

Module Details	
Module Title:	Thermofluids 2
Module Code:	MAE5012-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Mechanical and Energy Systems Engineering
Subject Area:	Mechanical and Automotive Engineering
FHEQ Level:	FHEQ Level 5
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	Hours
Lectures	48
Tutorials	24
Laboratory	6
Directed Study	122

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Academic Year (Sept - May)

Module Aims
To examine the principles of Fluid Mechanics, with an emphasis on the analysis of flows that are common in engineering fields. To review Thermodynamics as the science of energy conversion; to apply the subject to the analysis of simple processes; to introduce heat transfer; to introduce the Second Law of Thermodynamics.

Outline Syllabus
Understanding of fundamental principles: Flow acceleration, continuity and energy equations and their applications; Reynolds number and head losses in real flows;

Features of laminar and turbulent flows in pipes and conduits with velocity profiles, pressure drops, friction factors and Moody diagram;
 Pipe systems including pipes in series, pipes in parallels and branching pipelines;
 Pipe connections with pumps and siphons;
 Introduction to the no slip condition and the boundary layer;
 Momentum equation and fluid forces on structures;
 Properties of fluids and flow processes;
 Second law of thermodynamics;
 Entropy;
 Exergy;
 Gas power cycles;
 Vapour power cycles;
 Refrigeration cycles;
 Mixtures of gases and vapours;
 Heat transfer;
 Heat transfer correlations and heat exchangers.

Learning Outcomes

1	Correctly apply and evaluate the principles of fluid mechanics to real world applications within the fields of Mechanical, Civil and Chemical Engineering.
2	Correctly apply and evaluate the principles of thermodynamics to real world applications within the fields of Mechanical, Civil and Chemical Engineering.
3	Interpret data from a laboratory session and work independently or collaboratively to report scientific conclusions based upon evaluation of this data.

Learning, Teaching and Assessment Strategy

Theoretical understanding and problem solving through large lectures, staff-led tutorial/example classes and directed study. Practical skills of data interpretation and justification are gained from laboratory sessions, partially assessed by examination.

Assessment is through formal closed book examination (60%) as well as through a collaborative Group Laboratory report based upon one of the two laboratory classes (40%).

Formative assessment is provided through tutorial sheets provided on a weekly basis and answered by students during directed study. Feedback on these, and model solutions, are provided within tutorial classes.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G).

SM1b, SM2b, SM3b, EA1b, EA2, EA3b, D5, EL2, EL4, P1, P2, P3, G1, SM1m, SM2m, SM5m, EA1m, EA5m.

Further details of these learning outcomes can be found at <https://www.engc.org.uk/>.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Examination - closed book	Examination of taught material	2 hours	60%
Referral	Examination - closed book	Examination	2 hours	100%
Summative	Dissertation or Project Report	Group laboratory report		40%

Reading List

To access the reading list for this module, please visit <https://bradford.rl.talis.com/index.html>.

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.