

MODULE DESCRIPTION FORM

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

CL447 WATER AND WASTEWATER TREATMENT DESIGN

Module Registrar: Charles W. Knapp	Taught To (Course): Civil & Environmental Engineering		
Other Lecturers Involved: Prof. Vern Phoenix	Credit Weighting: 10	Semester: Autumn	
Assumed Prerequisites: Mathematics at pre-calculus level, introductory chemistry	Compulsory Civil & Environmental Eng.	Academic Level: 5	Suitable for Exchange: yes

Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	Total
20	0	0			10		30	40	100

Educational Aim

This course aims to develop an understanding of water and wastewater treatment processes, as well as the ability to undertake design calculations sufficient to produce a concept and detailed design of a treatment system.

Learning Outcomes

On completion of the course the student is expected to be able to

- LO1 recognise needs of the client, conceptualise appropriate treatment systems
- LO2 understand water treatment processes, including underlying chemical, physical and biological processes
- LO3 understand legislation relevant to water and wastewater treatment, and processes required to achieve objectives
- LO4 ability to manage imperfect information and uncertainty in design and calculations

Syllabus

The class will teach the following:

- Wastewater characteristics, its standards and legislation
- Principles of mass balance
- Uncertainty analyses
- Principles of primary, secondary, and tertiary wastewater treatment
- Sludge treatment & disposal, including contemporary concerns towards "one health"
- Water treatment processes, its standards and legislation
- Principles of environmental chemistry and its impact on water quality: e.g., filtration, adsorption, pH, coagulation, and disinfection

Assessment of Learning Outcomes

Criteria

For each of the Course Learning Outcomes the following criteria will be used to make judgements on student learning:

LO1 recognise needs of the client, conceptualise appropriate treatment systems

- C1 Assessment #1—ability to understand socio-economic, environmental and societal value to select a treatment process

LO2 understand waste treatment processes, including underlying chemical, physical and biological processes.

- C1 Assessment #1 – application of appropriate technology for the needs of the client
- C2 Assessment #2 – mass-balance accounting of pollutants of concern; understanding of reactor kinetics/processes
- C3 Examination

LO3 understand legislation relevant to water and wastewater treatment

- C1 Assessment #1 – ability to relate appropriate technology for the needs of the population
- C2 Assessment #2 – recognition of design targets; and how unit processes can incrementally contribute towards goals

LO4 ability to manage imperfect information and uncertainty in design and calculations

- C1 Assessment #2 – be able to assess situations/project and be able to suggest mitigation strategies; ability make decisions in the absence of perfect information (make reasonable, educated guesses); capable of determining robust
- nature of design given inherent uncertainties.
- C2 Examination

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

Principles of Assessment and Feedback

Assessment and feedback practices promote student learning

- Multiple, diverse assessments are utilised to guide student learning process
- General (class-wide) and individual assessments will be provided via MyPlace
- Feedback will be provided within two weeks of submission

Assessment and feedback practices are appropriate, fair and transparent

- Professional-quality report writing and conduct are expected in assignments
- When possible, criteria / rubrics will be provided in advance of assignments
- Feedback will be accessible via Myplace and, in most cases, will be based on pre-determined rubrics.

Assessment and feedback practices are clearly communicated to students and staff

- Course syllabus will be provided to all students on first day of class – highlighting assignment deadlines, assessment weighting and lecture order
- Rubrics will be provided for assignments
- Clarifications and further feedback could be arranged via individual meeting (if requested)

Assessment and feedback practices are continuously reviewed

- Students will have opportunities to evaluate the course (mid- and final-semester)
- Responses to evaluations (esp. mid-term) will be provided by the class registrar
- Assessments, feedback and course evaluations are reviewed by external examiner, examination boards, and accreditation reviews.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

	Examinations			Courseworks		Projects		
	Number	Month(s)	Duration	Weighting	Number	Weighting	Number	Weighting
	1	December	2	50%	2	20%+30%		
L/Outcomes	All LO			#1 LO1-3; #4 all LO				

Indicate which learning outcomes (L01, L02 etc) are to be assessed by exam/coursework/project as required.

Coursework / Submissions deadlines (academic weeks):

HW #1: conceptual design (20%) – week 3
 HW #2: mass balance model (30%) – week 9
 Exam (50%)

Resit Assessment Procedures:

Two hour examination in August diet.

PLEASE NOTE:

Students must gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of exam. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

Metcalf and Eddy. Wastewater Engineering: Treatment and Reuse.
(Good for details and specific treatment-design requirements)

Davis & Masten (2014) Principles of Environmental Engineering and Science. McGraw Hill, 3rd edition.
ISBN #97811259060472
(Good for background and generic design requirements/specifications; mass balance modelling)

Various Environmental Protection Agency technology guidance documents (Ireland and USA) as linked on myPlace.

Additional Student Feedback

(Please specify details of when additional feedback will be provided)

Date	Time	Room No
Mondays	10-12 (noon)	Rm 503k
Week 4	During class	Class
Week 11	During class	Class

Session: on-demand office hours during the semester. See above for day/time/location.

Homework will be discussed in class following its submission.

Approved:

Course Director Signature: *Charles W. Knapp*

Date of Last Modifications: 11/08/2022

(Updated May 2018)

MODULE TIMETABLE

Module Code:

CL447

Module Title:

Water & wastewater treatment design

Brief Description of Assessment:

HW #1: conceptual design (20%) – due week 3
 HW #2: mass balance model (30%) – due week 7
 Exam (50%)

Assessment Timing:-

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment using the dropdowns provided. Dropdowns can be left blank. Add extra notes below the dropdowns.

Please note: Timings can and will change, this should only be used as a guide.

Semester One	W&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
		Course work Set		Course work Submit									Exam 2 hours
		Course work Set						Course work Submit					