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	02 Oct 2017
If new, does this module replace another? If so, enter module code and title:	Replaces the materials and processes element of ES174 Design for Function and parts of ES2B3 Engineering Materials
If revised/discontinued, please outline the rationale for the changes:	
Confirmation that affected departments have been consulted:	Changes were made in consultation with the School of Engineering and WMG.

Module Summary	
1. Module Code (if known)	ES195
2. Module Title	Materials for Engineering
3a. Lead department:	WMG
3b. Teaching Split (if known):	100% WMG
4. Name of module leader	Dr Rohit Baghat
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

Module Summary	
7. Principal Module Aims	Engineers are required to make appropriate selection of materials and manufacturing processes taking due account of performance, cost and sustainability. The Module is split into 5 units of study, 4 of which has a Material type as its theme. The 5th unit is on selection, pulling the materials and processes together. Each unit will require students to explore the interaction of material, manufacturing process and design on the performance of engineered products as well as the wider implications of their use on the environment.
8. Principal Learning Outcomes	By the end of this module students will be able to …. • Distinguish the main classes of engineering materials and the underlying materials science that determines their properties and their applications. • Explain how the structure of engineering materials affect the properties through the structure property relationship • Describe how structures of materials can be manipulated to enhance the properties of materials • Link the performance of engineered products to the complex interaction between material, manufacturing process and design. • Select an appropriate engineering material and manufacturing process for a given design. • Evaluate the life cycle environmental impacts related to material and process choice
9. Timetabled Teaching Activities (summary)	20 hours of lectures 4 x 2 hour laboratories 4 x 1 hour computer based tests **32 hours total**
10. Departmental Web-link	http://www2.warwick.ac.uk/fac/sci/eng/eso/modules/year1
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)	4 x 1 hour computer based tests (10 % per test) 2 hour examination (60%)

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 100% of teaching although School of Engineering PhD students will need to help in delivering the laboratories

14. Availability of module

Degree Code	Title	Study Year	C/OC/ A/B/C	Credits
H113	BEng Engineering	1	C	15
H114	MEng Engineering	1	C	15
H216	BEng Civil Engineering	1	C	15
H217	MEng Civil Engineering	1	C	15
H315	BEng Mechanical Engineering	1	C	15
H316	MEng Mechanical Engineering	1	C	15
H335	BEng Automotive Engineering	1	C	15
H336	MEng Automotive Engineering	1	C	15
H605	BEng Electrical and Electronic Engineering	1	C	15
H606	MEng Electrical and Electronic Engineering	1	C	15
H63W	BEng Electronic Engineering	1	C	15
H63X	MEng Electronic Engineering	1	C	15
HH75	BEng Manufacturing and Mechanical Engineering	1	C	15
HH76	MEng Manufacturing and Mechanical Engineering	1	C	15
HN11	BSc Engineering and Business Studies	1	C	15
HN15	BEng Engineering Business Management	1	C	15

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

1 (core module)

16. Pre- and Post-Requisite Modules

none

Module Content and Teaching

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

Module duration (weeks)	10
Lectures	20 x 1 hr
Seminars	

Module Content and Teaching	
Tutorials	
Project Supervision	
Demonstration	
Practical Class/Workshops	4 x 2 hour laboratories
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.*	E-learning: each unit will be accompanied by a unit of e-learning (5 x 2.5 hour/unit) that will be required to be completed prior to attendance at the laboratory class. Each Laboratory will have a computer based and marked test (4 x 1 hour). 105.5 hours guided independent learning

18. Assessment Method (Standard)		
Type of assessment	**Length**	**% weighting**
Written Examinations	2 Hours	60%
Practical Examinations		
Assessed essays/coursework	4 x 1 hour computer based tests	4 x 10%= 40%
18a. Final chronological assessment *(please see guidance*)	2 hour examination (60%)	

19. Methods for providing feedback on assessment.
Formative feedback from computer based tests Cohort level feedback on exams
20. Outline Syllabus
The Module is split into 5 units. • Steels and other Ferrous alloys • Non Ferrous alloys • Polymeric Materials • Composites, Ceramics and Glasses • Selection of Materials and Processes

Each of the first 4 units will cover the following

- Atomic and Molecular Structure, Microstructure, Macrostructure
- Appropriate Mechanical, Physical, Chemical, Environmental, Electrical, Electronic, and Manufacturing properties
- Structure Property Relationships
- Manipulation of Structure Property Relationships
- Manufacturing Processes and Constraints
- Design Constraints
- In service considerations, degradation and failure
- Environmental and sustainability considerations.

The final unit will cover

- Selection of appropriate materials
- Selection of appropriate Manufacturing Processes (Shaping, Joining and Property Enhancing).

21. Illustrative Bibliography

The Science and Engineering of Materials. Donald R. Askeland, Wendelin J. Wright. Seventh edition, SI. Boston, MA : Cangage Learning, [2016]

Materials Selection in Mechanical Design / Michael F. Ashby. Butterworth-Heinemann 2011. 4th ed.

Engineering Materials 1 [electronic resource] : an Introduction to Properties, Applications, and Design. Michael F. Ashby, David R.H. Jones. Butterworth-Heinemann 2012. 4th edition

Engineering Materials 1 : An Introduction to Properties, Applications and Design by Michael F. Ashby and David R.H. Jones. Butterworth-Heinemann 2011. 4th ed.

Materials Science and Engineering : an Introduction. William D. Callister, Jr. John Wiley & Sons 2007 9th ed

Introduction to Materials Science for Engineers. James F. Shackelford. Pearson Prentice Hall 2009 7th ed.

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.

New Lab equipment and software has been identified and sourced.

Approval	
24. Module leader's signature	Dr Rohit Baghat
25. Date of approval	Teaching Policy Committee Chair's Action 16 May 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 Gill 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**
60	10% Computer Marked Test 1 10% Computer Marked Test 2 10% Computer Marked Test 3 10% Computer Marked Test 4	2 hours
A3. Will this module be examined together with any other module (sectioned paper)? If so, please give details below.		
A4. How many papers will the module be examined by?	☒ 1 paper	
A5. When would you wish the exam take place (e.g. Jan, April, Summer)?	**January**	
A6. Is reading time required?	☒ No	
A7. Please specify any special exam timetable arrangements.		
A8. Stationery requirements		
No. of Answer books?	5	
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?	☒ No	
Open Book?	☒ No	

Examination Information	
Restricted?	☒ 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)**
Distinguish the main classes of engineering materials and the underlying materials science that determines their properties and their applications.	Lectures Laboratories	Computer Marked test Written exam
Explain how the structure of engineering materials affect the properties through the structure property relationship.	Lectures Laboratories	Computer Marked test Written exam
Describe how structures of materials can be manipulated to enhance the properties of materials.	Lectures Laboratories	Computer Marked test Written exam
Link the performance of engineered products to the complex interaction between material, manufacturing process and design.	Lectures Laboratories	Computer Marked test Written exam
Select an appropriate engineering material and manufacturing process for a given design.	Lectures Laboratories	Computer Marked test Written exam
Evaluate the life cycle environmental impacts related to material and process choice	Lectures Lab/ Laboratories	Computer Marked test Written exam