Unit Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Unit Title: THERMODYNAMICS

Unit ID: ENGIN3304

Credit Points: 15.00

Prerequisite(s): (ENGIN2304 for undergraduate Students only)

Co-requisite(s): Nil

Exclusion(s): Nil

ASCED: 030701

Description of the Unit:

The unit will consolidate and further extend the principles of thermodynamics and apply them to a range of engineering and industrial applications and provide the underlying fluid mechanic concepts involved in fluid flow to enable students to analyse more complex applied phenomena.

Grade Scheme: Graded (HD, D, C, P, MF, F, XF)

Work Experience:

No work experience: Student is not undertaking work experience in industry.

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the Unit but gained a final mark of 45 per cent or above, has completed all major assessment tasks (including all sub-components where a task has multiple parts) as specified in the Unit Description and is not eligible for any other form of supplementary assessment

Course Level:

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Introductory						
Intermediate						

Level of Unit in Course	AQF Level of Course					
	5	6	7	8	9	10
Advanced			✔			

Learning Outcomes:

Knowledge:

K1. Identify the basic laws of thermodynamics and their utility in thermal engineering

K2. Demonstrate the principles of engineering analysis as applicable to thermodynamics.

K3. Analyse thermodynamic problems relevant to industrial applications.

Skills:

S1. Apply the knowledge gained in a controlled laboratory environment.

S2. Apply existing and developing knowledge and experience.

S3. Develop and analyse thermodynamic methodologies.

Application of knowledge and skills:

A1. Apply knowledge gained in thermodynamics in controlled laboratory environment.

A2. Apply the developed thermodynamic knowledge to solve realistic problems.

Unit Content:

Topics may include:

- Thermodynamic cycles
  - Generalised representation of thermodynamic cycles; Cycle efficiency.
  - The most efficient thermodynamic cycle: the Carnot cycle.
  - Statements of the Second Law of thermodynamics.
  - The Carnot Principles

- Entropy
  - Entropy and the T-S diagram.
  - Isentropic processes, isentropic efficiencies of steady-flow devices.
  - Entropy and reversibility.

- Reciprocating internal combustion engines
  - Otto cycle: the ideal cycle for spark ignition engines
  - Diesel cycles: The ideal cycle for compression-ignition engines
  - Differences between ideal and practical engine cycles
  - Four-stroke and two-stroke engines
  - Engine performance calculations.

- Gas-turbine engines
  - Brayton cycle: the ideal cycle for gas-turbine engines
  - Deviation of actual gas-turbine cycles from idealised ones
  - Enhancing Brayton cycle with regeneration, inter-cooling and reheating
  - Theory of mixtures, psychrometry and combustion
  - Jet-propulsion cycles

Learning Task and Assessment:

Learning Outcomes Assessed	Assessment Tasks	Assessment Type	Weighting
K1-K3, S2-S3, A2	Numerical problems to help students learn problem solving skills.	Numerical assignment	10-20%
S3, A1	Practical application of the basic thermodynamic principles in a laboratory setting.	Lab reports	10-20%
K1-K3, S2-S3, A2	Numerical problems and real engineering scenarios to assess student's understanding of application of the basic laws of thermodynamics	Quiz/Tests/Final Exam	10-50%

Alignment to the Minimum Co-Operative Standards (MiCS)

The Minimum Co-Operative Standards (MiCS) are an integral part of the Co-Operative University Model. Seven criteria inform the MiCS alignment at a Course level. Although Units must undertake MiCS mapping, there is NO expectation that Units will meet all seven criteria. The criteria are as follows:

1. Co-design with industry and students
2. Co-develop with industry and students
3. Co-deliver with industry
4. FedTASK alignment
5. Workplace learning and career preparation
6. Authentic assessment
7. Industry-link/Industry facing experience

MiCS Course level reporting highlights how each Course embraces the principles and practices associated with the Co-Operative Model. Evidence of Course alignment with the MiCS, can be captured in the Course Modification Form.

MICS Mapping has been undertaken for this Unit No

Date:

Adopted Reference Style:

Other (IEEE: Refer to the library website for more information)

Refer to the library website for more information

Fed Cite - referencing tool