

Module Details	
Module Title	Integrated Design
Module Code	ENG6004-B
Academic Year	2020/1
Credits	20
School	Department of Mechanical and Energy Systems Engineering
Subject Area	Mechanical and Automotive Engineering
FHEQ Level	FHEQ Level 6
Pre-requisites	N/A
Co-requisites	N/A

Contact Hours	
Type	Hours
Online Lecture (Synchronous)	6
Online Tutorials (Synchronous)	18
Independent Study	100
Directed Study	76

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 1

Module Aims
The module has 3 key aims: 1. Provide a student led group-based project to give relevant practical experience in the development of an industrially relevant product or system 2. Apply and further develop skills in the selection and application of appropriate computer aided engineering tools, design methodologies and manufacturing systems to achieve project objectives 3. Develop and apply personal and interpersonal skills in product, process or system design and communicate effectively your solution to an audience of your peers

Outline Syllabus

The syllabus follows the development of a product using the systems engineering approach to design with 5 main developmental areas:

1. Product Specification

The needs and requirements of the product are defined within a specification which accounts for factors such as required function, user profile, user interaction, legislation, existing intellectual property, cost of manufacture, production methods and operation.

2. Ideation

Idea generation around the product specification with suitable selection processes for future concept generation conveyed in suitable forms.

3. Concept Design

Generation of concepts based on selected ideas to be described via CAD, GDLs, prototypes and computer analysis models. Concept evaluation to include manufacturing methodologies and assembly considerations as well as predicted product performance.

4. Design Detailing and Prototyping

Detailed design consideration including prototyping methods, design analysis and final method of production. Final solution described by suitable 2D and 3D computer models and engineering drawings including individual components and assemblies.

5. Design Verification and Modification

Final designs are verified and compared to initial specification. Analysis of performance is considered and any modifications to the design solution specified and tested.

Learning Outcomes

Outcome Number	Description
01	Apply a holistic approach to product design and development including specification of all design elements and idea selection methodologies
02	Demonstrate abilities in the application of suitable analytical and computation tools to inform concept selection and development. Validate component and assembly performance via prototyping and computational tools.
03	Use problem solving skills individually and as part of a team to produce and present a design solution.

Learning, Teaching and Assessment Strategy

Students work in an online team-based learning environment with support provided by academic, research and technical staff. Where appropriate industrialist input may also be available in the form of a client meeting.

Student groups will present their project progression at a number of stages through the project life cycle, with academic formative feedback and peer review provided.

Synchronous Online Lectures focused on project management, ethics and health and safety implications of projects will be available in the early phase of the module.

There are 2 formal assessments.

Assessment 1 (Coursework) - A formal presentation of a group design solution at concept stage (30%)

Assessment 2 (Coursework) - Final solution of group work activity including all relevant documentation (CAD, solution analysis, mathematical models, validation of solution and specification of design modifications.

Assessment also includes peer assessment (70%)

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).

EA1b, EA2, EA3b, EA4b, D1, D2, D3b, D4, D5, D6, EL1, EL5, EL6b, P1, P4, P6, P7, P11b, G1, G2, SM6m, EA3m, EA4m, EA5m, EA6m, D3m, D7m, D8m, EL5m, EL6m, EL7m, P11m.

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	Concept Design Presentation	N/A	30%
Summative	Coursework	Design Solution Submission	N/A	70%
Referral	Coursework	Individual design solution (4000 words)	N/A	100%
Formative	Coursework	Project development presentations for formative assessment and peer review	N/A	N/A

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.