

Water and Waste Water Treatment

Module Code:	CSE7013-B
Academic Year:	2018-19
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 Periods

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

Module Aims

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.

Module Learning Outcomes

On successful completion of this module, students will be able to...

- 1 Critically evaluate principles of water supply and water treatment processes.
- 2 Critically evaluate main wastewater treatment processes.
- 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	Final Assess'
Summative	Examination - closed book		2 hours	60%	Yes
Summative	Coursework	Individual Report on waste water treatment process design and operation using process	-3000 words	40%	No

modelling and
simulation

Legacy Code (if applicable)

Reading List

To view Reading List, please go to [rebus:list](#).