WM985-15 Automotive Hybridisation and Electrification

24/25

Department
WMG
Level
Taught Postgraduate Level
Module leader
Andy Gardiner
Credit value
15
Module duration
1 week
Assessment
90% coursework, 10% exam
Study locations
University of Warwick main campus, Coventry Primary
Distance or Online Delivery

Description

Introductory description

The module covers the principles and concepts behind engineering hybrid and electrified vehicles at the vehicle system layer. Customer requirements such as performance feel, efficiency and sound quality are introduced. Requirements are decomposed to technical solutions, and verification methods to deliver those customer wants and desires. Propulsion architectures, control methods and integration issues are covered in detail and a thorough understanding of the process is gained

Module web page

Module aims

The student will gain a thorough understanding of the issues faced by the industry in moving to electrification, and the purpose of the propulsion system in context of delivering the customer attributes.

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.

The Module covers the vehicle layer of the "Systems V". Customer perceived attributes and characteristics such as performance feel are covered along with the governing legislation pertinent to New Energy Vehicles. Propulsion architectures for NEV's are then covered, along with the constituent systems and sub-systems. Principles of requirements cascade and NEV design are incorporated, and finally integration issues pertinent to NEV's are covered.

Learning outcomes

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

- Demonstrate initiative in the design of complex control systems for hybrid electric vehicle energy management strategies, interpreting optimization techniques for controlled and real world conditions [AHEP; 7, M1,M7,M17]
- Evaluate customer and attribute requirements to systematically decompose and cascade through the propulsion system in order to creatively design original proposals for practical vehicle applications [AHEP; 7, M5,M7,M17]
- Critically evaluate the alternative propulsion technologies applicable to automotive applications [AHEP; 7, M7,M17]
- Systematically and independently design novel solutions to practical problems under a comprehensive, requirements based, systems engineering approach [AHEP; 7, M1,M7,M16,M17]
- Interpret the practical consequences and feasibility of vehicle designs for real-world applications at the forefront of automotive technology [AHEP; 7, M7,M17]

Indicative reading list

View reading list on Talis Aspire

Subject specific skills

| Gaining the theoretical knowledge to solve problems in existing and emerging technologies, applying and developing analytical techniques |
| Understand the requirements and limitations (Customer, environmental, safety, cost, timescale), and how to propose design and development solutions that best address these |
| Understand design concepts and principles relating to the development of products, services and specifications |
| Gain practical competence to deliver innovative products and services |
| Gain an understanding of management of trade-offs between technical and socio-economic factors |
| Make trade-offs between requirements (Customer, environmental, safety, cost, timescale) and articulate the impact of these |

| Identify issues with system integration, test environment and design proving problems present at the design phase of products |

Transferable skills

Core Behaviours:
| Design and development of processes, systems, services and products
Contributing proactively to the continuing development of Engineering within their domain |
| Communication and inter-personal skills
Being able to demonstrate a range of communication styles and methods. Understanding the importance of networks within and across functions, handling conflict, giving and using feedback effectively. Able to understand the different needs for business relationships and their associated communication requirements. |

Study

Study time

Type	Required
Lectures	27 sessions of 1 hour (52%)
Seminars	3 sessions of 1 hour (6%)
Supervised practical classes	(0%)
Online learning (scheduled sessions)	(0%)
Online learning (independent)	12 sessions of 1 hour (23%)
Private study	10 hours (19%)
Total	52 hours

Private study description

Self-study time for preparation for assessed tasks, including independent research activity.

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
Post Module assignment: AHE	70%	42 hours	Yes (extension)
Post Module assignment based on the intended learning outcomes of the module			
Video Presentation	20%	12 hours	Yes (extension)
Video presentation critically evaluating and proposing a HEV solution			
In module online assessement tasks	10%	6 hours	Yes (extension)
Subject specific in module online assessment prior to on-site teaching. Duration 15 minutes.			

Feedback on assessment

Scaled ratings for Comprehension, Effort and Presentation. Individual written feedback and overall mark.

Past exam papers for WM985

Availability

Post-requisite modules

If you pass this module, you can take:

- WM984-15 Systems Engineering and Functional Safety
- WM994-15 Electrical Drivetrains
- WM986-15 Energy Storage Systems
- WM995-15 Battery Electrochemistry, Design and Manufacturing

There is currently no information about the courses for which this module is core or optional.