CVEN9857

Wastewater Treatment

Term One // 2021

School of Civil and Environmental Engineering // UNSW Engineering

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Michael Manefield	manefield@unsw.edu.au	Office hours	Hilmer Building Office 517	0405477066

Lecturers

Name	Email	Availability	Location	Phone
Bojan Tamburic	b.tamburic@unsw.edu.au	Office hours	Civil Engineering Building (H20) Level 5, Room CE512	(+61 2) 9385 4501

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

Credit Points 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

After successfully completing this course, you should be able to:

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 several operation issues and improve operation efficiency	PE1.1, PE1.5, PE2.1
3. Produce conceptual design of wastewater treatment train to meet the effluent quality requirements and design requirement criteria	PE1.5, PE2.1, PE2.3, PE3.2
4. Be 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 • Further explore materials from other resources such as Internet and UNSW library on your own
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 the practical contexts • Involve in group discussion activities of questions that you may have from lectures
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 for sourced materials and appropriate report structures) when required • Demonstrate ability to work in group or as individual to set studies in context
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 • Complete field paperwork and participate in the fieldtrip if applicable

Additional Course Information

For each hour of contact it is expected that you will put in at least 2.5 hours of private study. You are expected to review lecture notes, course and reading materials before each lecture/workshop and revisit your notes after class. The lectures/workshops will mainly provide you opportunities to strengthen your understanding on the subject materials from your private study and to actively engage in group discussion, debate and problem solving based learning experiences. You are also expected to actively collaborate with your fellow students via online discussion forum integrated in the course Moodle and any relevant group work activities.

Assessment

Course assessment will be discussed in week 1 lectures.

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Quizzes	10%		1, 2, 3, 4, 5
Technical report	10%	05/03/2021 05:00 PM	1, 2, 3, 4, 5
Process design	30%	16/04/2021 05:00 PM	1, 3, 4
Exam	50%	Not Applicable	1, 2, 3, 4, 5

Assessment Details

Assessment 1: Quizzes

Details:

Ten quizzes worth 10% of the course total. The quizzes directly relate to pre-reading material for the lectures and workshops.

Additional details:

Quizzes are conducted weekly on Moodle. They must be complete before the first weekly lecture. Late submission will not be accepted.

Turnitin setting: This is not a Turnitin assignment

Assessment 2: Technical report

Start date: Not Applicable

Length: Three pages

Details:

Undertake a background study on technologies used for treating wastewater from an industrial or manufacturing process.

Additional details:

The report must be submitted via Turnitin in the course Moodle. Late work will be penalised at the rate of 10% per day after the due time and date have expired.

Turnitin setting: This assignment is submitted through Turnitin and students do not see Turnitin

similarity reports.

Assessment 3: Process design

Start date: Not Applicable

Length: Eight pages

Details:

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

Additional details:

The report must be submitted via Turnitin in the course Moodle. Late work will be penalised at the rate of 10% per day after the due time and date have expired.

Turnitin setting: This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Assessment 4: Exam

Start date: Not Applicable

Length: Two hours

Details:

Two hour 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.

Turnitin setting: 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
O Week: 8 February - 12 February		
Week 1: 15 February - 19 February	Lecture	In week 1 lectures will be delivered covering 1) a course overview, 2) wastewater treatment flow designs and 3) wastewater screening and sedimentation. Information on course assessments will be delivered in the course overview.
Week 2: 22 February - 26 February	Lecture	In week 2, lectures will be delivered covering 1) screening and sedimentation and 2) biological treatment of wastewater.
	Assessment	In week 2, students will need to submit **Quiz 1** (sedimentation and screening) and **Quiz 2** (biological treatment) on Moodle before the first and second lecture of the week respectively.
Week 3: 1 March - 5 February	Lecture	In week 3, lectures will be delivered on 1) biological treatment of wastewater and 2) activated sludge prinicples and design.
	Assessment	In week 3, students will need to complete **Quiz 3** (activated sludge) on Moodle before the second lecture. In week 3, students will need to submit **Assessment 2** (technical report).
Week 4: 8 March - 12 March	Lecture	In week 4 lectures will be delivered on biological nutrient removal.
	Assessment	In week 4, students will need to complete **Quiz 4** (biological nutrient removal) on Moodle before the first lecture.
Week 5: 15 March - 19 March	Lecture	In week 5 lectures will be delivered on process modelling.
	Assessment	In week 5, student will need to complete **Quiz 5** (process modelling) on Moodle before the first lecture.
Week 6: 22 March - 26 March	Homework	No new material is presented in week 6. Students should study and work on assignments.
Week 7: 29 March - 2 April	Lecture	In week 7, lectures will be presented on membrane bioreactors.
	Assessment	In week 7, student will need to complete **Quiz**

		6 (membrane bioreactor) on Moodle before the first lecture.
Week 8: 5 April - 9 April	Lecture	In week 8, lectures will be delivered on biofilm systems.
	Assessment	In week 8, student will need to complete **Quiz 7** (biofilm systems) on Moodle before the first lecture.
Week 9: 12 April - 16 April	Lecture	In week 9, lectures will be presented on anaerobic systems.
	Assessment	In week 9, student will need to complete **Quiz 8** (anaerobic systems) on Moodle before the first lecture. In week 9, students will need to submit **Assessment 3** (process design).
Week 10: 19 April - 23 April	Lecture	In week 10, lectures will be delivered on 1) biosolids management and 2) energy optimisation and sustainability.
	Assessment	In week 10, students will need to submit **Quiz 9** (biosolid management) and **Quiz 10** (energy optimisation and sustainability) on Moodle before the first and second lecture of the week respectively.

Resources

Prescribed Resources

- Metcalf & Eddy (2014) Wastewater Engineering – Treatment and Reuse, 5th Edition, McGraw-Hill
- Additional reading materials provided on Moodle.
- BioWin process modelling simulator (http://envirosim.com)

Recommended Resources

Course Evaluation and Development

Students can provide feedback directly to the course coordinator and through MyExperience. Student feedback is used annually to review course materials and improve the student learning experience.

Submission of Assessment Tasks

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

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

Key UNSW Dates - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.

Final Examinations:

Final exams in Term 1 will be held online between 30th April - 13th May inclusive. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

Supplementary Examinations:

Supplementary Examinations for Term 1 2021 will be held on 24th - 28th May inclusive should you be required to sit one. You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism;
- Special Considerations: student.unsw.edu.au/special-consideration;
- General and Program-specific questions: The Nucleus: Student Hub
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC/SURVSOC/CEPCA

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

Synergies in Sound 2016

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.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✓
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	✓
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	✓
PE3.3 Creative, innovative and pro-active demeanour	
PE3.4 Professional use and management of information	
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	