

Water Engineering

Module Information

2022.01, Approved

Summary Information

Module Code	5204CIV
Formal Module Title	Water Engineering
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Civil Engineering and Built Environment

Learning Methods

Learning Method Type	Hours
Lecture	44
Practical	6
Tutorial	11

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	To introduce and then consolidate students' knowledge of the principles of engineering hydrology applied to civil engineering problems. To provide students with the ability to perform and assess a range of hydraulic computations relating to open channel flow commonly used in civil engineering. To provide an introduction to the basic unit processes and operations used in conventional water and wastewater treatment.
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After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Analyse free surface flow problems using friction, energy and momentum considerations and predict the behaviour of sub-critical and super-critical open channel flows.
MLO2	2	Appraise, and use in the correct context, design equations for the design and operation of water and wastewater treatment plant and associated pipelines.
MLO3	3	Assess, interpret and quantify hydrological data.
MLO4	4	Perform and present engineering calculations, exercising technical judgement and making associated decisions.
MLO5	5	Undertake relevant experiments to test the theoretical concepts encountered in the module and present appropriate findings of experimental work.

Module Content

Outline Syllabus	Open channel flow: Laminar and turbulent flow in open channels, principles of uniform flow, Chézy and Manning equations, development of friction equations, channel cross-sections, development of energy concepts & specific energy, critical flow considerations, applications of the energy principle, measurement structures, specific force considerations, analysis of hydraulic jump. Engineering hydrology: The hydrological cycle, precipitation, initial losses, infiltration, percolation, evapotranspiration, surface runoff, groundwater flow, catchment characteristics, impacts of urbanisation, hydrograph analysis, unit hydrograph theory. Water and wastewater: Water quality and standards, water classification, treatment systems and processes. Wastewater treatment, sewage, composition, sewerage systems – flows and sizing. Environmental impact of water and wastewater treatment works, sustainable design.
Module Overview	This module aids your appreciation of hydrological processes and will demonstrate how to approach practical problems in applied hydrology. Water and wastewater quality standards are reviewed, along with the rationale for the adoption of such standards from the perspective of protection of public health. The module is taught in a way that gives you a fundamental understanding of the physical, chemical and biological mechanisms involved in treatment operations, considered from the viewpoint of how treatment is carried out so as to prevent environmental damage upon discharge.
Additional Information	The material that will be taught includes a balance between theoretical principles and their application to real problems in hydraulic engineering. When studying open channel flows, students should gain an appreciation of the different types of flow that may occur in natural and engineered systems. The module will aid students' appreciation of hydrological processes and will demonstrate how to approach practical problems in applied hydrology. Water and wastewater quality standards are reviewed, along with the rationale for the adoption of such standards from the perspective of protection of public health. The module is taught so as to give a fundamental understanding of the physical, chemical and biological mechanisms involved in treatment operations, considered from the viewpoint of how treatment is carried out so as to prevent environmental damage upon discharge. Where this module is part of a Degree Apprenticeship programme, the knowledge learning outcomes are K2 and K4, the skills learning outcomes are S3.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Centralised Exam	Examination	70	2	MLO1, MLO2, MLO3, MLO4
Presentation	Report	30	0	MLO1, MLO4, MLO5

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Clare Harris	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings
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