Module Code	MEP55B03
Module Name	Advanced Thermal Fluids Design
ECTS Weighting	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Associate Professor Anthony Robinson
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. Solve problems for practical and industrially relevant thermal fluids applications. LO2. Analyse and generate closed mathematical models and/or simulations of heat transfer, fluid dynamic and thermodynamic systems. LO3. Apply design principles with bespoke engineering solutions to multidisciplinary problems with specified design goal performance targets and within design constraints. LO4. Understand the dynamics of teamwork in the context of solving multifaceted problems with rigid timelines. LO5. Communicate in the form of technical reports and formal presentations. **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Enhanced To develop continuously - Enhanced To communicate effectively - Enhanced
Module Content	This module is developed to deepen the student's understanding of heat and mass transfer as well as their capacity to solve complex engineering problems associated with real life thermal fluid systems. The module structure is primarily continuous assessment centred on problem-based learning. The group assignments and laboratory will pull together knowledge and understanding of thermodynamics, fluid mechanics and heat transfer together with other core areas of mechanical and manufacturing engineering, by posing open-ended and real-life thermal fluid system design problems that require bespoke engineering solutions. The problems will coordinate technical performance requirements with plausible real-life constraints such as size/weight, material compatibility, manufacturability, cost etc. The group assignments will encourage the use of internet resources and archived journal publications to find new and/or unconventional techniques for their design with the aim of fostering innovative and critical thinking while bringing the

students up to speed with regard to the state of the art of both commercially available high technologies as well as emerging high technology.

Teaching and Learning Methods

This module uses problem-based learning via self-directed group assignments, group presentations, a laboratory and final examination to help students achieve the required learning outcomes.

Assessment Details
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 (provisional)
Written examination	End of semester examination	1-3	20	Exam period
Assignments	Two group assignments (each 5 weeks in duration)	1-5	80	Staggered in Weeks 1-12

Reassessment Requirements

Contact Hours and Indicative Student Workload

Contact hours: 44
Independent Study (preparation for course and review of materials): 40
Independent Study (preparation for assessment, incl. completion of assessment): 40

Recommended Reading List

- Cengel and Turner, Fundamentals of Thermal Fluid Sciences (McGraw-Hill) Dynamics , JL Meriam (Wiley)
- Cengel and Bowles, Thermodynamics: an Engineering Approach (McGraw- Hill)
- Incropera & DeWitt, Introduction to heat Transfer (Wiley)
- White, Fluid Mechanics (McGraw-Hill)

Module Pre-requisite	4B4 Heat Transfer, 4B13 Fluid Mechanics, 5E4 Introduction to Computational Fluid Dynamics
Module Co-requisite	NA
Module Website	
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No
Module Approval Date	August 2026
Approved by	Anthony Robinson
Academic Start Year	2026
Academic Year of Date	2026/27