ES2F8-15 Applied Thermodynamic Engineering

24/25

Department
School of Engineering
Level
Undergraduate Level 2
Module leader
Angeles Rivero Pacho
Credit value
15
Module duration
24 weeks
Assessment
30% coursework, 70% exam
Study location
University of Warwick main campus, Coventry

Description

Introductory description

Applied Thermodynamic Engineering

Module aims

Mechanical Engineers are expected to have a working knowledge of the thermodynamic basis of a number of types of engine and refrigerators / heat pumps, together with the principles (such as the Second Law) that constrain their performance. This module addresses those requirements.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

1 Second Law of Thermodynamics
2 Properties of working fluids
3 Entropy of perfect gases
4 Otto cycle engines

5 Diesel cycle engines
6 Rankine cycle engines
7 Fuels and combustion
8 Air Conditioning, Refrigeration and Heat pump cycles

The learning on the module is supported by a laboratory on refridgeration; an application from the apprentice's workplace will be utilised to extend the understanding of cooling systems to wider context

Learning outcomes

By the end of the module, students should be able to:

- Apply the Second Law of Thermodynamics to complex processes occurring in internal combustion engines.
- Carry out complex thermodynamic analyses of various engine cycles.
- Discriminate between different types of engine cycle and their applications.
- Perform complex thermodynamic analyses of refrigeration and heat pump cycles.
- Demonstrate practical skills in a professional and scientific manner.
- Apply numerical and mathematical skills to the solution of mechanical and related engineering problems and communicate solutions
- Communicate the place and use of thermodynamic equipment in society.

Indicative reading list

Efstathios, M., Nanofluidics : thermodynamic and transport properties. E-book. Springer, 2014.
Miloslav, P., The Thermodynamics of linear fluids and fluid mixtures. E-book, Springer, 2014
G.F.C. Rogers and Y.R. Mayhew, Thermodynamic and transport properties of fluids, 5th ed., Oxford Blackwell, 1995.

View reading list on Talis Aspire

Subject specific skills

Communicate technical information with others at all levels, including technical reports and the use of digital tools.
Follow a methodical approach to engineering problem solving.
Model real-world mechanical systems efficiently.
Perform risk management for engineering activities.
Comply with statutory and organisational safety requirements.

Transferable skills

Hold paramount the health and safety of themselves and others, and model health and safety conscious behaviour.
Self-motivated, work independently and take responsibility for their actions. Set themselves challenging personal targets and make own decisions.

Communicate confidently to create and maintain working relationships. Be respectful.
Prioritise quality. Follow rules, procedures and principles in ensuring work completed is fit for purpose, and pay attention to detail / error checks throughout activities.
Adjust to different conditions, technologies, situations and environments and to new and emerging technologies.
Respect the environment and the public good. Consider sustainability and the adverse effects of projects and tasks on the wider world, in the short and longer term.
Commit to personal learning and professional development.
Commit to professional standards (or codes of conduct) of their employer and the wider industry.

Study

Study time

Type	Required
Lectures	25 sessions of 1 hour (17%)
Tutorials	8 sessions of 1 hour (5%)
Supervised practical classes	1 session of 3 hours (2%)
Work-based learning	60 sessions of 1 hour (40%)
Online learning (scheduled sessions)	2 sessions of 1 hour (1%)
Private study	52 hours (35%)
Total	150 hours

Private study description

52 hours guided independent learning (including VLE use).

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group D1

	Weighting	Study time	Eligible for self-certification
Extended Laboratory Report 6 pages report	30%		Yes (extension)

	Weighting	Study time	Eligible for self-certification
Online Examination 1 * 1.5 hour examination ~Platforms - AEP,QMP	70%		No

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- Online examination: No Answerbook required
- Engineering Data Book 8th Edition
- Thermodynamics tables
- Thermodynamic and Transport Properties of Fluids (ES4D90)

Feedback on assessment

Model solutions to questions for exam preparation.
Support through advice and feedback hours.
Written feedback on marked report.
Verbal feedback in Tutorial (Example) classes.
Cohort-level feedback on written examination.

Past exam papers for ES2F8

Availability

Courses

This module is Core for:

- Year 4 of DESA-H360 Undergraduate Electromechanical Engineering (Degree Apprenticeship)