



Module Descriptor Form

Civil and Environmental Engineering

CL447 - Water And Wastewater Treatment Design

Module Code	CL447	Module Title	Water And Wastewater Treatment Design				
Module Registrar	Phoenix, Prof Vernon						
Other Staff Involved							
Credit Weighting	10	Semester	1	Elective	No	Academic Level	4
Pre-requisites							
Required for							

Module Format and Delivery (hours):

Lectures	Tutorials	Assignments	Labs	Private Study	Total
20	0	40	0	40	100

Educational Aim

This module aims to:

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

Syllabus

This module will teach the following:

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, standards and legislation
- Principles of environmental chemistry and its impact on water quality: e.g., filtration, adsorption, pH, coagulation, and disinfection

Learning Outcomes

On Completion of the module, the student is expected to be able to:

LO: 1	recognise needs of the client, conceptualise appropriate treatment systems
LO: 2	understand water treatment processes, including underlying chemical, physical and biological processes
LO: 3	understand legislation relevant to water and wastewater treatment
LO: 4	ability to manage imperfect information and uncertainty in design and calculations

(UK SPEC suggests no more than 4 learning outcomes per module. Statements must be broad and be syllabus free and link in with the intended learning outcomes on the programme specifications.)

Assessment of Learning Outcomes - Criteria

Learning Outcome: 1

	Criteria
1	recognise the needs of the client, conceptualises appropriate treatment systems <ul style="list-style-type: none"> • C1 Assessment #1 – the ability to understand the socio-economic, environmental and societal value to select a treatment process

Learning Outcome: 2

	Criteria
1	understand waste treatment processes, including chemical, physical and biological processes. <ul style="list-style-type: none"> • 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

Learning Outcome: 3

	Criteria
1	C1 Assessment #1 – the ability to relate appropriate technology to the needs of the population <ul style="list-style-type: none"> • C2 Assessment #2 – recognition of design targets; and how unit processes can incrementally contribute towards goals

Learning Outcome: 4

	Criteria
1	ability to manage imperfect information and uncertainty in design and calculations <ul style="list-style-type: none"> • C1 Assessment #2 – be able to assess situations/projects and be able to suggest mitigation strategies; ability to make decisions in the absence of perfect information (make reasonable, educated guesses); capable of determining robust • nature of design given inherent uncertainties. • C2 Examination <p>The individual assessments/homework are intended to be formative assessments, whereas the examination is summative. Passing the examination (>40%) is not a requirement to pass the class; rather, the overall score must be > 40%.</p>

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

To Pass the module, students need to gain a summative mark of: 40%

Description	Semester	Start Week	Duration	Weight	Submission Week	Linked Criteria
coursework	1	1		20%	4	
coursework	1	3		30%	9	
Exam. Closed Book	1		2.00	50%	E	

Principles of Assessment Feedback

Assessment and feedback practices promote student learning

- Multiple, diverse assessments are utilised to guide the 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, based on pre-determined rubrics. Assessment and feedback practices are communicated to students and staff

• Course syllabus will be provided to all students on the 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 meetings (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 examiners, examination boards, and accreditation reviews.

Additional Information

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Resit Procedure

The resit (when qualified by the Board of Examiners) will comprise solely of examination during the next resit-exam diet (typically

August); a score of >40% will be required to pass. The exam schedule will be posted on Pegasus a few weeks before the exam diet.

It is the responsibility of the student to let the lecturer know that a resit exam will be required.

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)

Module Timetable

Week	Semester 1	Semester 2
0		
1		
2		
3		
4	Submission 20%	
5		
6		
7		
8		
9	Submission 30%	
10		
11		
E	Examination 50%	

Date of Last Modification

19-09-2025