Module Code	MEU33B02
Module Name	Fluid Mechanics 1
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Craig Meskell
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: 1. Explain the fundamental principles underlying the generalised equations of fluid motion for both incompressible and compressible flow. 2. Reduce the generalised equations of fluid motion to simplified versions in rectilinear and cylindrical coordinates and solve for simple flow problems. 3. Use Buckingham's Pi theorem to develop dimensionless groups and apply similarity and modelling procedures. 4. Generate mathematical models for boundary layer flows, using integral analysis procedures. 5. Estimate skin friction coefficients and drag for aircraft, ships and vehicles. 6. Discuss the characteristics of laminar and turbulent flow and describe flow visualisation methods and techniques for the measurement of turbulence. 7. Analyse head losses in piping systems and estimate the flow distribution in pipe networks. 8. Calculate the variation in pressure and velocity in a high speed internal gas flow. 9. Execute a numerical simulation of turbulent flow using RANS. 10. Follow formatting requirements typical of grant applications or contract tender process and present results graphically. **Graduate Attributes: levels of attainment** To act responsibly - Introduced To think independently - Enhanced

[1] TEP Glossary

	To develop continuously - Enhanced To communicate effectively – Introduced
Module Content	This course introduces the student to the basic concepts underlying the mechanics of fluid motion. The appropriate scientific principles and mathematical modelling techniques are described and then applied to practical engineering problems. Four different modelling techniques are discussed: exact analytical solutions using Navier- Stokes equations; approximate approaches (e.g. boundary layer integral analysis); similarity (dimensional) analysis for experimental data; and numerical simulation using RANS. Real life problem-solving skills are cultivated within the framework of practical flow devices and systems (e.g. piping system components, fluid machines, vehicle drag). Environmental and social implications are briefly discussed.
Teaching and Learning Methods	The course is delivered through a combination of formal podium lectures and online problem sets. **Assessment** There are two components to the module's assessment: • Written 2 hour in person examination at end of Semester. • An individual assignment (in two parts) on the use of CFD.

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
Exam	End of Semester exam	1-8	90	14
Assignment 1	Intro to Using CFD software	9 & 10	2	4
Assignment 2	Application of CFD	7, 9, 10	8	10

Reassessment Requirements	Exam

[2] TEP Guidelines on Workload and Assessment

Contact Hours and Indicative Student Workload[2]	**Contact hours:** 33 **Independent Study (preparation for course and review of materials): 7**0 **Independent Study (preparation for assessment, incl. completion of assessment):** 15
Recommended Reading List	This is the course textbook. Students are expected to have access to a copy. *Munson, Young and Okiishi's Fundamentals of Fluid Mechanics, 9th Edition* Andrew L. Gerhart, John I. Hochstein, Philip M. Gerhart Publisher: Wiley & Sons, ISBN: 978-1-119-59730-8 Other Relevant Texts The following textbook provide useful addition material: *Introduction to Fluid Mechanics 7e* Fox, Pritchard, McDonald. ISBN 978-0-470- 23450-1
Module Pre-requisite	MEU2205
Module Co-requisite	none
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No
Academic Year of Date	2025-26