UNIVERSITY OF WARWICK

Proposal Form for New or Revised Modules (MA1 - version 7 - April 2014)

Approval information	
Approval Type	☐ New module ☒ Revised module ☐ Discontinue module
Date of Introduction/Change	October 2017
If new, does this module replace another? If so, enter module code and title:	
If revised/discontinued, please outline the rationale for the changes:	Revised as part of the curriculum review
Confirmation that affected departments have been consulted:	Changes were made in consultations between the School of Engineering and WMG.

Module Summary	
1. Module Code (if known)	ES3A9
2. Module Title	Design for Vehicle Safety
3a. Lead department:	WMG
3b. Teaching Split (if known):	100% WMG
4. Name of module leader	Mr Hadi Moztarzadeh
5. Level	UG: ☐ Level 4 (Certificate) ☐ Level 5 (Intermediate) ☒ Level 6 (Honours) PG: ☐ Level 7 (Masters) ☐ Level 8 (Doctoral) See Guidance Notes for relationship to years of study
6. Credit value(s) (CATS)	15 CATS
7. Principal Module Aims	This key automotive-specific module will introduce the concept of design for vehicle safety. The module aims to promote an understanding and an interest in the issues of design for safety for the vehicle structure as well as considering some of the automotive systems which contribute to safety aspects. This module will draw upon the close links that WMG has with the automotive industry to deliver industry-relevant theory and applied engineering.

Module Summary	
8. Principal Learning Outcomes	By the end of the module students should be able to: • Evaluate and understand the scientific and engineering principles, including materials science and mechanical engineering concepts that underpin the design of an automobile for the safety of the occupants and other road users and apply them to smaller scale industrial-oriented case studies • Demonstrate an in-depth knowledge of future direction of the design of safety systems and structures within the vehicle engineering sector and adapt current knowledge accordingly • Appreciate the role and use of HMI systems in vehicle engineering, including in-vehicle technologies • Obtain a working knowledge of the legislative, social and environmental factors relevant to safety in automotive systems and apply them in specific case studies • Gain an appreciation of the role of mathematical modelling and CAE in design for failure analysis and apply the mathematical modelling for simple case studies in vehicle structure • Communicate the engineering discussions, related to vehicle safety, in a professional and scientific manner
9. Timetabled Teaching Activities (summary)	Lectures 30 x 1hr = 30 hours Examples classes 2 x 1hr = 2 hours Laboratory sessions 2 x 3h = 6 hours **Total contact hours = 38**
10. Departmental Web-link	http://www2.warwick.ac.uk/fac/sci/eng/eso/modules/year3/es3a9
11. Other essential notes	Advice and feedback hours are available for answering questions on the lecture material, theory and lab exercises.
12. Assessment methods (summary)	Examination (3 hours) 70% Assessed assignment, (2500 words) 30% Students must pass the examination and must pass the coursework.

For use by Strategic Planning and Analytics Office only - Do not fill in this section

Level	JACS3 Code	Teaching Split
		If not provided in 3b above

External Credit Level		Scheme	

Module Context

13. Please list all departments involved in the teaching of this module. If taught by more than one department, please indicate percentage split.

WMG

14. Availability of module

Degree Code	Title	Study Year	C/OC/ A/B/C	Credits
H106	BEng Engineering	3	O	15 CATS
H107	MEng Engineering	3	B	15 CATS
H109	MEng Engineering with Intercalated Year	3	B	15 CATS
H110	MEng Engineering with a Year in Research	3	B	15 CATS
H330	BEng Automotive Engineering	3	Core	15 CATS
H331	MEng Automotive Engineering	3	Core	15 CATS
H332	MEng Automotive Engineering with Intercalated Year	3	Core	15 CATS
H333	MEng Automotive Engineering with a year in Research	3	Core	15 CATS
HN12	BEng Engineering Business Management	3	B	15 CATS

15. Minimum number of registered students required for module to run

1 (core)

16. Pre- and Post-Requisite Modules

n/a

Module Content and Teaching

17. Teaching and Learning Activities *(totals for module – please see guidance)*

Module duration (weeks)	**10**
Lectures	**30 x 1 hour**
Seminars	
Tutorials	
Project Supervision	
Demonstration	
Practical Class/Workshops	2 x 3 hours

Module Content and Teaching		
Supervised time in studio/workshop		
Fieldwork		
External visits		
Work based learning		
Placement		
Year abroad		
Other activity *(please describe): e.g. distance-learning, intensive weekend teaching etc.*	Guided independent learning 112 hours 2 x 1 hour examples classes	
18. Assessment Method (Standard)		
Type of assessment	**Length**	**% weighting**
Written Examinations	3 Hours	70%
Practical Examinations	Hours	
Assessed essays/coursework	Assessed assignment (20 pages)	30%
18a. Final chronological assessment *(please see guidance*)	**Examination**	

19. Methods for providing feedback on assessment.
Written comments and electronically marked-up assignment Cohort level feedback on examination
20. Outline Syllabus
What is automotive safety; history, why and how The role of material science in design for vehicle safety Material selection for design for safety Automotive structure and safety Safety aspects of design for BIW Crashworthiness legislation Crash analysis; front/rear impact and side crash The role of HMI Systems in safety aspects of automotive systems CAE/FEA in analysis of vehicle structure Fatigue failure analysis for vehicle structure The role of different vehicle sub-systems in safety aspects
21. Illustrative Bibliography
Radhakanta Rana, Shiv Brat Singh, Automotive steels : design, processing and applications, 2017 Mehrdad Ehsani, Fei-Yue Wang and Gary L. Brosch, Transportation technologies for sustainability, 2013

Bhise, Vivek D., Ergonomics in the automotive design process, 2012
Davies, G, Materials for Automobile Bodies. Butterworth Heinemann. 2003
Dearborn, M. H. Vehicle Crash Dynamics. CRC Press 2002
Dixon, J.C. Tyres, Suspension and Handling, Cambridge University Press, 1991
Bastow, D; Howard, G; Whitehead, J. P; Car Suspension & Handling 4th Edition. Wiley 2004
Matthew Huang "vehicle crash mechanics", 2002
Jason C. Brown, "Motor vehicle structure", 2002
M.J. Fagan, "Finite element analysis : theory and practice", 1992
Close, C, M; Frederick, D. K; Newell, J. C. Modelling and Analysis of Dynamic Systems 3rd Edition, Wiley 2002

22. Learning outcomes

Successful completion of the module leads to the learning outcomes. The learning outcomes identify the knowledge, skills and attributes developed by the module.

Learning Outcomes should be presented in the format "By the end of the module students should be able to..." using the table at the end of the module approval form:

See table at the end of this form.

Resources

23. List any additional requirements and indicate the outcome of any discussions about these.

Approval

24. Module leader's signature	Mr Hadi Moztarzadeh
25. Date of approval	Teaching Policy Committee Chair's Action 30 August 2017
26. Name of Approving Committee (include minute reference if applicable)	School of Engineering and WMG Teaching Policy Committee
27. Chair of Committee's signature	Professor Gillian Cooke
28. Head of Department(s) signature	Professor Nigel Stocks

Examination Information		
A1. Name of examiner (if different from module leader)		
A2. Indicate all available methods of assessment in the table below		
% Examined	**% Assessed by other methods**	**Length of examination paper**
70%	**30 assignment 2500 words**	**3 Hours**
A3. Will this module be examined together with any other module (sectioned paper)? If so, please give details below.		
n/a		
A4. How many papers will the module be examined by?	☒ 1 paper	☐ 2 papers
A5. When would you wish the exam take place (e.g. Jan, April, Summer)?	**Summer**	
A6. Is reading time required?	☐ Yes	☒ No
A7. Please specify any special exam timetable arrangements.		
A8. Stationery requirements		
No. of Answer books?	**1**	
Graph paper?	**Yes**	
Calculator?	**Yes**	
Any other special stationery requirements (e.g. Data books, tables etc)?	**Engineering databook**	
A9. Type of examination paper		
Seen?	☐ Yes	☒ No
Open Book?	☐ Yes	☒ No
Restricted?	☐ Yes	☒ No
If restricted, please provide a list of permitted texts:		

LEARNING OUTCOMES		
(By the end of the module the student should be able to....)	**Which teaching and learning methods enable students to achieve this learning outcome? (reference activities in section 15)**	**Which summative assessment method(s) will measure the achievement of this learning outcome? (reference activities in section 16)**
Evaluate and understand the scientific and engineering principles, including material science and mechanical engineering concepts that underpin the design of an automobile for the safety of the occupants and other road users and apply them to smaller scale industrial-oriented case studies	Lectures, directed reading, examples papers and private study	Unseen examination
Demonstrate an in-depth knowledge of future direction of the design of safety systems and structures within the vehicle engineering sector and adapt current knowledge accordingly	Lectures, directed reading, examples papers and private study	Unseen examination Assessment of assignment
Appreciate the role and use of HMI systems in vehicle engineering, including in-vehicle technologies	Assignment	Assessment of assignment
Obtain a working knowledge of the legislative, social and environmental factors relevant to safety in automotive systems and apply them in specific case studies	Lectures, directed reading, examples papers and private study	Unseen examination. Assessment of assignment
Gain an appreciation of the role of mathematical modelling and CAE in design for failure analysis and apply the mathematical modelling for simple case studies in vehicle structure	Lectures, directed reading, examples papers and private study	Unseen examination. Assessment of assignments
Communicate the engineering discussions, related to vehicle safety, in a professional and scientific manner	Assignments	Assignments