UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Computer Aided Engineering
Module Code	ENB4002-B
Academic Year	2024/5
Credits	20
School	School of Engineering
FHEQ Level	FHEQ Level 4

Contact Hours	
Type	Hours
Tutorials	24
Practical Classes or Workshops	24

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Academic Year
BDB	University of Bradford / Academic Year

Module Aims

The module aims to provide a working understanding of computer aided design, analysis and simulation techniques applicable to Chemical, Civil, Mechanical and Biomedical Engineering through the use of industry standard Computer Aided Engineering software. The developed knowledge and understanding forms the foundation in computer aided engineering methods which will be utilised throughout all stages of study in all engineering disciplines.

Outline Syllabus

The syllabus is divided into 2 core areas (Computer Aided Design and Computation Analysis)

which are common to all disciplines. Some discipline specific learning is also included.

Computer Aided Design (AutoCAD and SolidWorks) 1. Understanding engineering drawings 2. Fundamentals of 3D geometry modelling 3. Modelling of assemblies 4. Simulation Computational Analysis (MATLAB) 1. Solving engineering mathematical problems 2. Creation and display of graphs and data plots 3. Matrices and vector analysis 4. Data fitting Discipline Specific 1. Chemical Engineering - Plant Design and Plant Arrangement 2. Civil Engineering - Building Information Management (BIM) 3. Mechanical and Medical Engineering - Enhanced discipline specific examples

Learning Outcomes	
Outcome Number	Description
01	Select and apply appropriate computational method for the description, analysis and visualisation of engineering problems.
02	Communicate engineering information through appropriate visual means
03	Demonstrate IT and problem solving skills as applied to engineering analysis including the use of AI.

Learning, Teaching and Assessment Strategy

Computer aided engineering (CAE) tools are introduced though the use of practical examples delivered either as live online demonstrations, online tutorial classes and personal or group directed study. Examples are designed to give students a broad experience of the use of CAE tools across all disciplines (Mechanical, Civil, Chemical and Biomedical) as well as methods for selecting appropriate computer aided design tools for a given engineering problem. Our virtual learning environment (VLE) Canvas will provide access to substantial tutorial material and examples which students complete during the Learning Objects Interaction and Directed Study time outside of timetabled sessions.

This module also familiarises students with the cutting-edge and revolutionary field of Artificial Intelligence (AI) and its many applications in different disciplines. By integrating theoretical principles with hands-on activities, students will get a thorough comprehension of artificial intelligence methods, algorithms, and their practical applications.
The module covers key topics such as:
? An Overview of Artificial Intelligence: Comprehending the notion, chronology, and development of AI.
? Introduction to Machine Learning: Investigating the principles and applications of supervised, unsupervised, and reinforcement learning methodologies.
? Neural Networks and Deep Learning: Exploring the structure and training of neural networks for intricate pattern recognition tasks.
? AI Applications: Examining the wide-ranging implementation of AI in several sectors like healthcare, banking, autonomous cars, and other areas.
Individual and group directed study activities will be formatively assessed during online tutorial sessions.Feedback and guidance will be given to students on an informal basis.
There are 3 formal assessments.
Assessment 1 (Coursework) - 2 and 3D modelling of parts, assemblies, processes and structures (20%)
Assessment 2 (Coursework) - Data analysis and visualisation (40%)
Assessment 3 (Coursework) - 2 and 3D modelling of parts, assemblies, processes and structures (40%)

It is a requirement of the Institution of Engineering and Technology (IET) that students MUST achieve a mark of at least 30% in assessment components weighted above 30% IN ADDITION to achieving a mark of at least 40% in the module overall. This requirement applies ONLY to students on IET accredited programmes, which is the BDA occurrence/version of the module.

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This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Fourth Edition (AHEP4) as published by the Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify five key areas of learning which partially (C) or fully (M) meet the academic requirement for CEng registration: Science and Mathematics (1), Engineering Analysis (2-4), Design and Innovation (5-6), The Engineer and Society (7-11), and Engineering Practice (12-18). Further details of these learning outcomes can be found at https://www.engc.org.uk/ahep/

C1, M2, C2, C4, M12, C12, M13, C13, C16,

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Coursework - Artefact	2 and 3D modelling of Systems Part 1	20%
Summative	Coursework - Artefact	Data analysis and visualisation	40%
Summative	Coursework - Artefact	2 and 3D modelling of Systems Part 2	40%

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.

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https://bradford.ac.uk