

Module Details	
Module Title:	Thermofluids 1
Module Code:	ENG4008-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Mechanical and Energy Systems Engineering
Subject Area:	Engineering
FHEQ Level:	FHEQ Level 4
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 / Semester 2 (Feb - May)

Module Aims
To provide students with a fundamental understanding of the composite subject Thermofluids, which comprises two branches of engineering science - Thermodynamics and Fluid Mechanics.

Outline Syllabus
1) Properties of fluids
2) Hydrostatics and buoyancy forces

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| 3) | Fluids in motion – laminar and turbulent flows |
| 4) | Introduction to energy thermodynamics |
| 5) | Systems, energy, work, heat, properties. |
| 6) | First Law of Thermodynamics. |
| 7) | Mass continuity |
| 8) | Energy conservation – Bernoulli’s equation |
| 9) | Conservation of momentum |
| 10) | Ideal gases; thermodynamic tables, compressibility |
| 11) | Analysis of closed systems |
| 12) | Analysis of open systems |

Learning Outcomes	
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1	Demonstrate knowledge of fluid flow and energy balances in engineering components such as pipes, weirs, nozzles, turbine and engines.
2	Explain the principles of thermodynamics and fluid mechanics and demonstrate the ability to apply these principles to the analysis of simple processes
3	Measure and critically evaluate energy balances and fluid flows; predict the behaviour of fluids in simple engineering applications
4	Demonstrate analytical skills, problems solving skills and design skills related to heat transfer, fluid and particle flow equipment.
5	Demonstrate skills in data interpretation, scientific method and systematic problem solving.

Learning, Teaching and Assessment Strategy

Theory, implementation, application, and critical analysis is gained through interactive lectures, tutorials, case studies and directed study. Engineering application and evaluation is gained from experimental laboratory sessions performed in small groups. Formative feedback will be provided to students during laboratory sessions and during tutorials. Directed study provides students with the opportunity to undertake guided reading and to develop their own portfolio of learning to enhance transferable skills and knowledge relating to evaluation of own role and subject provision.

Assessment of understanding, application and critical analysis by closed book examination (LOs 1-4); assessment of engineering application assessed by laboratory experiments and written coursework (LO5). Formative assessment will be provided as part of tutorial sessions with the aid of worked examples.

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, D3b, EL2, EL4, P1, P2, P3, P4, SM3m. Further details of these learning outcomes can be found at <https://www.engc.org.uk/>.

Mode of Assessment				
Type	Method	Description	Length	Weighting
Summative	Laboratory Report	Individual lab report based on ideal gas expansion, heat transfer and pressure measurement		20%
Summative	Laboratory Report	Individual Lab Report based on measure of fluid flow		20%
Referral	Examination - closed book	Answer 4 questions from 6 (3 fluids, 3 thermodynamics)	2 hours	100%
Summative	Examination - closed book	Answer 4 questions from 6 (3 Fluids, 3 Thermodynamics)	2 hours	60%

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.