Module Specification

Automotive Powertrain Technologies

Version: 2027-28, v1.0, Approved

Contents

Part 1: Information

Module title: Automotive Powertrain Technologies

Module code: UFMEBE-15-2

Level: Level 5

For implementation from: 2027-28

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Applied Electrical Technology 2026-27, Thermofluids 2026-27

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module focuses on both fundamental thermodynamic cycles of engines, and modern propulsion system including all-electric (battery, fuel cell, ultra-capacitor), or hybrid mode for automotive applications. The course provides the students with a detailed knowledge and understanding about various powertrain components and their configurations. It will consider powertrains with only an IC engine, an electric powertrain, or combinations of these as different hybrid powertrains. It will also enbale them to systematically apply the principles which

underlie the operation of engine and powertrain systems in order to design strategies to optimise performance, emissions and economy. The impact of transportation on the environment, alternative fuel and energy infrastructure issues and the economic and technical issues surrounding it will also be analysed and discussed in detail.

Motorised transport has transformed many aspects of human life over the past 120 years. Today's automotive engineers, however, face the unresolved challenge of continuing that transformation in a sustainable manner. Therefore this module develops the student's ability to engineer efficient and low-emission automotive propulsion solutions for future industry needs .

Features: Not applicable

Educational aims: This module aims to develop students' knowledge and understanding around automotive powerplants, with a focus on internal combustion engines before branching out into new and emerging technologies such as all-electric (battery, fuel cell) and hybrid mode for automotive applications.

Outline syllabus: Introduction to Fuels and Powertrain systems
Powertrain systems based on combustion technologies
Alternative Fuels and technologies to control emissions
Fuel cell vehicles (FCV) & Electrified Powertrain technologies
Hybrid Powertrain technologies

Part 3: Teaching and learning methods

Teaching and learning methods: The teaching and learning methods are designed to introduce automotive powertrain design and engineering principles through theory with worked examples. This is delivered principally through formal lectures, automotive lab sessions, a coursework report and online DEWIS exam element covering students' understainding on the fundamental powertrain systems design methodologies.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Demonstrate a comprehensive understanding of fundamental thermodynamic cycles and working principles of internal combustion engines, fuel cells, batteries and electric motors.

MO2 Configure and appraise various vehicle propulsion systems, e.g. ICEs, HEVs and EVs and also be able to solve vehicle powertrain problems associated with these.

MO3 Analyse and interpret data obtained from powertrain models and experiments.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 111 hours

Face-to-face learning = 39 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/365D3BAE-14AA-B6E2-E811-7DC6FFA0437B.html?lang=en-GB&login=1

Part 4: Assessment

Assessment strategy: Module assessment strategy comprises of a group of summative portfolio tasks that will assess students' knowledge, analytical and application skills related to automotive powertrain systems. It is designed to reflect both theoretical understanding and practical competence through two integrated tasks:

1) Coursework Assignment Report (70%) - Addressing the understanding of thermodynamic cycles and propulsion technologies and systems-level configuration and problem-solving. (MO1 & MO2)

2) Lab Practicals Report (30%) - Students will participate in laboratory based sessions involving powertrain experiments or model-based analysis (e.g., using

MATLAB/Simulink) interpreting performance data (e.g., power-torque curves, energy consumption, efficiency maps) and simulated or measured results from EVs or HEVs. (MO3)

The resit strategy takes the same form as the first sit assessment strategy.

Assessment tasks:

Portfolio (First Sit)
Description: 70% - Coursework report (2500 words) - MO1, MO2

30% - Lab practicals report (5 pages max) - MO3
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Portfolio (Resit)
Description: 70% - Coursework report (2500 words) - MO1, MO2

30% - Lab practicals report (5 pages max) - MO3
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Automotive Engineering {Foundation} [Frenchay] BEng (Hons) 2025-26

Automotive Engineering [Frenchay] BEng (Hons) 2026-27