MODULE SPECIFICATION

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Refer to guidance notes for completion of each section of the specification.

Module Code:	ENG60F

Module Title:	Design For X

Level:	6	**Credit Value:**	20

Cost Centre(s):	GAME	JACS3 **code**: HECoS code:	H711/100202

Faculty	FAST	**Module Leader:**	Martyn Jones

Scheduled learning and teaching hours	20hrs
Placement tutor support	Click here to enter hours.hrs
Supervised learning eg practical classes, workshops	10 hrs
Project supervision (level 6 projects and dissertation modules only)	Click here to enter hours. hrs
Total contact hours	Click here to enter hours. hrs
Placement / work based learning	
Guided independent study	170 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered (not including exit awards)	Core	Option
BA(Hons) Product Design	✓	☐
BEng (Hons) Mechanical Manufacturing	✓	☐
BEng (Hons) Composite Design	✓	☐
BEng (Hons) Renewable and Sustainable Engineering	✓	

Pre-requisites
N/A

Office use only
Initial approval: 01/02/2017 Version no:
With effect from: 01/09/2018

MODULE SPECIFICATION

Date and details of revision: Version no: 2
APSC approval of modification Sept 18
08/09/20 approved addition of BA (Hons) Product Design

Module Aims
To support the development of the student in the following areas: • To design effective product development methodology • To apply lean manufacturing methodology to design • To understand deign for manufacture and assembly • Apply design solutions for the sustainability of products their life cycles. • To envisage how products will be recycled or dissembled after use. • To evaluate reverse engineering procedures, whilst understanding intellectually property and patents.

Module Learning Outcomes - at the end of this module, students will be able to	
1	Analyse and develop a lean product development model
2	Systematically understand the basics of DFMA, health and safety in manufacturing, legal requirements in engineering activities, intellectual property right in design, environmental and commercial risks, risk management in manufacturing.
3	Critically evaluate the design of products for recycling, investigate sustainability and how product's life cycle can be extended.
4	Apply to methods and techniques, while appreciating the limitations of reverse engineering.

Employability Skills The Wrexham Glyndŵr Graduate	I = included in module content A = included in module assessment N/A = not applicable
CORE ATTRIBUTES	
Engaged	I
Creative	IA
Enterprising	I
Ethical	IA
KEY ATTITUDES	
Commitment	I
Curiosity	IA
Resilient	IA
Confidence	I
Adaptability	IA
PRACTICAL SKILLSETS	
Digital fluency	I
Organisation	IA
Leadership and team working	IA
Critical thinking	IA
Emotional intelligence	I
Communication	I

Derogations

A derogation from regulations has been approved for BEng programmes 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%.

The derogation doesn't apply BA (Hons) Product Design

Assessment:

Indicative Assessment Tasks:

Assessment 1 – Students will be asked to find a case study on the development of a certain product, machine or component. Alternatively, they will find a case study on a particular company that specialises in design for sustainability or recycling. By discussing how the design of the product has complied with DFS and DMR practices they will show an understanding of the process as a whole. (2000 words)

Assessment 2 – The student will be asked to reverse engineer a product and are asked to investigate how they would improve on the design based on DFMA principles (2000 Words)

Assessment 3 – On the completion of assignment 2, the students will each give a 10 minute presentation into the improved design.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1,3	Essay	50
2	2,4	Project	40
3	2,4	Presentation	10

Learning and Teaching Strategies:

The module will be delivered through detailed presentations combined with interactive sessions to enhance students' learning. The learning experience will be further supported by tutorials and self-study work and case studies of world significance.

Lectures - presentation of theory, facts and concepts, relating to Design for manufacturing and assembly (DFMA), in order to convey critical information. Interaction or active learning should be implemented to develop an understanding concurrent engineering, design for manufacturing, design for assembly, health and safety in manufacturing, legal requirements in engineering activities, intellectual property right in design, environmental and commercial risks, risk management in manufacturing.

Industrial visits - in order to demonstrate DFMA principles being applied.
Reverse engineering lab sessions, utilising metrology, such as the Faro Arm scanner, to enable accurate measurement of components.

Specialist knowledge and expertise from industrial partners can and will be disseminated to other students where relevant. e.g. design & production techniques.

Syllabus outline:

- History and Modern Applications of Lean Manufacturing
- Introduction to concurrent engineering, design for manufacturing, design for assembly.
- DFM/DFA guidelines, feature-based design, virtual manufacturing, quantitative evaluation methodologies, rapid prototyping, integrated CAD/CAM systems.
- Economic materials selection.
- Environmental factors in design, Sustainability and life cycle management; health and safety in manufacturing, legal requirements in engineering activities, intellectual property right in design, environmental and commercial risks, risk management in manufacturing.
- Reverse engineering and its applications in design
- An overview of Patent and intellectual property law.
- Design for manual, automatic and robot assembly.
- Case studies of products that have undergone DFMA
- Recycling and upcycling methodologies.

Indicative Bibliography:

Essential reading

Boothroyd, G., (2010), *Product Design for Manufacture and Assembly*, Third Edition (Manufacturing Engineering and Materials Processing Series), 2010

Anderson, D, M., (2014) *How to Use Concurrent Engineering to Rapidly Develop Low-Cost, High-Quality Products for Lean Production*, Productivity Press.

Other indicative reading

Thompson, R., (2011), *Prototyping and Low-volume Production*, 1st Edition, Thames & Hudson.

Thompson, R., (2013), *Sustainable Materials, Processes and Production*, 1st Edition, Thames & Hudson.