Module Template for New and Revised Modules[1]

Module Code	MEU33B02
Module Name	Fluid Mechanics 1
ECTS Weighting[2]	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 scientific 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.

[1] An Introduction to Module Design from AISHE provides a great deal of information on designing and re-designing modules.
[2] TEP Glossary

	Graduate Attributes: levels of attainment To act responsibly - Introduced To think independently - Enhanced 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 problem solving tutorial sessions **Assessment** There are two components to the module's assessment: • Written 2 hour examination at end of Semester. • A series of class tests. • An individual assignment (in two parts) on the use of CFD.

Assessment Details[3]
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	65	16
Assignment 1	Intro to CFD	9 & 10	5	5
Assignment 2	Application of CFD	9 & 10	15	9
Class tests	Class test	1-8	15	2-12

Reassessment Requirements

Contact Hours and Indicative Student Workload[3]

Contact hours: 38
Independent Study (preparation for course and review of materials): 60
Independent Study (preparation for assessment, incl. completion of assessment): 20

Recommended Reading List

This is the course textbook. Students are expected to have access to a copy.

Fundamentals of fluid mechanics 8e (SI Version) Munson, Young, Okiishi, Huebsch. Publisher: Wiley & Sons, ISBN ISBN 978-1-119-54799-0

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

Module Website

[3] TEP Guidelines on Workload and Assessment

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	