MODULE DESCRIPTION FORM

DEPARTMENT OF …Civil and Environmental Engineering……..

CL315 Water Engineering 1

Module Registrar: Mrs Sarah Lavery	**Taught To (Course):** Civil Engineering; Civil and Environmental Engineering	
Other Lecturers Involved:	**Credit Weighting:** 20crs	**Semester:** 1 & 2
Assumed Prerequisites: CL216 Hydraulics and Hydrology	**Compulsory/ ~~optional/ elective class~~**	**Academic Level:** UG Year 3

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

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
40	44	2	15		15	15	15	54	200

Educational Aim

This module aims to introduce common concepts, applications and design calculation methods used in water engineering. The class will develop students to be able to examine hydraulics in common water engineering situations such as for steady flows in pipes and flow in pipe networks. The class also aims to build on engineering hydrology knowledge through developing students understanding of the concept of turbomachinery and provides an introduction to its theory and design as well as familiarises students with the concept of sustainability and renewable energy production with use of water. This class also, includes knowledge on water resource systems planning, management and water resources risk management.

Learning Outcomes

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

LO1 Calculate friction and minor energy losses in pipes, analyse and/or design flows in pipelines and small networks.

LO2 Examine and explain the underpinning hydraulic principles and operations of a range of common water engineering structures, applications and equipment, including understanding turbomachinery with an introduction to green energy production, turbines and pumps turbine selection and system design.

LO3 Understand water resource systems planning, management and water resources risk management and appreciating the underlying relationships and uncertainties in hydrology.

Syllabus

The module will include the following:

- Incompressible flow in pipes and pipe networks.
- Major frictional head loss and minor losses in pipes.
- Moody diagram to estimate the friction factor in a pipeline.
- Pipe in series, parallel and branched pipelines.
- Pipe network analysis.
- Pipe roughness and hydraulics research charts.
- Common hydraulic concepts and principles and systems.
- Appreciate application of turbo-machinery in hydro power.
- Power generation from water.
- Water resource systems planning, management and water resources risk management.

Assessment of Learning Outcomes

Criteria

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

LO1 Calculate friction and minor energy losses in pipes, analyse and/or design flows in pipelines and small networks.
C1 Ability to characterise and identify types of flow, and calculate relevant parameters
C2 Ability to work with simple models of fluid flow and flow in pipes
C3 Ability to perform analysis and design calculations on pipelines and pipe networks

LO2 Examine and explain the underpinning hydraulic principles and operations of a range of common water engineering structures, applications and equipment, including understanding turbomachinery with an introduction to green energy production, turbines and pumps turbine selection and system design.
C1 The ability to identify common and relevant hydraulic concepts, relationships and systems
C2 The ability to examine water engineering systems and develop detailed understandings or demonstrations of their underlying principles and operations
C3 The ability to explain and communicate these clearly to wider audiences

LO3 Understand water resource systems planning, management and water resources risk management and appreciating the underlying relationships and uncertainties in hydrology.
C1 The ability to identify common and relevant hydraulic concepts, relationships and systems
C2 The ability to examine water engineering systems and develop detailed understandings or demonstrations of their underlying principles and operations.
C3 The ability to explain and communicate these clearly to wider audiences.

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
(within Assessment and Feedback Policy at:
*https://www.strath.ac.uk/staff/policies/academic/*http://www.strath.ac.uk/learnteach/informationforstaff/staff/assessfeedback/12principles/
)

Please state briefly how these are incorporated in this module.

Principle 1. Assessment and feedback practices promote effective student learning
1. Coursework and lab 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.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams (Semester 1)

	Examinations				Courseworks		Projects	
	Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***
	1	December	2 hours	25%	5 Quizzes	10%	1	15%
L/Outcomes	LO1				LO1		LO1	

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

Assessment Method(s) Including Percentage Breakdown and Duration of Exams (Semester 2)

	Examinations				Courseworks		Projects	
	Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***
	1	May	2	20%	2 Quizzes	5%	1	25%
L/Outcomes	LO2, LO3				LO2, LO3		LO2, LO3	

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

Coursework / Submissions deadlines (*academic weeks*):

Semester 1:

Pipe Flow Lab Report due Week 7 (for Week 5 Lab Groups) and Week 8 (for Week 6 Lab Groups).

Online Myplace Quizzes due Weeks 3, 5, 9, 10 and 11.

Semester 2:

Coursework project due Week 8.

Online Myplace Quizzes due Weeks 5 and 9.

Resit Assessment Procedures:

Sem. 1 resit: ***Formal examination*** in August with same format as in December.
Sem. 2 resit: ***Formal examination*** in August with same format as in May/June.

NB: The August examination marks are 100% of the resit marks. Students will be advised as to what semester exams they are required to resit by the module lecturers.

PLEASE NOTE:
Students need to 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.

Recommended Reading

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

- ** L Hamil. Understanding Hydraulics, 4th Ed., Palgrave
- *LJF Douglas, JM Gasiorek, JA Swaffield, LB Jack. Fluid Mechanics, Prentice Hall
  YA Cengel, JM Cimbala. Fluid Mechanics, McGraw-Hill
- *Chadwick & Morfett. Hydraulics in Civil and Environmental Engineering, E&FN Spon
- *MC Potter, DC Wiggert and BH Ramadan, Mechanics of Fluids, Cengage Learning
  Featherstone and Nalluri, Civil Engineering Hydraulics, BSP
- *Wilson. Engineering Hydrology, 4th Ed., Palgrave MacMillan
- *Shaw. Hydrology in Practice, 4th Ed., Routledge, Taylor Francis

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

Date	Time	Room No

Session:

Approved:

Course Director Signature:
Date of Last Modifications: August 2022

(Updated May 2018)

MODULE TIMETABLE

Module Code:	**CL315**	**Module Title:**	**Water Engineering 1**

Brief Description of Assessment:

The summative assessment opportunities are provided through coursework, a lab activity, Myplace quizzes, and end of semester exams.

The formative assessment opportunities are provided through question-and-answer sessions during class time, feedback sessions with the students, tutorial sessions and pre-exam tutorial questions.

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
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Online Test Choose an item.	Choose an item. Choose an item.	Online Test Lab	Lab Choose an item.	Lab Report Submission Choose an item.	Lab Report Submission Choose an item.	Online Test Choose an item.	Online Test Choose an item.	Online Test Choose an item.	Exam

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Online Test Course work Set	Choose an item. Choose an item.	Choose an item. Choose an item.	Course work Submit Choose an item.	Online Test Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Exam