MODULE SPECIFICATION PROFORMA

Module Code:	ENG765

Module Title:	Engineering Design & Innovation

Level:	7	**Credit Value:**	20

Cost Centre(s):	GSAC	JACS3 **code**:	H220

School:	Applied Science, Computing & Engineering	**Module Leader:**	David Sprake

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 (not including exit awards)	Core	Option
MSc Engineering (Aeronautical) MSc Engineering (Mechanical Manufacture) MSc Engineering (Automotive) MSc Engineering (Composite Materials) MSc Engineering (Renewable & Sustainable Energy) MSc Engineering (Electrical & Electronic) MSc Engineering (Mechatronics) MSc Unmanned Aircraft System Technology	✓	☐

Pre-requisites
N/A

Office use only
Initial approval: 19/06/2018 Version no:1
With effect from: 01/09/2018
Date and details of revision: Version no:

Module Aims

- Develop a rigorous understanding of innovative engineering design methodology; modern design tactics and practice.
- Critically analyse the drivers for innovation past, present and future.
- Demonstrate initiative, innovation and creativity to solve a complex engineering problem in your dissertation project.

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	Demonstrate a systematic understanding of the design and innovation process and its drivers.	KS2	KS3
		KS6	KS9
2	Critically evaluate the trade-offs that are made in the design of innovative products to achieve a balance of the technical, sustainable, market, socio-economic and environmental constraints.	KS3	KS7
		KS5	KS9
3	Design and innovate a new sustainable product or service, critically assess it for a range of criterion and develop it for market.	KS1	KS4
		KS5	KS6
		KS7	KS10
4	Critically reflect and report on team members, group working and project performance.	KS2	KS3
		KS7	KS9
5	Deliver a professional relevant presentation	KS1	KS8

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

Credits shall be awarded by an assessment board for those Level 7 modules in which an overall mark of at least 50% has been achieved with a minimum mark of 40% in each assessment element.

Assessment:

Indicative Assessment Tasks:

Assessment will be by a combination of group and individual assessments utilising the production of a clear, critical, and comprehensive group report (totalling 50% group mark), a presentation (25% individual mark) and critical reflective report and design diary or logbook marked individually (25% individual mark).

Group project: Students will be placed in groups and asked to design an innovative engineering product. The groups will be expected to deal with a range of financial, design, personal, environmental, 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 number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1, 2, 3	Group Project	50	N/A	2500
2	4,	Reflective Practice	25	N/A	1500
3	5	Presentation	25	N/A	5 minutes

Learning and Teaching Strategies:

A series of workshop style lectures with student-led seminars and small group activities. Directed learning using library and internet resources will be facilitated using Moodle.

Syllabus outline:

- Why innovation? The drivers that motivate innovation.
- Investigation of the design and innovation process. Introduction of invention. How invention starts, how the process of design and invention works, technology push and market pull, etc. 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. 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 processes, organisation for new product development, strategies for new product development. 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.

Indicative Bibliography:

Essential reading

Bessant, J. and Tidd, J. (2015), Innovation and Entrepreneurship. 3rd ed. Hoboken, New Jersey: Wiley-Blackwell.

Other indicative reading

Robertson, M. (2017), Sustainability Principles and Practice. London: Routledge.

Walker, S. (2006) Sustainable by Design Explorations in Theory and Practice. London: Earthscan Ltd.

Plus various others to be signposted on Moodle.