UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title:	Team Project
Module Code:	ENG7011-D
Academic Year:	2019-20
Credit Rating:	40
School:	Department of Mechanical and Energy Systems Engineering
Subject Area:	Mechanical and Automotive Engineering
FHEQ Level:	FHEQ Level 7 (Masters)
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	**Hours**
Project supervision	24
Tutorials	24
Directed Study	352

Availability	
Occurrence	**Location / Period**
BDA	University of Bradford / Academic Year (Sept - May)

Module Aims

The aim of this module is to provide the advanced knowledge base necessary to bring a complex product, system or project to a successful delivery, through a systematic approach to product development and systems engineering, deployed within a multi-disciplinary context representative of the dynamics of real world engineering design teams.
Students will develop advanced skills in systems engineering design and product development processes, as well as project management, and strong personal skills for team performance management.

Outline Syllabus

1. Introduction to Competitive Design.

2. Product development frameworks and processes; Total design and Axiomatic design principles; the Failure Mode Avoidance framework for lean product development.
3. Principles of consumer focused engineering and tools to support acquiring consumer insight, and translation to engineering requirements. Product / System Design Specification. Product planning.
4. Systems Engineering Fundamentals; functional models for system representation and design decomposition.
5. Concept generation and selection. Principles of innovation; TRIZ and USIT.
6. The functional framework for robust engineering design; robustness through noise factors management; countermeasure development; robust design verification; the role of DFMEA in managing the design process.
7. Lean product development and systems engineering management. Global product development operations. Managing the design and development process.
8. Project and People skills for successful Competitive Design. Effective communication.

Learning Outcomes	
1	Critically evaluate the complex nature of the processes involved in product development operations and the inherent multidisciplinarity of modern systems engineering design.
2	Explain the principles of axiomatic design, consumer focused engineering and robust engineering design.
3	Discuss approaches to manage complexity in modern systems engineering based on structured design methods.
4	Justify the selection of a framework and process for product development.
5	Demonstrate your ability to plan and complete the design of an interdisciplinary system, product or project by using a formal product development framework.
6	Demonstrate your ability to apply formal design tools for function analysis and decomposition, and function failure mode analysis.
7	Apply formal tools for innovation and countermeasure development.
8	Develop and implement strategies for robustness improvement and development of robust design verification methods.
9	Demonstrate skills in data management; data presentation; data interpretation;
10	Demonstrate ability for systematic problem solving;
11	Demonstrate enhanced skills for communication, teamwork & leadership, personal management.

Learning, Teaching and Assessment Strategy

Product design and development frameworks, processes and tools, will be introduced with a series of short-course style lectures. The module will start with a short course teaching block which will cover methods and tools for product development and systems engineering design (including formal design methods, failure mode avoidance, and team management techniques). Industry / expert guest lectures will cover specialist topics such as perceived quality, user interaction design, HMI / HCI, ASO. The design project report will be the basis for assessment. Most of the materials used in the module have been developed though collaborative work with industry, developed on the principles of constructivist learning within a problem based teaching

context. Reference to real world engineering experience and case studies based on current and recent applied research are made throughout the module.
Guest speakers, including industry experts, are invited to provide specialist expertise as well broadening on real world engineering practice.
Students will work in interdisciplinary groups on a system design problem given by an industrial "client" / sponsor. Students will deliver interim reports / presentations, simulating a gated Product Development process, and a final design show. Where appropriate, development of prototypes and embedded software will be supported / showcased.

Student learning is amplified through the multi-disciplinary team-based system design project. Students from different engineering disciplines will work in groups of 3-5 on a student led project set in the context of the application of competitive design principles to a system design task.

Progress monitoring and assessment mimics a real-world product development process through 2 gate-way interim submissions, aligned with key stages in project development and the teaching periods (nominally week 13 in Semester 1 and week 6 in Semester 2). Interim submissions include both a report and an oral presentation. The assessment of interim submissions is both formative and summative (10% stage 1 submission and 20% stage 2 submission), with comprehensive feedback provided on both the report and the presentations. A peer feedback process is introduced for the oral presentation, where students give each other feedback in both written and oral form.

Project clinics are organised throughout the 2 semesters for continuous monitoring and feedback on project work.
The final submission is made at the end of the module, assessed through a 4000 words per student report and a poster presentation.
The students will complete a self-assessment of individual contribution to teamwork, which is used to adjust the individual final mark based on the team report.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G).
SM2m, SM6m, EA1m, EA3m, EA4m, EA5m, EA6m, D1, D2, D3m, D4, D5, D6, D7m, D8m, EL1m, EL2, EL3m, EL5m, EL6m, EL7m, P1, P2m, P4, P5, P6, P7, P8, P9m, P10m, P11m, G1, G3m, G4.
Further details of these learning outcomes can be found at https://www.engc.org.uk/.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Presentation	Phase 1 Team based project report 80%; team based project oral presentation 20%	0-1500 words	10%
Summative	Coursework	Design Solution submission including asset folder of		70%

		supporting material		
Referral	Coursework	Supplementary Re-presentation of individual student's contribution to the group project		100%
Formative	Coursework	Project development presentations for formative assessment and peer review		%
Summative	Coursework	Phase 2 Team based project report 80%; team based project oral presentation 20%	0-2500 words	20%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html.

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.