University of the West of Scotland

Module Descriptor

Session: 2024/25

Title of Module: Hydraulics			
Code: ENGG08012	**SCQF Level: 8 (Scottish Credit and Qualifications Framework)**	**Credit Points: 20**	**ECTS: 10 (European Credit Transfer Scheme)**
School:	School of Computing, Engineering and Physical Sciences		
Module Co-ordinator:	Shakun Paudel		

Summary of Module

This module is a core component of the programmatic BEng/BEng (Honours) degree in Civil Engineering and the programmatic BSc/BSc (Hons) Degree in Civil Engineering.

This module starts from the introduction to engineering physics in level 7 Applied Engineering Science and provides an overall theoretical background to hydrostatics and basics of hydrodynamics. There is a substantial part in laboratory activities, which will help students to understand the theoretical concepts and develop analytical and research skills through observation and analysis of laboratory results. This module complements the more applied module Water Resources Engineering (level 9).

The contents of the module are:

- Hydrostatic pressure distribution, forces on submerged surfaces, pressure measurement Basic equations of continuity, energy and momentum and their
- engineering applications
- Pipe hydraulics: systems of pipes in series and parallel; major and minor head losses in pipes; use of tables and charts; forces on pipes and bends; measurement of flow in pipes
- Open channel hydraulics: uniform flow, design of channels, rapidly varying flow, introduction to gradually varying flows, measurement of flow in open channel
- Classification of hydraulic machines, pumps and their characteristic curves, introduction to turbines

The Graduate Attributes related to this module are:

- Academic: Problem solver; innovative; critical thinker; knowledgeable; analytical
- Personal: Reflective; motivated
- Professional: Team worker; research oriented

Module Delivery Method

Face-To-Face	Blended	Fully Online	HybridC	Hybrid 0	Work-Based Learning
☒	☐	☐	☐	☐	☐

See Guidance Note for details.

Campus(es) for Module Delivery						
The module will **normally** be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
☒	☐	☐	☐	☐	☐	Add name

Term(s) for Module Delivery					
(Provided viable student numbers permit).					
Term 1	☐	Term 2	☒	Term 3	☐

Learning Outcomes: (maximum of 5 statements) **These should take cognisance of the SCQF level descriptors and be at the appropriate level for the module.** On successful completion of this module the student will be able to:	
L1	Understand and apply the principles of hydraulics to solve relevant civil engineering problems.
L2	Carry out the basic design of open channels and pipe systems.
L3	Carry out the measurement of flow and head losses in pipes and open channels and communicate results in the form of laboratory reports.
L4	Carry out calculations in relation to rapidly varied flow and demonstrate a basic understanding of gradually varied flow.

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	During completion of this module, there will be an opportunity to achieve core skills in:
Knowledge and Understanding (K and U)	SCQF Level **8** • Demonstrating a broad knowledge of the main areas of hydraulics (AHEP LO: SM1b) • Demonstrating understanding of the energy, momentum and continuity equations (AHEP LOs: SM1b, SM2b) • Demonstrating understanding of concepts such as head loss, momentum force, sub- and super-critical flow (AHEP LOs: SM1b, SM2b) • Demonstrating some knowledge of the potential effects of climate change, importance of water and sustainable development (AHEP LO: EL4)
Practice: Applied Knowledge and Understanding	SCQF Level **8** • Carrying out measurements of head, discharge and water velocity in pipes/channels in the laboratory and in the field, including the use of ultrasonic (AHEP LO: EA3b) • Applying knowledge and understanding to simple professional level problems (AHEP LO: EA1b, D4)

	• Conduct appropriate research to prepare the laboratory reports using technical literature and other citable sources of information (AHEP LO: P4)
Generic Cognitive skills	SCQF Level **8** • Using information gained from laboratory experiments in the solution of practical design problems (AHEP LO: P3) • Critically evaluating the validity of laboratory experiments (AHEP LO: SM3b)
Communication, ICT and Numeracy Skills	SCQF Level **8** • Using and evaluating numerical and graphical data in the form of spreadsheets to demonstrate the results of laboratory and field experiments (AHEP LO: G1) • Using spreadsheets to investigate the factors controlling flow in pipes and open channels (AHEP LO: G1) • Using literacy and numeracy skills to convey complex information in the form of laboratory reports (AHEP LOs: G1, SM3b)
Autonomy, Accountability and Working with others	SCQF Level **8** • Taking responsibility for the safety of other members of a group during experimental works (AHEP LO: EL6b) • Working as a group to carry out laboratory experiments (AHEP LO: G1) • Assisting another student during paired exercises (AHEP LO: G1)

Pre-requisites:	Before undertaking this module the student should have undertaken the following:	
	Module Code:	**Module Title:**
	Other:	Higher National Level
Co-requisites	**Module Code:**	**Module Title:**

*Indicates that module descriptor is not published.

Learning and Teaching	
The learning and teaching activity for this module includes lectures, tutorials, laboratories, and independent study. Independent study includes all study, learning, and processing undertaken by a student, outside of the scheduled lectures, tutorials, and laboratories.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)
Lecture/Core Content Delivery	24
Tutorial/Synchronous Support Activity	12
Laboratory/Practical Demonstration/Workshop	12

Independent Study	152
	200 Hours Total

****Indicative Resources: (eg. Core text, journals, internet access)**

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

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- Printed Notes
- Spreadsheets for pipe flow and open channel flow
- Tables of Pipe Flow

Extension Resources: Consultation of the under-noted resources is recommended and material from these resources may be of benefit to the student in the assessment process:

- Understanding Hydraulics, Hamill, Palgrave Macmillan, 3rd Edition, (2011)
- Hydraulics in Civil and Environmental Engineering, Chadwick and Morfett, 5th Edition, (2013)
- British Standard BS3680 Measurement of Liquid Flow in Open Channels
- Practical Hydraulics, Kay, Routledge, 2nd Edition (2008).
- Civil Engineering Hydraulics, Nalluri, Wiley-Blackwell, 5th Edition (2009)

(**N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure: Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

For the purposes of this module, academic engagement equates to the following:

Equality and Diversity

The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.

Please ensure any specific requirements are detailed in this section. Module Co-ordinators should consider the accessibility of their module for groups with protected characteristics..

(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	Engineering
Assessment Results (Pass/Fail)	Yes ☐No ☒
School Assessment Board	Civil Engineering and Quality Management
Moderator	Djamalddine Boumezerane
External Examiner	Alison Robinson
Accreditation Details	This module is accredited by the Joint Board of Moderators as part of BEng (Hons) Civil Engineering & GA-BEng (Hons) Civil Engineering.
Changes/Version Number	2.18 Previous changes 2.17 March 2023-- Assessment Changed to Unseen Closed Book Class Test from Unseen Open Book Examination.

Assessment: (also refer to Assessment Outcomes Grids below)
Assessment 1 – Unseen Closed Book Class Test (60%)
Assessment 2 – Assignment (40%)- Laboratory
(N.B. (i) **Assessment Outcomes Grids** for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An **indicative schedule** listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Assessment Outcome Grids (See Guidance Note)

Component 1						
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Class test (written)	✓	✓		✓	60	2

Component 2						
Assessment Type (Footnote B.)	**Learning Outcome (1)**	**Learning Outcome (2)**	**Learning Outcome (3)**	**Learning Outcome (4)**	**Weighting (%) of Assessment Element**	**Timetabled Contact Hours**
Design/ Diagram/ Drawing/ Photograph/ Sketch			✓	✓	40	12
Combined Total for All Components					**100%**	**14 hours**