Module Code	CE7J06
Module Name	J6: Wave Energy
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Prof. Biswajit Basu (basub@tcd.ie) **Lecturer(s):** Prof. Biswajit Basu (basub@tcd.ie)
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: LO1. Carry out assessment of wave energy, applying wave equations and wave theory. LO2. Carry out simplified analysis using linear wave theory. LO3. Carry out nonlinear wave analysis. LO4. Analyse oscillating body systems. LO5. Analyse fixed and floating wave energy devices. LO6. Analyse mooring systems. LO7. Carry out the basic design of wave energy power systems. LO8. Calculate resource and potential outputs for wave energy systems. LO9. Articulate the social and environmental aspect of wave power systems. **Graduate Attributes: levels of attainment** To act responsibly - Introduced To think independently - Enhanced To develop continuously - Attained To communicate effectively - Enhanced
Module Content	To introduce the students about the theory, technology and engineering associated with wave, hydro-power, tidal and ocean energy. The topics covered are: • Introduction to wave energy resource • Hydrodynamics – Theoretical and numerical, model testing • Controls • Oscillating water column – Fixed, Floating • Oscillating body systems – single, multiple, pitching , many body • Overtopping devices • Power equipment

- Moorings

The aims of the module are:

1. To foster problem solving and critical thinking skills by requiring students to apply the theory learnt on wave energy to real life projects and engage in discussions with other experts.
2. To enable students to communicate well in engineering contests in relation to ocean energy, both when discussing about projects, plans and problems, and when writing, reporting and communicating about these.
3. To achieve a pro-active engagement in wave energy problems.
4. To enable students to identity, formulate, analyse and solve engineering problems by applying the theory of ocean energy both analytically and computationally.
5. To solve real world engineering problems by carrying out analysis using real data such as those available from tank tests or sea trials.
6. To solve real world engineering problems by applying the theory and employing software packages such as WecSim, Nemoh and Comsol.

Teaching and Learning Methods

- Lectures
- Tutorials
- Labs

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	2 hours written examination	LO1-9	70%	
3Coursework/project work (2 Theoretical assignment - 8% each, Computer assignment – 14%)	Coursework and project work during the semester	LO1-5, 7,8	30%	4,7,11

Reassessment Requirements	Reassessment Examination [2 hours written] – 100%
Contact Hours and Indicative Student Workload[2]	**Contact hours: 33** **Independent Study (preparation for course and review of materials): 47** **Independent Study (preparation for assessment, incl. completion of assessment): 45**
Recommended Reading List	Ocean wave energy conversion (1981) McCormick, Wiley, New York. Power from sea waves (1995) Ross, OUP, Oxford. Wave energy conversion (2003) Brooke, Elsevier, Amsterdam. Wave and Tidal Power (2011) Gerdes, Greenhaven Press, Detroit. Costal & Offshore Engineering (2011) Reid, Chadwick and Flemming.
Module Pre-requisite	Mechanics (1stYear), Fluid Mechanics (2nd or 3rd year), Maths (1st and 2nd year -Complex numbers, Linear Ordinary Differential Equations), MATLAB
Module Co-requisite	
Module Website	
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	
Module Approval Date	
Approved by	
Academic Start Year	1st September 2025
Academic Year of Date	2025/2026