

Module Title:	Automotive Design	Level:	5	Credit Value:	20
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Module code:	ENG557	Is this a new module?	NO	Code of module being replaced:	
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Cost Centre:	GAME	JACS3 code:	H330
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Trimester(s) in which to be offered:	1, 2	With effect from:	September 17
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School:	Applied Science, Computing & Engineering	Module Leader:	B. Manesh
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Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BEng (Hons) Automotive Engineering	✓	
Pre-requisites		

Office use only

Initial approval February 17

APSC approval of modification

Version 1

Have any derogations received Academic Board approval?

Yes ✓ No

Module Aims

To support the development of the student in the following areas:

- The conceptual design of automotive systems.
- Design evaluation and modelling.
- Project planning, management, team working and presentation skills.
- Applying advanced design principles to create a new and innovative products and solve engineering design problems.
- Experience in the use of up to date visualisation approaches and commercial computer software for design applications.
- The selection of appropriate materials and processes for economic designs.
- To provide students with the opportunity to practice the task management and problem-solving activities of a professional engineer and to explore original ideas.
- To exercise the student in applying and extending the methods, skills, information, knowledge and understanding obtained during the various parts of the programme to developing and evaluating an original design of an engineering product.

Intended Learning Outcomes

Key skills for employability

- KS1 Written, oral and media communication skills
- KS2 Leadership, team working and networking skills
- KS3 Opportunity, creativity and problem solving skills
- KS4 Information technology skills and digital literacy
- KS5 Information management skills
- KS6 Research skills
- KS7 Intercultural and sustainability skills
- KS8 Career management skills
- KS9 Learning to learn (managing personal and professional development, self-management)
- KS10 Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Apply structured techniques to the specification and creative phases of the design process and understand the structure and dynamics of a modern vehicle and design the operation of major vehicle sub systems	KS1	KS3
2	Use analytical techniques to confirm the adequacy of conceptual solutions including the use of visualisation approaches and commercial software to model and optimise design solutions for specific vehicle performance and select design parameters.	KS4	KS5
		KS9	KS10

3	Select appropriate materials and processes for economic and sustainable designs including research on vehicle designs	KS5	KS6
		KS7	
4	Develop creative thinking to generate ideas, evaluate them and turn them onto a new product or design	KS2	KS3
5	Implement the appropriate stages of a product design (including: specification, task analysis, search of current information sources, consider options and plan and cost solutions, select and design a solution, construct/implement solution, test and evaluate the solution)	KS5	KS6
		KS8	

Derogations

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Assessment:

The assessment will be contained in an overall project based portfolio. Typically the student will be tasked to provide a portfolio containing the following sections as a minimum:

Project brief & log book

An evidence portfolio built up by the student, including Concept development, Drawings, CAD, models, Detail designs, materials and component selections, planning and development notes, a diary recording progress and reflective comments, reflective analysis and conclusion.

Students will communicate the results in the form an oral presentation, with due consideration given to commercial implications.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1 ,2,3,5	Portfolio	60%		2500
2	4	Presentation	40%	20min	

Learning and Teaching Strategies:

Lectures - presentation of theory, facts and concepts, relating to product design, in order to convey critical information. Interaction or active learning should be implemented to develop an understanding of principles and concepts and stimulate discussion.

Tutorials – Close interaction with students ensuring that the work presented during lectures has been understood, with specific help being given in order to overcome any learning problems, should they occur.

Syllabus outline:

Problem Identification: Product design specification criteria and content in an automotive context.

Ethical Considerations: consideration of moral fitness and professional standards throughout the process.

Creativity: the psychological mind set for creativity, inversion and fantasy as methods of developing ideas, brainstorming, morphological analysis, presentation of ideas.

Concept Selection: subjective decision making methodologies including techniques such as criteria ranking and weighting, datum and EVAD method.

Embodiment: scheme drawings, form design, designing for assembly and manufacture.

Modelling: mathematical and computer modelling, scale models and simulation as used in automotive engineering design.

Detail Design: Safety, robustness of design and selection of bought components.

Presentation to Client: how to present the creative, conceptual, embodied and final designs to a client orally and in report form.

Structural design: Structural design and analysis of performance automotive structures; stiffness of structures; influence of material properties on the design process.

Composite and plastic materials: Material forms, performance and selection; manufacturing technology and joining techniques; vehicle component development; ceramics matrix composites; metal matrix composites; manufacturing facilities; NDE; health and safety

Bibliography:

Essential reading

Hurst, K.S. *Engineering Design Principles*, Oxford: Elsevier Ltd. 1999

K.H. Dietsche (ed.) *Bosch Automotive Handbook*, 8th ed. Robert Bosch GmbH. 2011

Other indicative reading

Brown, J.C. et al. *Motor Vehicle Structures: Concepts and Fundamentals*, Butterworth-Heinemann Ltd. 2001

D.A. Crolla (ed.) *Automotive engineering powertrain, chassis system and vehicle body*, Oxford, Butterworth-Heinemann Ltd. 2009

A. Milton et al. *Research Methods For Product Design*. Laurence King Publishing Ltd. 2013