Module Code	CE7E06
Module Name	E6: Water Resource Planning and Climate Change
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Prof. David O'Connell (david.oconnell@tcd.ie) Lecturer(s): Dr. Chris Werner
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students should be able to: evaluate a range of water resource problems in different hydrological environments. Specifically, students will gain an understanding of: LO1. Combined use of surface and groundwater resources, including river augmentation schemes and artificial recharge. LO2. Water resource planning in large river basins, especially the Nile basin. LO3. Arid zone hydrology, with emphasis on the Middle East. LO4. Protecting groundwater from pollution. LO5. Climate dynamics, including human-induced global warming and the models used to make projections of future climate scenarios. LO6. Environmental impact assessment and the preparation of Environmental Impact Assessment Reports, with particular emphasis on water schemes. **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Attained To develop continuously - Attained To communicate effectively - Enhanced
Module Content	Please provide a brief overview of the module of no more than 350 words written so that someone outside of your discipline will understand it. To introduce students to a range of current water resource planning issues, in both temperate and arid regions. Module content: • Conjunctive use of surface and groundwater

[1] TEP Glossary

- Managed aquifer recharge
- Low river flow analysis and river augmentation
- Bankside well schemes
- River basin management and approaches
- Transboundary river basins and challenges
- Water resource planning in arid zones
- Groundwater protection strategies in UK and Ireland
- Climate change, energy balance, global warming, global and regional climate models
- Environmental impact assessment

Teaching and Learning Methods

e.g., lectures, seminars, online learning via VLE, field trips, laboratories, practice-based etc…

This module is taught by a combination of lectures and tutorials, along with one assignment, which is linked to one of the module topics. The completed assignment has to be submitted by the end of week 6 of the second semester.

Assessment Details[2]
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Examination	Examination [3 hours] **COVID contingencies** Online exam **or** take home assignment	LO1-6	80 (covid assignment 50%)	-
Coursework	Assignment related topics from one of LO1-6	Annually dynamic LO1-6	20 (Covid assignment 50%)	6

Reassessment Requirements

Examination [3 hours]

Contact Hours and Indicative Student Workload[2]

Contact hours: 27 hours
Independent Study (preparation for course and review of materials): 41 hours
Independent Study (preparation for assessment, incl. completion of assessment): 32 hours

[2] TEP Guidelines on Workload and Assessment

Recommended Reading List	A comprehensive reading list is provided at the beginning of the course. Texts cited include 'Hydrology in practice' by Shaw et al. (2011), 'The hydrology of the Nile' by Sutcliffe & Parks (1999), 'Hydrogeology: Principles and Practice' by Hiscock & Bense (2014), 'Water wells and boreholes' by Misstear et al. (2017), 'Water sustainability: A global perspective' by Jones (2011) and 'Introduction to Environmental Impact Assessment' by Glasson et al (2012). In addition, the module includes many case study examples, with an extensive reading list of published papers.
Module Pre-requisite	No specific pre-requisite, but previous engineering hydrology module helpful
Module Co-requisite	No co-requisite
Module Website	
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No
Module Approval Date	
Approved by	
Academic Start Year	
Academic Year of Date	January 2023