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 & title:	
If revised/discontinued, please outline the rationale for the changes:	Revised as part of curriculum refresh
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)	ES4E6
2. Module Title	**Automotive Materials & Processes**
3a. Lead department:	WMG
3b. Teaching Split (if known):	2/3 Dr. Michael AUINGER (Metals and Alloys) 1/3 Dr. Tara SCHILLER, Dr. Stuart COLES (Polymers, Composites) 100% WMG
4. Name of module leader	Dr. Michael AUINGER
5. Level	UG: ☐ Level 4 (Certificate) ☐ Level 5 (Intermediate) ☐ Level 6 (Honours) PG: ☒ Level 7 (Masters) ☐ Level 8 (Doctoral)
6. Credit value(s) (CATS)	15
7. Principal Module Aims	This automotive related module advances the known key aspects of materials selection for body-in-white parts as well as for view parts and powertrain application. A range of selected processes to manufacture and combine different materials will be evaluated, according to their suitability for automotive manufacture and in order to improve performance of the vehicle in terms of mechanical strength, weight reduction, overall costs and

Module Summary	
	environmental impact. Highly specialised parts such as coatings, catalysts and brakes will also be introduced to the audience.
8. Principal Learning Outcomes	By the end of the module students should be able to: • Demonstrate an advanced understanding and evaluate the production processes of metallic materials, used for automotive fabrication. • Demonstrate advanced knowledge on where to use certain materials in the chassis, for panels and powertrain application as well as applying this to evaluate reasonable design of a "real" vehicle in the coursework. • Evaluate current techniques for joining the different materials, mentioned above and apply this knowledge to the design of a "real" vehicle in the coursework. • Assess the importance of the use of different materials in terms of mechanical stability, lightweight application, environmental impact and costs. Advance this knowledge to the complex design in automotive applications.
9. Timetabled Teaching Activities (summary)	Lectures 30 x 1h = 30h 1 x 1 hr revision class Hands-on training / workshop 3 x 1h = 3h **TOTAL 34 Hours**
10. Departmental Web-link	www2.warwick.ac.uk/fac/sci/eso/modules/year4/es4e6
11. Other essential notes	Advice and feedback hours are available for answering questions on the module
12. Assessment methods (summary)	3 hour Examination (70%) Workshop-based report (3000 Words) (30%)

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.

100% WMG

14. Availability of module

Degree Code	Title	Study Year	C/OC/ A/B/C	Credits
H331	MEng Automotive Engineering	4	A	15
H332	MEng Automotive Engineering with Intercalated Year	5	A	15
H333	MEng Automotive Engineering with a Year in Research	5	A	15
H33A	MEng Automotive Engineering with Business Management	4	A	15
H33B	MEng Automotive Engineering with Sustainability	4	A	15
H33C	MEng Automotive Engineering with Robotics	4	A	15
HH37	MEng Manufacturing & Mechanical Engineering	4	A	15
HH38	MEng Manufacturing & Mechanical with Intercalated Year	5	A	15
HH39	MEng Manufacturing & Mechanical with a Year in Research	5	A	15
H37A	MEng Manufacturing & Mechanical with Business Management	4	A	15
H37B	MEng Manufacturing & Mechanical with Sustainability	4	A	15
H37D	MEng Manufacturing & Mechanical with Robotics	4	A	15
H107	MEng Engineering and Variants	4	A	15
H109	MEng Engineering with Intercalated Year	5	A	15
H110	MEng Engineering with a Year in Research	5	A	15

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

10

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 hr
Seminars	---
Tutorials	---
Project Supervision	---
Demonstration	---
Practical Class/Workshops	---
Supervised time in studio/workshop	1 x 3 hr hands-on session where people can have a look to the vehicles that are shown either in a workshop or at Warwick to evaluate and interpret which materials are appropriate and are being used and where they are used
Fieldwork	---
External visits	---
Work based learning	---
Placement	---
Year abroad	---
Other activity *(please describe): e.g. distance-learning, intensive weekend teaching etc.*	**1 x 1 hr revision class** **116 hrs guided independent learning**

18. Assessment Method (Standard)		
Type of assessment	**Length**	**% weighting**
Written Examinations	3 Hours	70
Practical Examinations	---	
Assessed essays/coursework	1 x workshop-based report (3000 Words)	30
18a. Final chronological assessment *(please see guidance*)	**Examination**	

19. Methods for providing feedback on assessment.
• Model solutions to past papers. • Support through advice and feedback hours. • Written feedback on assignment. • Cohort-level feedback on final exam.
20. Outline Syllabus
Lightweight materials: High strength steels, Aluminium and Magnesium Alloys, Plastics and Composites

Processes: Pressing and Forming, Joining, Composite manufacture
Specialist applications: Coatings, Catalysts and Brakes
Design for light-weighting

21. Illustrative Bibliography

- Chang-Soo Kim, Charles Randow, Tomoko Sano "*Hybrid and Hierarchical Composite Materials*" Springer International Publishing (2015).
- Vadim V. Silberschmidt, Valery P. Matveenko "*Mechanics of Advanced Materials – Analysis of Properties and Performance*" Springer International Publishing (2015).
- Jörg Vetter "*Chapter - Surface Treatments for Automotive Applications*" from "*Coating Technology for Vehicle Applications*" Springer International Publishing (2015).
- Andre Hieke, Val. Lieberman, G.J. van der Kolk "*Chapter – Hard Coatings and Coating Processes for the Automotive Industry*" from "*Coating Technology for Vehicle Applications*" Springer International Publishing (2015).

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:

Resources

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

Approval

24. Module leader's signature	Dr. Michael AUINGER
25. Date of approval	Teaching Policy Committee Chair's Action 30 March 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 workshop-based report 3000 words	**3 hours**
A3. Will this module be examined together with any other module (sectioned paper)? If so, please give details below.		
No		
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?	2	
Graph paper?	Yes	
Calculator?	Yes	
Any other special stationery requirements (e.g. Data books, tables etc)?	Engineering Data Book	
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 17)**	**Which summative assessment method(s) will measure the achievement of this learning outcome? (reference activities in section 18)**
Demonstrate an advanced understanding and evaluate the production processes of metallic materials, used for automotive fabrication.	Teaching the systematics of production processes and critical evaluation (discussion based) of known metallurgical processes with a sound focus on current materials.	Written exam (relevant for the marks) and student's response during discussion to justify what is new information and what is not.
Demonstrate advanced knowledge on where to use certain materials in the chassis, for panels and powertrain application as well as applying this to evaluate reasonable design of a "real" vehicle in the coursework.	Teaching in class, followed by a tour and hands-on session where students critically evaluate their observations on where certain materials are used in a vehicle.	Written exam as well as the quality of the report from the hands-on session.
Evaluate current techniques for joining the different materials, mentioned above and apply this knowledge to the design of a "real" vehicle in the coursework.	Teaching in class, followed by a tour and hands-on session where students reflect on their observations of where different joining techniques are used in a vehicle.	Written exam as well as the quality of the report from the hands-on session.
Assess the importance of the use of different materials in terms of mechanical stability, lightweight application, environmental impact and costs. Advance this knowledge to the complex design in automotive applications.	Teaching in class, hands-on session and discussions about the brief reports of the tour.	Written exam as well as the quality of the report from the hands-on session.