Module Code: CE7E06
Module Name: E6: Water Resource Planning and Climate Change
ECTS Weighting: 5 ECTS
Semester taught: Semester 2
Module Coordinator/s: Prof. David O’Connell ([david.oconnell@tcd.ie](mailto: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.

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**

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Assessment Description</th>
<th>LO Addressed</th>
<th>% of total</th>
<th>Week due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td>Examination [3 hours] <strong>COVID contingencies</strong></td>
<td>LO1-6</td>
<td>80 (covid assignment 50%)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Online exam or take home assignment</td>
<td></td>
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<tr>
<td>Coursework</td>
<td>Assignment related topics from one of LO1-6</td>
<td>Annually dynamic LO1-6</td>
<td>20 (Covid assignment 50%)</td>
<td>6</td>
</tr>
</tbody>
</table>

**Reassessment Requirements**

Examination [3 hours]

**Contact Hours and Indicative Student Workload**

<table>
<thead>
<tr>
<th></th>
<th>Contact hours: 27 hours</th>
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<tbody>
<tr>
<td>Independent Study</td>
<td>41 hours</td>
</tr>
<tr>
<td>(preparation for course</td>
<td></td>
</tr>
<tr>
<td>and review of materials)</td>
<td></td>
</tr>
<tr>
<td>Independent Study</td>
<td>32 hours</td>
</tr>
<tr>
<td>(preparation for assessment, incl. completion of assessment)</td>
<td></td>
</tr>
</tbody>
</table>

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