

# ES4B6-15 Global Water and Sanitation Technologies

**22/23**

**Department**

School of Engineering

**Level**

Undergraduate Level 4

**Module leader**

Modupe Jimoh

**Credit value**

15

**Module duration**

10 weeks

**Assessment**

30% coursework, 70% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

ES4B6-15 Global Water and Sanitation Technologies

[Module web page](#)

### Module aims

Engineers are sometimes required to carry out public health services related to the water and environmental engineering subsector. This module introduces the concepts of water supply in rural and urban areas, the design of components of the technologies required, and how the choice of technology interacts with economics and social impacts. The module also focuses on the design of technologies required for sustainable sanitation processes; incorporating wastewater, fecal and solid waste management principles.

### Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

1. Introduction
  - I. Water supply
  - II. Sanitation
2. Water Supply
  - I. Source
  - II. Quality
  - III. Treatment
  - IV. Storage- Dams and Reservoirs
  - V. Distribution
3. Wastewater Handling
  - I. Generation
  - II. Collection
  - III. Treatment and Disposal
4. Design of unit operations and processes in water and wastewater treatment
  - I. Sedimentation
  - II. Chemical coagulation
  - III. Ion-exchange
  - IV. Filtration
  - V. Dis-infection
5. Sanitation and Faecal Management
  - I. Sanitation principles
  - II. Sanitation technologies
6. Solid Waste Management
  - I. Solid waste classification and surveys
  - II. Design and operation of solid waste collection and disposal systems
  - III. System approach design of land disposal operations
7. Sustainability in Water Resources
  - I. Conservation and usage- Water wastage, leakage & inefficiency
  - II. Flood control
  - III. Hydropower
  - IV. Irrigation
  - V. Navigation- Ports and Harbours
  - VI. River Basin Planning

## **Learning outcomes**

By the end of the module, students should be able to:

- Critically analyse common water supply and sanitation technologies and the biological and physical processes underlying them.
- Design the components of water and sanitation technologies with a focus on sustainability.
- Comprehend the significance of sustainable water resources management.
- Evaluate the economics, engineering, social organisation, and environmental impact

analysis of the best choice between competing technologies for any specific site.

- Review a technical case study and present it effectively to a technical and non-technical audience.

## **Indicative reading list**

“Water Resources Management: Innovative and Green Solutions”, Robert C. Brears, 2021. De Gruyter Online E-book Collection (EBS). ISBN 9783110685640.

“Controlling the Water: Matching Technology and Institutions in Irrigation Management in India and Nepal”, Oxford University Press, 2013, ISBN 0198082924.

“Advanced water supply and wastewater treatment: a road to safer society and environment”, Springer, 2011, ISBN 9789400703094 9400703090.

“Alternative Water Supply System”, IWA Publishing, 2015, ISBN 9781780405513.

<http://library.oapen.org/handle/20.500.12657/25918>.

“The Management of Water Quality and Irrigation Technologies”, Taylor & Francis, 2012, ISBN 1136553223.

“Water, Sanitation and Hygiene in Humanitarian Contexts: Reflections on Current Practice”, Practical Action Publishing, 2015, ISBN 1853398845.

“Advances in Water Supply, Sanitation and Environmental Management: A Water, Sanitation and Hygiene (Wash) Perspective for Developing Countries”, 2014, ISBN-13 9789966720511.

## **Subject specific skills**

1. Ability to conceive, make and realise a component, product, system, or process
2. Ability to develop economically viable and ethically sound sustainable solutions
3. Ability to be pragmatic, taking a systematic approach and the logical and practical steps necessary for, often complex, concepts to become reality
4. Ability to seek to achieve sustainable solutions to problems and have strategies for being creative and innovative
5. Ability to be risk, cost and value-conscious, and aware of their ethical, social, cultural, environmental, health and safety, and wider professional engineering responsibilities

## **Transferable skills**

1. Numeracy: apply mathematical and computational methods to communicate parameters, model and optimize solutions
2. Apply problem solving skills, information retrieval, and the effective use of general IT facilities
3. Communicate (written and oral; to technical and non-technical audiences) and work with others
4. Awareness of the nature of business and enterprise in the creation of economic and social value
5. Overcome difficulties by employing skills, knowledge, and understanding in a flexible manner
6. Ability to formulate and operate within appropriate codes of conduct, when faced with an ethical issue
7. Appreciation of the global dimensions of engineering, commerce, and communication
8. Be professional in their outlook, be capable of team working, be effective communicators,

and be able to exercise responsibility and sound management approaches.

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## Study

### Study time

Type	Required
Lectures	28 sessions of 1 hour (19%)
Other activity	2 hours (1%)
Private study	120 hours (80%)
Total	150 hours

### Private study description

120 hours of guided independent learning

### Other activity description

2x1 hours revision classes

## Costs

No further costs have been identified for this module.

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## Assessment

You must pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

### Assessment group D5

	Weighting	Study time
Individual Oral Presentation	30%	
Students would give a 7-minute oral presentation on a topic of choice (from a given list) relevant to the syllabus and learning objectives. Depending on the number of students registered for the module, the presentations might be spread across several days towards the end of the module delivery.		
Online Examination	70%	
~Platforms - QMP		

- Online examination: No Answerbook required
- Students may use a calculator
- Engineering Data Book 8th Edition

### **Feedback on assessment**

Written individual feedback on essay submissions and cohort level feedback on the oral presentation and written exam.

[Past exam papers for ES4B6](#)

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## **Availability**

### **Pre-requisites**

To take this module, you must have passed:

- All of
  - [ES3D5-15 Water Engineering for Civil Engineers](#)

### **Courses**

This module is Core for:

- Year 4 of UESA-H211 MEng Civil Engineering
- Year 4 of UESA-H217 MEng Civil Engineering
- Year 5 of UESA-H218 MEng Civil Engineering with Intercalated Year

This module is Optional for:

- Year 4 of UESA-H21A MEng Civil Engineering with Exchange Year
- Year 4 of UESA-H116 MEng Engineering with Exchange Year
- Year 4 of UESA-H117 MEng Engineering with Exchange Year
- Year 5 of UESA-H115 MEng Engineering with Intercalated Year

This module is Option list A for:

- UESA-H211 MEng Civil Engineering
  - Year 4 of H211 Civil Engineering
  - Year 4 of H20A Civil Engineering with Business Management
  - Year 4 of H20C Civil Engineering with Fluid Dynamics

- Year 5 of UESA-H212 MEng Civil Engineering with Intercalated Year
- Year 4 of UESA-H635 MEng Electronic Engineering
- UESA-H107 MEng Engineering
  - Year 4 of H107 Engineering MEng
  - Year 4 of H10J Engineering with Automotive Engineering MEng
  - Year 4 of H10C Engineering with Business Management MEng
  - Year 4 of H10G Engineering with Communications MEng
  - Year 4 of H10H Engineering with Computer Engineering MEng
  - Year 4 of H10M Engineering with Fluid Dynamics MEng
  - Year 4 of H10F Engineering with Instrumentation MEng
  - Year 4 of H10K Engineering with Robotics MEng
  - Year 4 of H10L Engineering with Systems Engineering MEng
- Year 4 of UESA-H114 MEng Engineering
- Year 5 of UESA-H109 MEng Engineering with Intercalated Year
- Year 4 of UESA-H311 MEng Mechanical Engineering
- UESA-HH63 MEng Systems Engineering
  - Year 4 of H63C Systems Engineering with Computer Engineering
  - Year 4 of H63D Systems Engineering with Instrumentation

This module is Option list B for:

- UESA-H107 MEng Engineering
  - Year 4 of H10E Engineering with Appropriate Technology MEng
  - Year 4 of H10D Engineering with Sustainability MEng
- Year 4 of UESA-H311 MEng Mechanical Engineering

This module is Option list C for:

- UESA-H311 MEng Mechanical Engineering
  - Year 4 of H30L Mechanical Engineering with Automotive Engineering
  - Year 4 of H30M Mechanical Engineering with Robotics
  - Year 4 of H30N Mechanical Engineering with Systems Engineering