Module Descriptor

Title	Hydraulics		
Session	2025/26	**Status**	Published
Code	ENGG08012	**SCQF Level**	8
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	S 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	On-Campus[1] ☒	Hybrid[2] ☐	Online[3] ☐	Work -Based Learning[4] ☐
Campuses for Module Delivery	☐ Ayr ☐ Dumfries	☐ Lanarkshire ☐ London ☒ Paisley	☐ Online / Distance Learning ☐ Other (specify)	

Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
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.
L5	N/A

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 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)

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

	• 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 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 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 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 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)

Prerequisites	**Module Code**	**Module Title**
	Other Higher National Level	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours. 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** (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
n/a	0
n/a	0
TOTAL	200

Indicative Resources

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

Module Reading List:

• 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:

Hamill, L. (2011). Understanding Hydraulics. Third Edition. Hampshire: Palgrave Macmillan.

Chadwick, A. J. & Morfett, J. C. (1993). Hydraulics in Civil and Environmental Engineering. Second Edition. London: Spon.

Featherstone, A. E. & Nalluri, C. (1995). Civil Engineering Hydraulics: Essential Theory with Worked Examples. Third Edition. Oxford: Blackwell Scientific Publications.

Kay, M. (1998). Practical Hydraulics. London: E & FN Spon.

BSI: BS3680 (1996). Measurement of liquid flow in open channels. Measuring instruments and equipment. Method of specifying the performance of hydrometric equipment. BS 3680-8H:1996, ISO 11655:1995. British Standards Institution.

(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:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in timetabled sessions.

Students will scan their attendance via the attendance scanners each time they are on-campus. Students will have attendance recorded in class and they will be expected to login to the VLE several times per week. Students who are unable to attend a timetabled learning session, due to illness or other circumstance, should notify their Programme Leader. Across the School an 80% attendance threshold is set. Students who fall below this, will be referred to the Student Success Team to see how they can be best supported in their studies.

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. Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE, material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. This module has lab-based teaching and as such students are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, in accordance with the University's policies and regulations.
(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 Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
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.
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
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
Assessment 3
N/A
(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.)

Component 1							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Unseen Closed Book Class Test	☒	☒	☐	☒	☐	60	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Laboratory reports/Coursework	☐	☐	☒	☒	☐	40	12

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
N/A	☐	☐	☐	☐	☐	0	0
Combined total for all components						100%	14 hours

Change Control

What	**When**	**Who**
Further guidance on aggregate regulation and application when completing template	16/01/2020	H McLean
Updated contact hours	14/09/21	H McLean
Updated Student Attendance and Engagement Procedure Updated UWS Equality, Diversity and Human Rights Code	19/10/2023	C Winter
Guidance Note 23-24 provided General housekeeping to text across sections.	12/12/23	D Taylor