email and Moodle news to be sure that you are aware of any CVEN9857 course announcements or arrangements

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Assignment 1	20%	04/03/2022 05:00 PM	1, 2, 3, 4, 5, 6
2. Assignment 2	20%	01/04/2022 05:00 PM	1, 2, 3, 4, 5, 6
3. Presentation interview	10%	Not Applicable	1, 2, 3, 4, 5, 6
4. Exam	50%	Exam period	1, 2, 3, 4, 5, 6

Assessment 1: Assignment 1

Assessment length: 5 pages
Due date: 04/03/2022 05:00 PM
Marks returned: One week after submission

Provide a design appraisal for the inclusion of secondary biological treatment at a coastal WWTP that is currently primary treatment.

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

Assessment criteria

Criteria for grading include the following with equal weighting:

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 2: Assignment 2

Assessment length: 8 pages
Due date: 01/04/2022 05:00 PM
Marks returned: Two weeks after submission deadline

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.

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

Assessment criteria

Criteria for grading include the following with equal weighting:

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: Presentation interview

Assessment length: 10 minutes
Marks returned: End of term

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

The purpose of the presentation interview is to assess your understanding of the subject matter presented in the course to probe the depth of your knowledge on the subject matter. It is your responsibility to reschedule if you are unavailable and it is your responsibility to attend the interview at the scheduled time.

Assessment 4: Exam

Start date: Exam Period
Assessment length: 2 hours
Due date: Exam period
Marks returned: Two weeks after exam

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

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

View class timetable

Timetable

Date	Type	Content
Week 1: 14 February - 18 February	Topic	Unit operations and Physical treatment processes
Week 2: 21 February - 25 February	Topic	Biological treatment processes
Week 3: 28 February - 4 March	Topic	Activated sludge principles and design
Week 4: 7 March - 11 March	Topic	Biological nutrient removal and process modelling
Week 5: 14 March - 18 March	Topic	Process modelling
Week 6: 21 March - 25 March	Homework	Non-teaching week. Time to catch up!
Week 7: 28 March - 1 April	Topic	Membrane bioreactors and process modelling
Week 8: 4 April - 8 April	Topic	Biofilm systems
Week 9: 11 April - 15 April	Topic	Anaerobic systems
Week 10: 18 April - 22 April	Topic	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 2022 will be held online between 29th April - 12th May inclusive, and supplementary exams between 23rd - 27th May inclusive. 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): https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw
- Key UNSW Dates - 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): https://intranet.civeng.unsw.edu.au/student-intranet
- Student Life at CVEN, including Student Societies: https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life
- Special Consideration: https://student.unsw.edu.au/special-consideration
- General and Program-Specific Questions: The Nucleus: Student Hub
- Refer to Academic Advice on the School website available at: https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice

Image Credit

Mike Gal.

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Acknowledgement of Country

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