UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Design, Build and Test (Chemical)
Module Code	CPE4001-B
Academic Year	2024/5
Credits	20
School	School of Engineering
FHEQ Level	FHEQ Level 4

Contact Hours	
Type	Hours
Online Tutorials (Synchronous)	12
Directed Study	141
Lectures	12
Seminars	18
Practical Classes or Workshops	17

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

Module Aims

(1) To develop problem-solving skills through applied project work.
(2) To develop team working in both discipline-specific and interdisciplinary, time management and communication skills.
(3) To introduce experimental techniques in engineering and technology.
(4) To develop an understanding of professionalism, engineering ethics and sustainability.
(5) To introduce elements of chemical engineering design.

Outline Syllabus
Students will study topics directly relevant to the three projects and include Material Balances with and without Reactions and with Recoverie, Energy Balances and Phase Equilibria. Students will also study Dimensions and Units pertinent to Chemical Engineering. In addition, the module establishes professional skills with supplementary online lectures/workshops on: Sketching, Health and Safety, Project Management, Time Management, Team Building, Financial Management, sustainability, Engineering Ethics, Presentation skills and Technical Report Writing including searching for and referencing information.

Learning Outcomes	
Outcome Number	Description
01	Explain the design process as applied to simple engineering systems, critique a solution and recognise opportunities for design improvements
02	Analyse the role of health and safety, professional conduct and engineering ethics in the design and development of an engineering product
03	Apply knowledge of the principles of sustainability on the basic design methods for the analysis and solution of simple engineering problems
04	Effectively utilise appropriate laboratory equipment, computer software and instrumentation to accomplish the objectives of a project in a safe working environment. In addition, implement elements of chemical engineering design practice.
05	Participate effectively in the operation of a team and collaborate effectively with members of the team.
06	Deliver a paper or presentation that succeeds in communicating effectively with members of the team.
07	Analyse data using appropriate tools and techniques including AI.

Learning, Teaching and Assessment Strategy

The Learning strategy is to develop skills and knowledge through active learning activities in line with CDIO principles. The learning strategy harnesses active learning and experiential learning is key driver.

The module will be taught through a series of design and build challenges supported by targeted interactive workshops. Each student will complete 3 group projects over two semesters. The first two projects will be discipline-specific ,and the third project will be a common interdisciplinary project shared with all Engineering disciplines. The project briefs may vary from year to year.

The interactive workshops will focus on critical aspects designed to help students understand fundamental concepts in engineering and solve real-world problems in discipline specific topics as well as interdisciplinary aspects of engineering. They include basic concepts of design and manufacturing, relevant mathematical modelling, materials, and other technologies as appropriate for the projects. Prototypes will be constrained by a limited budget and students will be able to use given materials and tools (hardware and software) to realise the projects.

Groups will be selected to include mixed gender, ethnicity and technical ability and will vary from one project to another. Furthermore, groups in the interdisciplinary Project 3 will include students from all four disciplines.

Student assessment will be directly linked to each of the projects. Each group project will be assessed based on the effectiveness of the project to meet the project brief, design quality and build, with a detailed justification of design, materials, and manufacturing methodologies taking into account ethical and sustainability implications of the project. Students will need to demonstrate lessons learned in all aspects of the work during the presentation stage. A peer evaluation, formative and summative, of participation and commitment to the projects will form part of the assessment.

The 3 competitive projects, which will address LOs 1 to 7, will be assessed as follows:

Project 1: Group demonstration/Presentation of the deliverable (e.g. product, solution), including formative peer assessment of members in the same group as well as peer assessment between groups.

Project 2: Coursework (group work + individual work in the form of specific tasks proposed by the students and agreed by academic staff). Plus, group demonstration/presentation of the deliverable, including formative peer assessment of members in the same group as well as peer assessment between groups.

Project 3: Group demonstration/Presentation of the deliverable (e.g. product, solution), this time including summative peer assessment of members in the same group as well as peer assessment between the multidisciplinary groups.

In addition, students will be exposed to discipline specific learning material as detailed below in order to achieve project outcomes:
Chemical Engineering: Students will study Material Balances with and without Reactions and with Recoveries; Energy Balances and Phase Equilibria. Students will also study Dimensions and Units pertinent to Chemical Engineering.

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Examination - practical/laboratory	Project 1 (20 mins)	20%
Summative	Examination - practical/laboratory	Project 2 (20 mins)	40%
Summative	Examination - practical/laboratory	Project 3 (20 mins)	40%
Referral	Coursework - Written	Coursework: Individual evaluative report on Project 1 (1000 words)	20%
Referral	Coursework - Written	Coursework: Individual evaluative report on Project 2 (2000 words)	40%
Referral	Coursework - Written	Coursework: Individual evaluative report on Project 3 (2000 words)	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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