

<b>Module Code</b>	CE7E07
<b>Module Name</b>	E7: Sustainable Water Supply and Sanitation
<b>ECTS Weighting<sup>1</sup></b>	5 ECTS
<b>Semester taught</b>	Semester 1
<b>Module Coordinator/s</b>	Prof. Laurence Gill ( <a href="mailto:Laurence.gill@tcd.ie">Laurence.gill@tcd.ie</a> ) Lecturer(s): Prof. Bruce Misstear ( <a href="mailto:bmisster@tcd.ie">bmisster@tcd.ie</a> )
<b><u>Module Learning Outcomes</u> with reference to the <u>Graduate Attributes</u> and how they are developed in discipline</b>	<p>On successful completion of this module, students should be able to:</p> <p>LO1. Develop conceptual models to help to solve typical problems within the field of water supply and sanitation projects in developing countries.</p> <p>LO2. Explain the conceptual pathways for transition of water related infectious diseases and their link to sanitation related contaminants.</p> <p>LO3. Formulate the full suite of sanitation technologies that can be linked into compatible combinations to design a logical sanitation system.</p> <p>LO4. Evaluate the need and methods for successful health and hygiene education in parallel to water supply/ sanitation infrastructure development.</p> <p>LO5. Assess the adequacy of existing water schemes and plan new water systems, including estimating water demands for people, animals and crops.</p> <p>LO6. Evaluate different water supply options, including rainwater collection, Protected springs, hand-dug wells, drilled wells, river intakes and small dams.</p> <p>LO7. Design appropriate types of wells for different hydrogeological environments.</p> <p>LO8. Design appropriate soil-based and/or vegetated passive treatment systems for water resource protection.</p> <p>LO9. Elucidate the concepts of sustainable resource management within the urban water cycle.</p> <p><b>Graduate Attributes: levels of attainment</b></p> <p>To act responsibly - Enhanced</p> <p>To think independently - Attained</p> <p>To develop continuously - Enhanced</p> <p>To communicate effectively - Enhanced</p>

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## Module Content

This module aims to develop the students' comprehension of water supply and sanitation, particularly focussing on rural areas in developing countries. The students should understand the conceptual pathways for transmission of water-related infectious diseases and their link to contaminant transport and attenuation in relation to appropriate water supply and sanitation technologies. This will enable students to be able to devise appropriate conceptual models to solve typical problems within the field of sustainable water supply and sanitation projects.

- **Water and sanitation related diseases**  
Water borne / Water washed / Water related vector
- **Sustainable Development Goals**
- **Planning a water scheme**  
Reviewing existing schemes  
Assessing water demand  
Engaging the local community
- **Water supply technologies**  
Rainwater collection / Protected springs / Hand-dug wells / Drilled wells / Infiltration galleries / River intakes / Small dams / Simple water treatment systems
- **Groundwater engineering**  
Well design and construction  
Pumps
- **Sanitation technologies**  
Inputs (different waste streams) / User interface (toilets etc.) / Collection / storage / treatment / Conveyance / Semi-centralized systems / Re-use / disposal
- **Sustainable urban wastewater management**  
Recovery of wastewater resources (water, organics, nutrients)  
Rainwater as a resource  
Design of Sustainable Urban Drainage Systems

## Teaching and Learning Methods

This module is taught by a combination of lectures and tutorials during which the two assignments are discussed. The key information from the lecture presentations will be made available on-line. The first continuous assessment assignment, on an aspect of water supply, is handed out to the students in week 4 of the module. The second continuous assessment assignment, a group project on decentralised sanitation, is handed out to the students in week 7 of the module. Both completed assignments have to be submitted by the last day of the first semester. The projects are marked and returned to the students with comments.

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
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<b>Assessment Details<sup>2</sup></b> <b>Please include the following:</b> <ul style="list-style-type: none"> <li>• <b>Assessment Component</b></li> <li>• <b>Assessment description</b></li> <li>• <b>Learning Outcome(s) addressed</b></li> <li>• <b>% of total</b></li> <li>• <b>Assessment due date</b></li> </ul>	Continuous assessment 1	Assignment 1 (Rural water supply)	LO5, LO6, LO7	15%	9			
	Continuous assessment 2	Assignment 2 (decentralised sanitation)	Lo2, LO3, LO8	15%	12			
	Examination	Examination [3 hours]	LO1-LO9	70%	-			
<b>Reassessment Requirements</b>	Examination [3 hours]							
<b>Contact Hours and Indicative Student Workload<sup>2</sup></b>	<table border="1"> <tr> <td><b>Contact hours: 27</b></td> </tr> <tr> <td><b>Independent Study (preparation for course and review of materials): 40.5</b></td> </tr> <tr> <td><b>Independent Study (preparation for assessment, incl. completion of assessment): 32.5</b></td> </tr> </table>					<b>Contact hours: 27</b>	<b>Independent Study (preparation for course and review of materials): 40.5</b>	<b>Independent Study (preparation for assessment, incl. completion of assessment): 32.5</b>
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<b>Recommended Reading List</b>	<p><i>Engineering in Emergencies</i> – Davis and Lambert [ITDG]  <i>Compendium of Sanitation Systems &amp; Technologies</i> – Tilley et al. [EAWAG]  <i>Water wells and boreholes</i> – Misstear et al. [Wiley]</p> <p>The material from textbooks is supplemented by case studies and by a large number of references from international agencies and others, including the UN World Water Development reports.</p>							
<b>Module Pre-requisite</b>	n/a							
<b>Module Co-requisite</b>	n/a							
<b>Module Website</b>	<a href="http://www.tcd.ie/Engineering/undergraduate/maiyear5/">http://www.tcd.ie/Engineering/undergraduate/maiyear5/</a>							
<b>Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.</b>	No							
<b>Module Approval Date</b>								
<b>Approved by</b>								

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**Academic Start Year** 1<sup>st</sup> September 2020

**Academic Year of Date** 2020/2021