Module Descriptor Form

Civil and Environmental Engineering

EO412 - Water Engineering 2

Module Code	EO412	**Module Title**	Water Engineering 2				
Module Registrar							
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
0	5	40	3	52	100

Educational Aim

This module aims to:

This class aims to develop an understanding of a wide range of water engineering theory and processes for open channels and river systems including open channel flow, complex free surface flows, hydraulics structures and hydropower systems processes as well as the ability to undertake design calculations sufficient to produce a concept and detailed design of simple hydraulic structures and stable channels. This class builds on the knowledge gained in GA Water Engineering 3 in terms of understanding the application of hydraulics now to open channel flows.

Syllabus

This module will teach the following:

Common hydraulic concepts, principles and systems
Open Channel Flow Systems
Channel conveyance and optimisation
Roughness and channel conveyance (flow forces and energy)
Complex flows including Gradually varied flow (GVF) in a channel and Rapidly varied channel flow (RVF) (specific force)
Compound Channels
Unsteady Free Surface Flows and waves (rivers, coasts and estuaries)
Common Hydraulic structures including weirs, orifices and culverts
Design of stable channels

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Learning Outcomes

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

LO: 1	LO1 Undertake calculations of basic hydraulic parameters (flow, head, velocity, depth) in open channels subject to uniform flows and use this information to optimise the channel conveyance and where, appropriate, develop suitable hydraulic modelling approaches for simple flow studies.
LO: 2	LO2 Undertake calculations of basic hydraulic parameters (flow, head, velocity, depth) in open channels subject to complex and changing free surface flows (non-uniform, GVF, RVF and waves)
LO: 3	LO3 Undertake a range of simple calculations for common hydraulic structures based on an understanding of the hydraulic principles of operation for each asset and the operating constraints they face.

(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	C1.1 The ability to identify common and relevant hydraulic concepts and relationships
2	C1.2 The ability to work with simple channel sections of fluid flow and open channel flow concepts
3	C1.3 The ability to estimate channel conveyance and optimise the channel shape

Learning Outcome: **2**

	Criteria
1	C2.1 The ability to identify common and relevant hydraulic parameters
2	C2.2 The ability to identify and evaluate the controlling or dominant hydraulic components
3	C2.3 The ability to solve complex hydraulic calculations through identifying, resolving or balancing common terms or determining unknowns

Learning Outcome: **3**

	Criteria
1	C3.1 The ability to identify the function of common hydraulic structures and the role they play in the environment.
2	C3.2 The ability to identify and evaluate the relevant hydraulic parameters and assess the controlling or dominant hydraulic components, resolving equations based on these
3	C3.3 Design simple hydraulic structures based on hydraulic theory to achieve desired outcomes or effects on channel hydraulics

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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
GVF and RVF Lab Report	1	4		40%	9	LO 1: C1, C2, C3 LO 2: C1, C2, C3 LO 3: C1, C2
Online Weekly Quizzes	1	1		10%	E	LO 1: C1, C2, C3 LO 2: C1, C2, C3 LO 3: C1, C2, C3
End of Course Exam. Open Book: Students allowed One Sheet A4 paper (both sides) with own notes, equations etc. Must be submitted with paper.	1		2.00	50%	E	LO 1: C1, C2, C3 LO 2: C1, C2, C3 LO 3: C1, C2, C3

Principles of Assessment Feedback

Principle 1. Assessment and feedback practices promote effective student learning

1. Coursework assignments are designed to focus student learning on key topics and learning material.
2. Tutorial problems with answers to encourage and guide private study are provided .
3. Tutorial classes are held frequently for one-to-one interaction between instructors and students and timely feedback.

Principle 2. Assessment and feedback practices are appropriate, fair, and transparent

1. All assignments and assessments combine straightforward and challenging tasks.
2. Model solutions are provided for some coursework assignments.

Principle 3. Assessment and feedback practices are clearly communicated to students and staff

1. All assessed coursework assignments are open to view within a reasonable time before the deadline.
2. All assessed coursework assignments are returned to students with feedback including annotations and comments.

Principle 4. Assessment and feedback practices are continuously reviewed

1. Interim student feedback is taken during each semester to review progress and resolve current issues; final semester student feedback taken upon completion of lecture courses to monitor student experience.
2. Coursework assignment and examination marks reviewed at end of year to monitor attainment and compared to student experience.

Additional Information

Resit Procedure

Students will resit in the next appropriate resit period (summer resit period most likely).
Resit will be by examination, unless otherwise agreed.
Resit exam is 2hrs long, with same conditions as examination in December diet

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Recommended Reading

***Purchase recommended **Highly recommended reading *For reference

** Chadwick & Morfett. Hydraulics in Civil and Environmental Engineering 3rd Ed. E & FN Spon.
Butler and Davies, Urban Drainage, 2nd Edition, SPON
Wilson, Engineering Hydrology, 4th Ed, Palgrave MacMillan
Chanson. The Hydraulics of Open Channel Flow. Arnold.
**Hamill. Understanding Hydraulics. 4th Ed. Palgrave.
Massey. Mechanics of Fluids Chapman & Hall.
Novak, Moffat, Nalluri & Narayanan. Hydraulic Structures Unwin Hyman

Module Timetable

Week	Semester 1	Semester 2
0		
1		
2		
3		
4		
5		
6		
7		
8		
9	Lab 40%	
10		
11		
E	Continuous 10%, Examination 50%	

Date of Last Modification

15-09-2025