Module Specification

Hydraulics and Engineering Applications

Version: 2025-26, v5.0, Approved

Contents

Part 1: Information

Module title: Hydraulics and Engineering Applications

Module code: UBGMNU-30-2

Level: Level 5

For implementation from: 2025-26

UWE credit rating: 30

ECTS credit rating: 15

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Geography and Environmental Management

Module type: Module

Pre-requisites: Engineering Principles for Civil Engineering 2024-25, Mathematics for Civil and Environmental Engineering 2024-25

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Hydraulics is the branch of fluid mechanics that deals with Water and the Environmental focus adopted by this module provides core material for Civil and Environmental Engineering. The skills developed will help an engineer understand natural flow phenomena and to design structures and systems that deal with fluid flow. The theory will be developed in Semester 1 before its application to the design of a pipe network in Semester 2.

Features: Module Entry Requirements: 60 credits at Level 1

Educational aims: In addition to the learning outcomes, the educational experience may explore, develop, and practise but not formally discretely assess the following: Working as a team member

Outline syllabus: HYDRAULICS (FLUID MECHANICS):

-Statics: general properties of fluids, pressure, buoyancy.

-Basic Concepts of Fluid Motion: flow of Newtonian fluids, types of flow, drag.

-Two Dimensional Inviscid Flow: conservation equations, continuity, Bernoulli equation, kinematics of fluid motion, velocity, acceleration, streamlines.

-Dynamics: laminar and turbulent flows, Reynold's number, fluid acceleration, energy equation, momentum equation, flow around a cylinder, flow around aerofoils and over buildings.

-Open Channel Flow: design rainfall, classification, Manning’s equation, sections, normal depth, Bernoulli equation, critical depth, critical conditions, hydraulic jumps, flumes, weirs.

-Steady Flow in Pipes: Darcy equation, Moody diagram, HR Wallingford tables.

-Unsteady Pipe Flow: pressure surge – simulation and mitigation techniques.

-Machines: the use and characteristics of roto-dynamic pumps and turbines.

APPLICATIONS (FEASIBILITY STUDY):

Determine alternative design options.
Use Net Present Value analysis.

Part 3: Teaching and learning methods

Teaching and learning methods: Scheduled learning includes lectures, seminars, tutorials, project supervision, demonstration, practical classes and workshops; fieldwork; external visits; supervised time in studio/workshop. Scheduled sessions may vary slightly depending on the module choices you make.

Independent learning includes hours engaged with essential reading, assignment preparation and completion etc. Students will receive on average 3 hours contact time per week. This will be in a range of formats including lectures, tutorials, hydraulics laboratories, computer laboratories and field work.

The amount of time spent on activities in this module is shown below in hours:
Contact time: 72
Assimilation and development of knowledge: 150
Exam and coursework preparation: 78
Total study time: 300

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Demonstrate a detailed knowledge and understanding of the application of hydraulics to describe and solve problems encountered in civil engineering.

MO2 Assess and apply the requirements involved in the civil engineering design of a range of hydraulic structures.

MO3 Generate feasibility studies by selecting appropriate systems ,technologies and materials for a large-scale hydraulic application and by employing elementary technical-economical optimization.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/9FFA98B6-5300-C183-8D79-D489591702C6.html?lang=en-GB&login=1

Part 4: Assessment

Assessment strategy: The module will be assessed by a combination of a face to face examination and an individual coursework report.

Examination. Learning outcomes 1 and 2.

The examination will be a combination of calculation exercises, laboratory exercises including:

-calculate hydrostatic forces on hydraulic structures
- calculate pressures, forces, velocities, energy and flow rates through pipes and pipe bends
- identify types of flows in open channels and flow rates through flow control structures (culverts and weirs)

Assessment will be based on a mixture of calculation based questions.

Coursework report. Learning outcomes 2 and 3.

Report to be based on a feasibility study of a hydraulic application
by deploying elementary technical-economical optimization at preliminary design phase and recognizing essential elements for carrying out associated studies (technical report, general layout, pipe profiles).

Assessment will be based on relevance, depth of interpretation and standards of literacy and presentation.

Assessment tasks:

Examination (First Sit)
Description: Exam (3 hours) Frenchay campus
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Report (First Sit)
Description: Report (2000 words) based on a feasibility study of a hydraulic application
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3

Examination (Resit)
Description: Face to face exam (3 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Report (Resit)
Description: Report (2000 words) based on a feasibility study of a hydraulic application
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Civil Engineering {Foundation} [Frenchay] BEng (Hons) 2023-24

Civil Engineering [Frenchay] - WITHDRAWN BEng (Hons) 2024-25

Civil Engineering [Frenchay] - WITHDRAWN MEng 2024-25

Civil Engineering {Foundation} [Frenchay] MEng 2023-24

Civil Engineering {Apprenticeship-UWE} [Frenchay] BEng (Hons) 2022-23

Civil Engineering [Frenchay] BEng (Hons) 2022-23

Civil Engineering [Frenchay] MEng 2022-23