

Liverpool John Moores University

Title: WATER ENGINEERING
Status: Definitive
Code: **5204CIV** (122930)
Version Start Date: 01-08-2021

Owning School/Faculty: Civil Engineering and Built Environment
Teaching School/Faculty: Civil Engineering and Built Environment

Team	Leader
Clare Harris	Y
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Academic Level: FHEQ5 **Credit Value:** 20 **Total Delivered Hours:** 63
Total Learning Hours: 200 **Private Study:** 137

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	44
Practical	6
Tutorial	11

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	EXAMINATION	70	2
Report	AS2	REPORT	30	

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.

Learning Outcomes

After completing the module the student should be able to:

- 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.
- 2 Appraise, and use in the correct context, design equations for the design and operation of water and wastewater treatment plant and associated pipelines.
- 3 Assess, interpret and quantify hydrological data.
- 4 Perform and present engineering calculations, exercising technical judgement and making associated decisions.
- 5 Undertake relevant experiments to test the theoretical concepts encountered in the module and present appropriate findings of experimental work.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

EXAMINATION	1	2	3	4
REPORT	1	4	5	

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.

Learning Activities

Lectures, tutorials and practicals

Notes

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.