School of Civil and Environmental Engineering

Term 1, 2020

CVEN9857 WASTEWATER TREATMENT

COURSE DETAILS

Units of Credit	6	
Contact hours	4 hours per week (Lecture/ Workshop)	
Class	Wednesday, 4:00PM – 6:00PM	Valentine Annex 121
	Thursday, 12:00PM – 2:00PM	Valentine Annex 121
Course Coordinator and Lecturer	Dr Nhat Le-Minh (NL), UNSW Water Research Centre email:minh@unsw.edu.au	

INFORMATION ABOUT THE COURSE

The course aims to introduce the physical and chemical unit operations and biological processes associated with wastewater treatment, primarily focusing on the fundamental principles and applications of aerobic and anaerobic biological processes to the treatment of domestic wastewater and biosolids. Design and operation of integrated systems of chemical, physical and biological treatment unit operations and processes to satisfy effluent quality objectives and energy optimisation are reviewed and practised. Stabilisation, processing and utilisation of wastewater treatment residuals are also considered.

HANDBOOK DESCRIPTION

See link to virtual handbook - for example, for CVEN9857 in 2020, this would be:

http://www.handbook.unsw.edu.au/postgraduate/courses/2020/CVEN9857/

OBJECTIVES

To familiarise students with the fundamental principles and applications of physical and chemical unit operations and biological unit processes associated with wastewater treatment, and to apply these theoretical knowledge to understanding of, and development of solutions to the wastewater treatment design and operation problems typical of those encountered by Civil, Chemical and Environmental Engineers.

List of programme attributes:

- An in-depth engagement with the relevant disciplinary knowledge in its inter-disciplinary context
- Capacity for analytical and critical thinking and for creative problem solving

- Ability to engage independent and reflective learning
- Information literacy
- Skills for collaborative work
- A respect for ethical practice and social responsibility
- Skills for effective communication

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

EXPECTED 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.	Get familiarised 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

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.

COURSE PROGRAM

A table of lectures and workshops or practical class topics for each week, indicating the name of lecturer involved (where multiple lecturers teaching in course), online activities, such as discussion forums, and relevant readings from textbook and other reference material identified for the course.

Term 1, 2020

Start Date	Topic	Lecturer	Quizzes/Assessments
17/02/2020 (Week 1)	Introduction / Flowsheet Screening & Sedimentation (Part1)	NL	Assessment 1 issued
24/02/2020 (Week 2)	Screening & Sedimentation (Part 2) Biological Treatment (Part 1)	NL	Quiz 1 & 2 submitted
02/03/2020 (Week 3)	Biological Treatment (Part 2) Activated Sludge Principles and Design	NL	Quiz 3 submitted Assessment 1 submitted
09/03/2020 (Week 4)	Biological Nutrient Removal	NL	Quiz 4 submitted Assessment 2 issued
16/03/2020 (Week 5)	Process Modelling	NL	Quiz 5 submitted
23/03/2020 (Week 6)	BREAK – NON TEACHING WEEK		
30/03/2020 (Week 7)	Membrane Bioreactor	NL	Quiz 6 submitted

06/04/2020 (Week 8)	Biofilm Systems	NL	Quiz 7 submitted
13/04/2020 (Week 9)	Anaerobic Systems	NL	Quiz 8 submitted Assessment 2 submitted
20/04/2020 (Week 10)	Biosolid Management Energy Optimisation and Sustainability	NL	Quiz 9 and Quiz 10 submitted
27/04/2020 (Week 11)	Review		

ASSESSMENT

Overall rationale for assessment components and their association with course objectives.

The final grade for this course will normally be based on the sum of the scores from each of the assessment tasks. The Final Examination is worth 45% of the Final Mark and the Coursework is worth 55% of the Final Mark. The formal exam scripts will not be returned. Any request for extension on your assignments must be formally submitted via the student's myUNSW. Students who perform poorly in the assignments are recommended to discuss progress with the lecturer during the semester.

Supplementary Examinations for Term 1, 2020 will be held between Monday 25th May – Friday 29 May 2020 (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to make any personal or travel arrangements during this period.

Final Examination for Distance Students:

All Distance/Short course mode students are expected to sit their final examination on Kensington campus (Sydney). If you reside further than 40 Km from the Kensington campus, and you wish to sit your exam externally (by distance), you must register for an external exam by 15th March 2020 (University Census Date). More information can be found at the link below

https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/exam

Details of each assessment component, the marks assigned to it, the criteria by which marks will be assigned, and the dates of submission are set out below.

PENALTIES

For pre-lecture quizzes, quizzes must be completed online in the course Moodle before the start of each corresponding lecture – i.e. before 4 pm Wednesday of each week specified below. Late submission will not be accepted.

For assessments, each individual or group 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.

ASSESSMENT OVERVIEW

Item	Length	Weighting	Learning outcomes assessed	Assessment Criteria	Due date and submission requirements	Marks returned
A. Quizzes (10%)						
Quiz 1 & Quiz 2		2.0%	1	Complete multiple choice questions online	4 pm -26/02/20	27/02/20
Quiz 3		1.0%	1	Complete multiple choice questions online	4 pm - 04/03/20	05/03/20
Quiz 4		1.0%	1	Complete multiple choice questions online	4 pm - 11/03/20	12/03/20
Quiz 5		1.0%	1	Complete multiple choice questions online	4 pm - 18/03/20	19/03/20
Quiz 6		1.0%	1	Complete multiple choice questions online	4 pm - 01/04/20	02/04/20
Quiz 7		1.0%	1	Complete multiple choice questions online	4 pm - 08/04/20	09/04/20
Quiz 8		1.0%	1	Complete multiple choice questions online	4 pm - 15/04/20	16/04/20
Quiz 9 & Quiz 10		2.0%	1	Complete multiple choice questions online	4 pm – 22/04/20	23/04/2
B. Assessments (45%)						
Assessment 1 Flowsheet		15%	2,3,5	Design a wastewater treatment flowsheet for an industrial or manufacturing process based on the literature	23:50 - 06/03/20	13/03/2020
Assessment 2 Process Design		30%	3,4	Provide a design appraisal for the inclusion of secondary biological treatment at a coastal WWTP that is currently primary treatment.	23:50 - 19/04/20	05/05/2020
C. Final Examination (45%)						
Final Exam	2 hrs	45%	1,2,3	(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		

RELEVANT RESOURCES

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

DATES TO NOTE

Refer to MyUNSW for Important Dates available at:

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

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 ADVICE

(Formerly known as Common School Information)

For information about:

- Notes on assessments and plagiarism,
- School policy on Supplementary exams,
- Special Considerations:student.unsw.edu.au/special-consideration
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC.

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

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex 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
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (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