

MODULE SPECIFICATION

Module Title:	Engineering Design Practice	Level:	4	Credit Value:	20
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Module code:	ENG484	Is this a new module? Yes	Code of module being replaced:	ENG417
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Cost Centre:	GAME	JACS3 code:	H150
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Trimester(s) in which to be offered:	1, 2	With effect from:	September 18
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School:	Faculty of Arts, Science and Technology	Module Leader:	Martyn Jones
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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) Aeronautical & Mechanical Engineering	✓	<input type="checkbox"/>
BEng (Hons) Mechanical Manufacturing	✓	<input type="checkbox"/>
BEng (Hons) Applied Product Design	✓	<input type="checkbox"/>
BEng (Hons) Automotive Engineering	✓	<input type="checkbox"/>
BEng (Hons) Drone Technology & Operations	✓	<input type="checkbox"/>
BEng (Hons) Renewable and Sustainable Engineering	✓	<input type="checkbox"/>
BEng (Hons) Electrical & Electronic Engineering	✓	<input type="checkbox"/>
BEng (Hons) Automation Engineering	✓	<input type="checkbox"/>
BEng (Hons) Optoelectronics & Holography	✓	<input type="checkbox"/>
BEng (Hons) Aerospace and Modern Optics	✓	<input type="checkbox"/>

Pre-requisites
None

Office use only

Initial approval February 17

APSC approval of modification September 18

Have any derogations received Academic Board approval?

Version 1

Yes ✓ No

Module Aims
<ul style="list-style-type: none"> • To develop understanding of the design process, the use of specifications, and the creation of design solutions by manual methods and by use of computers, including relevant theory, such as basic statics and dynamics in the design process. • To support the development of the student in the following areas: • The conceptual design of products. • Project planning, management, team working and presentation skills. To contextualise these activities within the professional standards and codes of practice for the engineering profession, and to develop the engineering communication skills. • Applying advanced design principles to solve engineering design problems. • Experience in the use of up to date commercial computer software for design applications. • The selection of appropriate materials and processes for economic designs. To appreciate the work with incomplete information and technical uncertainty.

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	
1	Apply structured techniques to the specification and creative phases of the design process.	KS1	KS3
		KS4	
2	Use computer-based design and programming software and understand how to relate these to the design process	KS5	KS10
3	Appreciate the business needs taking consideration of wider political and social contexts, such as environmental, ethics, economics and sustainability; understand codes of practice in industries.	KS2	KS6
		KS7	
4	Develop creative design skills, practical skills, engineering communication skills, personal and professional career management skills, and team working skills.	KS3	KS5

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

- Evidence of Professional development that includes reflecting on capability and experiences. Meet with your personal tutor 4 times in the academic year to discuss your development.
- An understanding of your responsibilities as an engineer, including social, ethical, environmental, sustainable requirements.
- A development log of your practical sessions on how you can utilise the skills during engineering design as a professional engineer
- A design process from concept to preliminary design, the will include a detailed Product Design Specification, Concepts, and a detailed selection process. The final work will be presented in a 5 minutes presentation and the preliminary design will be shown as a CAD model.
- A computer programed script (written for example in Matlab), that demonstrates understanding of the software.

Assessment number	Learning Outcomes to be met	Portfolio	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1 ,2,3 & 4	Portfolio	100%		4000

Learning and Teaching Strategies:

Candidates will learn and be familiar with engineering design process and apply the knowledge learned to conduct a design project. Formal lectures, group project and workshop/lab practice are the integrated parts of module teaching and learning practices.

Lectures will be given on the engineering design process with a detailed insight into the development of a product design specification and quantifiable methods for choosing the best engineering solution. In addition, the health and safety aspects of working in engineering will be discussed and the importance of risk assessments will be outlined.

Coding (using Matlab or similar) Industry standard Computer Aided Design, both mechanical (Inventor or similar) and electrical (Ulitisim or similar) will be taught via tutorials and practical sessions.

Professional studies, including development of transferrable skills, will be integrated with the practical activities for application and assessment but will have separate tutorial sessions. The emphasis will be on recording, reporting and presentation relating to the practical activities.

Syllabus outline:

Engineering Profession: Professional bodies, structure of Engineering profession, range of careers, membership, UK-SPEC academic and professional requirements including sustainable design, health and safety, environmental and ethical considerations.

Design process: Stages in design; stages in development; apply to Software and to hardware product, maintaining a log report of activities. (Specification, task analysis, outline design, selection of components/materials, detailed design including test definition or evaluation parameters, implementation, testing, evaluation of tests, reiteration as necessary, conclusions, reporting). Refer to quality (quality is designed in, not built in).

Design practices, lab/workshop practice and team work: From a specific design brief work as part of a small team, analyse problem, and propose various designs. Choose one cost effective design and produce a design study with full documentation.

Computer aided design and simulation in design: Understand how computers can aid the designer in the design process. Introduction to various simulation packages.

Personal skills: Self-evaluation (reflective log); target-setting and managing time; note-taking; log report; formal report of complete exercise; and presentation skills. (Reinforcement of health, safety, sustainability, ethical, economic and social considerations during the design/production process.)

Bibliography:

Essential reading

Cross, N. (2008) *Engineering Design Methods: Strategies for Product Design*, 4th Edn., Wiley- Blackwell.

Other indicative reading

Karl, T. Ulrich, Steven D. Eppinger (2016). *Product Design and Development*. Publisher: Mc Graw Hill.

Maja Bystorm, Bruce Eisenstein (2005). *Practical Engineering Design*. Publisher CRC Press

Jim Lesko (2008). *Industrial Design: materials and manufacturing guide*. Publisher: John Wiley & Sons, Inc.