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Module Code:MAAD0025

Title of Module

Full Title: Advanced Engines & Power Systems

Short Title: Advances Power Sys

MODULE

MAAD0025 (A 05/6)

Advanced Engines & P...

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Version: 1

Credit Points: 15

Level / ECTS Level: M

First Offered: 26/9/2005 00-00-00

6. Home Department:

AAD

7. Departments(s) contributing to teaching:

9. Module Aims:

- provide an understanding of various advanced concepts in engine design and alternative power systems.
- introduce alternative fuels for both conventional and unconventional engines.
- examine the impact of utilising the advanced/alternative power systems on the vehicle's overall performance and the environment.

10a. Learning Outcomes: Knowledge and Understanding:

- have good understanding of the advanced techniques for conventional and unconventional engines and power systems.
- identify advanced concepts developed to improve conventional engine performance and to meet environmental legislation.
- have good knowledge of alternative fuel properties and their use for advanced engines and power systems.
- quantify the impact of utilising conventional and alternative fuels on vehicle performance and the environment.

10b. Learning Outcomes: Skills and Attributes:

- analyse the performance of a variety of vehicle power units/systems.
- identify the structure and components of the advanced power systems.
- select appropriate power unit/system for particular vehicle application.
- identify the alternative vehicle fuel necessary to meet particular engine performance and environmental legislation.

- quantify the impact of the individual systems on the vehicles performance and environment.

11. Module Content

11a Module Content:

This course introduces new developments in engine technology and alternative power systems. It examines these developments and assesses their impact on the vehicle's overall performance and on the environment. Future developments in engine fuel system design, combustion control strategies, and exhaust gases treatment are amply covered. The development of hybrid, fuel cell, hydrogen, gas turbine and other types of vehicles are investigated. A variety of emission legislations, cycles, measurement techniques and environmental effects are introduced.

11b. Further details on how the learning outcomes of the module will be achieved:

The intended learning outcomes are facilitated through a series of individual mentoring basis to encourage and guide the students to fulfil the aims and objectives of their projects, by encouraging the students to access a variety of resources, eg StudyNet, electronic databases, relevant professional and academic text, journals, conference proceedings, available laboratory facilities and technologies.

The module comprises-

Various advanced engines and power unit concepts (products) will be developed during the course of the study. Many of these concepts listed below are still undergoing extensive academic and industrial R&D. Students will be introduced to the relative merits of each of the power systems in terms of their performance and reliability as well as standards of emission and their effect on environment. Where appropriate the students will undertake experimental work in the Automotive Centre where they will further enhance their knowledge and understanding of test and validation of principals using engine test rig and computer software.

- Advanced techniques for conventional engines-- common rail direct injection systems for diesel and gasoline engines, combustion systems modifications, fuel injection systems, fuel spray characteristics, combustion process and control strategies, emission reduction strategies, exhaust gas recirculation, three way catalytic converters, regenerative particulate traps, engine turbocharging.

- Alternative power systems-- hybrid engines, hybrid engines with energy storage facilities, series and parallel hybrids, electric engines, fuel cells, hydrogen fuel cells, sterling engines, gas turbine engines, and Wankel rotary engines.

- Advanced/unconventional engines- - the adiabatic engine, free piston engine, swash-plate engine and slider-crank engine.

- Alternative fuels & systems- - reformatting gasoline and diesel, alcohol/gasoline mix, ethanol and methanol, Natural compressed gas (LPG), liquid petroleum gases (LPG), hydrogen, animal and vegetable oils.

- Emission from advanced engines and alternative fuels- - Exhaust gas composition, emission Legislation, emission cycles including (urban/cruise cycles), emission testing techniques, infrared CO and CO₂ analysers, flame ionisation hydrocarbon (UH) detectors, paramagnetic oxygen (O₂) analysers, light/photometric particulate and soot detectors, and chemi-illuminescence (NO_x) analysers.

12. Language of Delivery:

English

13. Language of Assessment:

English

14. Assessment Details (Academic):

Coursework: 50

Exam: 50

Other:

Assessment Notes:

The examination (50%) is an end-of-module 3 hours individual examination.

The successful candidates would be expected to pass the exam element and pass overall.

Each Assessment satisfies a selection of the learning outcomes.

15. Locations(s):

UH HATFIELD

16. Pre and Co-Requisite:

Pre-Requisite

Co-Req

Prohibited

17. Subject Board of Examiner/s:

18. Comments

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