Course Outline (Higher Education)

Institute / School: Institute of Innovation, Science & Sustainability

Course Title: THERMODYNAMICS

Course ID: ENGIN3304

Credit Points: 15.00

Prerequisite(s): (ENGIN2304)

Co-requisite(s): Nil

Exclusion(s): Nil

ASCED: 030701

Description of the Course:

The course 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)

Placement Component: No

Supplementary Assessment: Yes

Where supplementary assessment is available a student must have failed overall in the course but gained a final mark of 45 per cent or above and submitted all major assessment tasks.

Program Level:

Level of course in Program	AQF Level of Program					
	5	6	7	8	9	10
Introductory						
Intermediate						
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.

Course 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

Graduate Attributes

The Federation University Federation graduate attributes (GA) are entrenched in the Higher Education Graduate Attributes Policy (LT1228). FedUni graduates develop these graduate attributes through their engagement in explicit learning and teaching and assessment tasks that are embedded in all FedUni programs. Graduate attribute attainment typically follows an incremental development process mapped through program progression. **One or more graduate attributes must be evident in the specified learning outcomes**

and assessment for each FedUni course, and all attributes must be directly assessed in each program

Graduate attribute and descriptor		Development and acquisition of GAs in the course	
		Learning Outcomes (KSA)	Assessment task (AT#)
GA 1 Thinkers	Our graduates are curious, reflective and critical. Able to analyse the world in a way that generates valued insights, they are change makers seeking and creating new solutions.	K1-K3, S2-S3, A2	AT1-AT3
GA 2 Innovators	Our graduates have ideas and are able to realise their dreams. They think and act creatively to achieve and inspire positive change.	Not applicable	Not applicable
GA 3 Citizens	Our graduates engage in socially and culturally appropriate ways to advance individual, community and global well-being. They are socially and environmentally aware, acting ethically, equitably and compassionately.	Not applicable	Not applicable
GA 4 Communicators	Our graduates create, exchange, impart and convey information, ideas, and concepts effectively. They are respectful, inclusive and empathetic towards their audience, and express thoughts, feelings and information in ways that help others to understand.	S3, A1	AT3
GA 5 Leaders	Our graduates display and promote positive behaviours, and aspire to make a difference. They act with integrity, are receptive to alternatives and foster sustainable and resilient practices.	S3, A1	AT3

Learning Task and Assessment:

Learning Outcomes Assessed	Learning 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%

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