

Module Details	
Module Title:	Water and Waste Water Treatment
Module Code:	CSE7013-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Civil and Structural Engineering
Subject Area:	Civil and Structural Engineering
FHEQ Level:	FHEQ Level 7 (Masters)
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	Hours
Independent Study	152
Lectures	24
Tutorials	12
Laboratory	12

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2 (Feb - May)

Module Aims
This module will look at water pollution and the main aspects of public health engineering. The following topics will be covered: - water quality characteristics; - water supply and treatment processes; - sources of water pollution; - wastewater treatment.

Outline Syllabus

Water quality characteristics: physical, chemical and microbiological characteristics. Sources of pollution: point sources (sewage and industrial waste water) and non-point sources (agricultural runoff and urban storm runoff). Best Management Practice. Water treatment: basic principles, primary treatment, coagulation, flocculation, sedimentation, filtration, disinfection and advanced technologies. Wastewater treatment: basic principles, primary treatment, secondary treatment (trickling filters, activated sludge, lagoons), tertiary treatment, sludge treatment and disposal source control and advanced technologies. Wastewater and high toxicity pollutants. Wastewater treatment methods (Physicochemical, Biological, Membrane Technology). Membrane Processes (Pressure driven, transport through membranes). Types of membranes (Microfiltration, Ultrafiltration, Nanofiltration). Reverse osmosis (Process performance measurement, Concentration Polarization, Membrane Fouling). Types of Membrane Modules (Hollow fiber, Tubular, Flat and Spiral Wound). Applications of Reverse Osmosis (Desalination of Seawater, wastewater treatment, Removal of heavy metals, Removal of high toxic organic compounds. Modeling of Reverse Osmosis processes (Models and challenges, Transport Theories, Wastewater treatment). Outline simulation of steady state and dynamic RO process for wastewater Treatment and impact of operating pressure, flow rate, concentration and temperature. Generic optimisation aspects of RO processes for wastewater treatment. Economic aspects of RO process and sustainability. Wastewater treatment by oxidation process. Modelling of wastewater treatment processes.

Learning Outcomes

1	Critically evaluate principles of water supply and water treatment processes.
2	Critically evaluate main wastewater treatment processes and the impact on sustainability.
3	Assess pollutant inputs from various sources accurately.
4	Design water treatment and wastewater treatment plant (e.g. Reverse Osmosis Process for wastewater treatment)

Learning, Teaching and Assessment Strategy

Lectures and interactive discussions on key issues on: water supply and demand, water management, water resources and water quality, wastewater treatment processes. Tutorial sessions will cover design calculations, computer lab sessions will be used for modelling and simulation of wastewater treatment processes.

Formative assessments will be carried out during tutorial and computer lab sessions. 2 hour exam (60%) will assess LO1-3 and coursework (40%) will assess LO4. The coursework will cover aspects of both physical and chemical methods for wastewater treatment processes via modelling and simulation using gPROMS and ASPEN software.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Examination - closed book		2 hours	60%
Summative	Coursework	Individual Report on waste water treatment	-3000 words	40%

		process design and operation using process modelling and simulation		
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Reading List

To access the reading list for this module, please visit <https://bradford.rl.talis.com/index.html>.

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.