

MODULE SPECIFICATION PROFORMA

Module Title:	Sustainable Design and Innovation	Level:	7	Credit Value:	20
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Module code:	ENG706	Is this a new module?	No	Code of module being replaced:	N/A
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Cost Centre(s):	GSAC	JACS3 code:	H100
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With effect from:	September 17
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School:	Applied Science, Computing & Engineering	Module Leader:	David Sprake
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Scheduled learning and teaching hours	40 hrs
Guided independent study	160 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
MSc Aeronautical Engineering	✓	<input type="checkbox"/>
MSc Aircraft Design	✓	<input type="checkbox"/>
MSc Mechanical Manufacturing	✓	<input type="checkbox"/>
MSc Aircraft Structure	✓	<input type="checkbox"/>
MSc Renewable Engineering and Sustainable Energy	✓	<input type="checkbox"/>
MSc Electrical Power Engineering	✓	<input type="checkbox"/>
MSc Electronic Engineering	✓	<input type="checkbox"/>
MSc Mechatronics	✓	<input type="checkbox"/>
MSc Automotive Engineering	✓	<input type="checkbox"/>
MSc Composite Material Engineering	✓	<input type="checkbox"/>
MSc Unmanned Aircraft System Technology	✓	<input type="checkbox"/>

Pre-requisites: None

Office use only

Initial approval: September 15

APSC approval of modification: N/A

Version: 2

Have any derogations received Academic Board approval?

Yes ✓ No N/A

If new module, remove previous module spec from directory?

Yes No

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Module Aims

- To create and develop a preliminary idea for a new product, device, or system and evaluate it in terms of its market potential, technical feasibility, and sustainability.
- To provide an in-depth awareness of the range of issues concerning sustainable development that could relate to designing and to develop an understanding of sustainable design.

Intended Learning Outcomes

At the end of this module, students will be able to

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|---|---|
| 1 | Demonstrate a systematic understanding of the innovation process from ideas to diffusion |
| 2 | Critically analyse the trade-offs that are made in the design of innovative products to achieve a balance of the technical, market, economic, and environmental constraints |
| 3 | Assess the advanced environmental impacts of existing products and systems |
| 4 | Evaluate and discuss the diffusion of new products and how the uptake of innovations is shaped by technical, market, socio-economic and policy forces |
| 5 | Discuss and present ideas for new products and critically evaluate those ideas |

Transferable skills and other attributes

1. Communication
2. ICT Technologies
3. Time management and organisation
4. Interpersonal skills
5. Problem solving
6. Information handling including numeracy

Derogations

A derogation from regulations has been approved for these programmes:

Students are required to achieve a minimum overall module mark of 50%, with each element of assessment (where there is more than one assessment) requiring a minimum mark of 40%.

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Assessment:

Students will be placed in groups and asked to produce a project proposal. The groups will be expected to deal with a range of financial, design, personal, cultural, and organisational issues. These will be combined to form a challenging academic and vocationally relevant project requiring students to engage in role-play that will reflect their intended professional careers.

Assessment will be by a combination of group and individual assessments utilising group presentation, production of a clear, critical, and comprehensive group report (totalling 60%), and a critical reflective report and design diary or logbook (40%).

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,4	Presentation and group report	60	20 mins	2500
2	3,5	Learning logs/journals	40		1500

Learning and Teaching Strategies:

Short programme of key lectures will introduce the module and identify the issues to be addressed. Students will be expected to work from the beginning in their groups to start constructing their proposals for the design project. Learning will be supported by group tutorials, directed reading and guest lecturers in conjunction with other modules. A high standard of professionalism will be required for the working practices of each group.

Syllabus outline:

Introduction to Invention and Innovation: Investigation of the innovation process. Introduction of invention (How invention starts, how the process of invention works, technology push and market pull, etc). Introduction to innovation (Overcoming obstacles to innovation, diffusion of innovations, sustaining and disruptive innovation, phases and waves of innovation). Inventors and organisations. Impact of new technologies. Forecasting the future of innovation.

Markets - Designing for people: Making products that sell. Who buys products? Ways of finding out about markets (Role of marketing, marketing decision support systems, understanding the market environment, market research, quantitative and qualitative information, etc). Markets and design (Using market information in design, marketing mix and the four Ps-Product, Price, Place, Promotion, new P factors, product life cycle). Designing the user experience. Products and their markets (Selling the product, product-service relationship, designing product ranges). Markets, cultures, and design (Cultural contexts, cultures and markets, markets and organisations). Global production and world markets.

Products - New Product development and sustainable design: New product development (What is a new product? New product development processes, organisation for new product development, strategies for new product development). Product development

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and the environment (Environmental context, strategic responses to the environment, designing for the environment, eco-design processes and organisation, sustainable design and innovation).

Diffusion - Consumers and innovation: Introduction to diffusion. Conventional consumer involvement. Consumer choice and new energy technologies. Consumers, producers, and pressure groups. Government and sustainable energy.

Consumption - Innovation for sustainability: International debate. Eco-efficiency. Problems with eco-efficiency. Understanding consumption. Technology and sustainability.

Bibliography:

Essential reading

Fuad-Luke, A. (2009) *Design Activism Beautiful Strangeness for a Sustainable World*. London: Earthscan Ltd.
 Stasinopoulos, P. (2008) *Whole System Design: An Integrated Approach to Sustainable Engineering*. London: Earthscan Ltd.

Other indicative reading

Vallero, D.A. and Brasier, C. (2008) *Sustainable Design: The Science of Sustainability and Green Engineering*. John Wiley & Sons.
 Walker, S. (2006) *Sustainable by Design Explorations in Theory and Practice*. London: Earthscan Ltd.