UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Water and Wastewater Treatment
Module Code	CSE7013-B
Academic Year	2024/5
Credits	20
School	School of Built Environment, Architecture & Creative Industries
FHEQ Level	FHEQ Level 7

Contact Hours	
Type	Hours
Independent Study	160
Lectures	26
Laboratories	4
Tutorials	10

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2

Module Aims

1. Understand water pollution, sources of water pollution and the main aspects of public health engineering.
2. Apply water quality characteristics to assess the water quality.
3. Understand water supply and treatment processes, learn the design of various water treatment processes, technology and facility.
4. Understand wastewater treatment processes and the design of various wastewater treatment stages.

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. Consideration of the 17 UN sustainable development goals, such as 3: Good health and well-being; 6: Clean water and sanitation; 11: Sustainable cities and communities;14: Life below water and 15: Life on land.

Learning Outcomes

Outcome Number	Description
01	Critically evaluate principles of water supply and water treatment processes.
02	Critically evaluate main wastewater treatment processes..
03	Assess pollutant inputs from various sources accurately.
04	Design water treatment and wastewater treatment plant (e.g. Reverse Osmosis Process for wastewater treatment).
05	Consideration of sustainability of various water and wastewater treatment processes.

Learning, Teaching and Assessment Strategy

Module learning, teaching and assessment strategies are: Lectures and interactive discussions on key issues on water supply and demand. Lectures on water management, water resources and water quality. Learning and understanding the sources of water pollution, water treatment and wastewater treatment processes. Tutorials sessions as well as practical examples in lectures will cover design calculations, computer lab sessions will be used for modelling and simulation of wastewater treatment processes. Learning and understanding the design of elements of the water and wastewater treatment plants.
Formative assessments will be carried out during tutorial and computer lab sessions. The final assessment of the module will be 100% individual coursework, which will assess LO1-5.

Mode of Assessment

Type	Method	Description	Weighting
Summative	Coursework - Written	Individual Coursework Report	100%

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.

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