UNIVERSITY OF WARWICK

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

Approval information	
Approval Type	☒ Revised
Date of Introduction/Change	01/10/2018
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 to capture timetabling detail. Contact hours reduced from 80 hours overall to 74 hours with laboratory hours divided between actual laboratories and project work. Detail relating to Design Portfolio provided.
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)	ES192
2. Module Title	Engineering Design
3a. Lead department:	School of Engineering
3b. Teaching Split (if known):	100 % School of Engineering
4. Name of module leader	Dr Simon Leigh
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

7. Principal Module Aims	Design is a major activity within all branches of engineering. Similar design methods and skills can be applied at many levels of detail from the conceptual arrangement of a complex system down to the physical embodiment of its constituent parts. Designers use a range of skills and a repertoire of prior knowledge to synthesise an appropriate solution that satisfies the various constraints of the problem. Their efficiency and success depend on judicious use of analysis, experience and creativity. Modern designers need to possess a range of skills, including; the ability to generate innovative designs and solutions to problems, the ability to design for a particular manufacturing process, the ability to collaborate effectively across teams and the ability deliver compelling presentations of designs. While the delivery of precise and detailed engineering designs is a key skill, the impact of pervasive simulation tools, automated and generative design tools, as well as cloud computing and cyber-physical systems means that designers of the future will require both traditional design and manufacturing knowledge as well as a whole new repertoire of skills. This module aims to introduce students to the complexities of the design task and equip them with some of the techniques and experience required to design for a function and manufacturing/construction process within their discipline.
8. Principal Learning Outcomes	By the end of the module the student should be able to: • Imagine and create innovative products that are fit for purpose; • Balance competing technical, commercial, regulatory, socio-environmental requirements in engineering design; • Apply a methodical approach to the solution of design problems from design conceptualisation through to design verification; • Use computational tools to aid the application of theoretical models to the quantitative design of functional components; • Develop effective team-working practices; • Develop effective project management skills; • Develop effective communication behaviours.
9. Timetabled Teaching Activities (summary)	12 hours of lectures, 4 hours of seminars, 22 hours of laboratory exercises, 36 hours design projects. **Total of 74 hours.**
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 module.
12. Assessment methods (summary)	100 % Design portfolio incorporating elements of CAD, reverse engineering findings, and staged projects (50 pages maximum length). (1 x Term 1 Design Portfolio (20%);1 x Term 1 Electronics Assessment (13.4%);1 x Term 2 Sprint Report (33.3%); 1 x Term 3 Sprint Report (33.3%) **Total: 100%)**

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.

School of Engineering (100%).

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
H161	BEng Biomedical Systems Engineering	1	C	15
H163	MEng Biomedical Systems 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
HH35	BEng Systems Engineering	1	C	15
HH31	MEng Systems 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)	30	
Lectures	12 x 1 hours	
Seminars	1 x 1 Hour Team Working Seminar 1 x 1 Hour Engineering Build Space 'Quick Make Session' 1 x 2 Hour Design Disassembly Seminar **Total: 4 Hours**	
Tutorials	None	
Project Supervision	None	
Demonstration	None	
Practical Class/Workshops	5 x 2 hour CAD Computer Lab Sessions 1 x 4 Hour Engine Strip Lab Session 1 x 4 Hour Simulation and Optimisation Computer Lab Session 2 x 2 Hour ECAD/Electronics Design Lab Sessions *Academic Staff and Demonstrators Required* **Total: 22 Hours**	
Supervised time in studio/workshop	2 x 18 Hour Design Sprint Projects (4 x 4 Hour & 1 x 2 Hour Test Session) - *Academic Staff and Demonstrators Required* **Total: 36 Hours**	
Fieldwork	None	
External visits	None	
Work based learning	None	
Placement	None	
Year abroad	None	
Other activity *(please describe): e.g. distance-learning, intensive weekend teaching etc.*	76 hours of guided independent learning	
18. Assessment Method (Standard)		
Type of assessment	**Length**	**% weighting**
Written Examinations		
Practical Examinations		
Assessed essays/coursework	1 x Term 1 Design Portfolio (20%) 1 x Term 1 Electronics Assessment (13.4%) 1 x Term 2 Sprint Report (33.3%) 1 x Term 3 Sprint Report (33.3%) **Total: 100%**	100%

Module Content and Teaching

18a. Final chronological assessment *(please see guidance*)	Term 3 Design Sprint report.

19. Methods for providing feedback on assessment.

- Verbal feedback during design seminars.
- Support through advice and feedback hours.
- Verbal and written feedback on design reports.

20. Outline Syllabus

1 Generic design process: Applicable to any engineering product, programme, system or software. Project management of design needs and requirements. Specifications (Assessing the Problem)
2 Application of engineering theory: The use of Engineering theory to understand a problem and inform concepts. Reverse engineering (Research)
3 Conceptualisation of solutions: Hand-drawn concepts, collaboration, Computer aided design (CAD), aesthetics, design automation. Integrated mechanical and electrical\electronic design. Design for manufacture. Design communication (Ideas)
4 Construction of prototypes: First embodiment. Prototyping technologies. Systems integration. (Prototypes)
5 Analysis and optimisation in design: Simulation, testing of prototypes, data capture and analysis. Design automation. In-service monitoring. (Testing and Validation)
6 Final design embodiment: 3D solid modelling and 2D engineering drawings. Detailed design for manufacture. Second embodiment. Design communication. (Final Designs)
7 Solution realisation: Manual and digital manufacturing methods. Cyber-physical systems. (Manufacturing). Team-working and communication skills.

21. Illustrative Bibliography

1. Shigley's Mechanical Engineering Design, Budynas, R.G., Nisbett, K.J.,2014. McGraw-Hill Education. ISBN : 978-9814595285.
2. Product Design, Otto, K. & Wood, K., 2001. Pearson. ISBN : 978-0130212719.

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.

N/A

Approval	
24. Module leader's signature	Dr Simon Leigh
25. Date of approval	25 April 2018
26. Name of Approving Committee (include minute reference if applicable)	School of Engineering and WMG Course and Module Approval Committee, Minute 241-17/18
27. Chair of Committee's signature	Professor Gillian Cooke
28. Head of Department(s) signature	Professor David Towers

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**
	100% Design Portfolio 1 x Term 1 Design Portfolio (20%) 1 x Term 1 Electronics Assessment (13.4%) 1 x Term 2 Sprint Report (33.3%) 1 x Term 3 Sprint Report (33.3%) **Total: 100%**	
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?	N/A	
A5. When would you wish the exam take place (e.g. Jan, April, Summer)?	N/A	
A6. Is reading time required?	N/A	
A7. Please specify any special exam timetable arrangements.		
N/A		
A8. Stationery requirements		
No. of Answer books?	N/A	
Graph paper?	N/A	
Calculator?	N/A	
Any other special stationery requirements (e.g. Data books, tables etc)?	N/A	
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)**
Imagine and create innovative products that are fit for purpose.	Laboratories, seminars, presentations, design projects, lectures and tutorial classes.	Design coursework. Sprint Reports (2 x 33.3%)
Balance competing technical, commercial, regulatory, socio-environmental requirements in engineering design.	Laboratories, seminars, presentations, design projects, lectures and tutorial classes.	Design coursework. Term 1 Design Portfolio (20%)
Apply a methodical approach to the solution of design problems from design conceptualisation through to design verification.	Laboratories, seminars, presentations, design projects, lectures and tutorial classes.	Design coursework. Sprint Reports (2 x 33.3%))
Use computational tools to aid the application of theoretical models to the quantitative design of functional components.	Laboratories, seminars, presentations, design projects, lectures and tutorial classes.	Design coursework. Term 1 Design Portfolio (20%) Term 1 Electronics Assessment (13.4%)
Develop effective team-working practices.	Laboratories, seminars, presentations, design projects, lectures and tutorial classes.	Design coursework. Sprint Reports (2 x 33.3%)
Develop effective project management skills.	Laboratories, seminars, presentations, design projects, lectures and tutorial classes.	Design coursework. Sprint Reports (2 x 33.3%)
Develop effective communication behaviours.	Laboratories, seminars, presentations, design projects, lectures and tutorial classes.	Design coursework. Sprint Reports (2 x 33.3%)