UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Design, Build and Test (Biomedical and Clinical Technology)
Module Code	MHT4006-B
Academic Year	2022/3
Credit Rating	20
School	Department of Biomedical and Electronics Engineering
Subject Area	Medical and Healthcare Technology
FHEQ Level	FHEQ Level 4
Pre-requisites	
Co-requisites	

Contact Hours	
Type	**Hours**
Lectures	8
Tutorials	4
Seminars	6
Directed Study	157
Practical Classes or Workshops	25

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

Outline Syllabus

Students will study topics directly relevant to the three projects and include Project 1 (P1) Joint (elbow or knee) Structure and Function,
Project 2 (P2) Physiological Measurements and design of a low-cost pulse oximeter and
Project 3 (P3) of multidisciplinary nature with other engineering disciplines. In addition, the module establishes professional skills with supplementary lectures 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. Biomedical Engineering Students will also undertake practical workshops in material forming and joining; control and robotics; fitting and machining; measurement and metrology; CNC machining, Bio-sensing Related Electronics and Computer Aided Engineering to achieve project outcomes

Learning Outcomes

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, social 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 in order to accomplish the objectives of a project in a safe working environment
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

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 a key driver.

The module will be taught through a series of design and build challenges supported by targeted interactive online 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.

Students will also undertake practical field course sessions. 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. The

systems required for the projects will be conceived, designed and specified by the Student Groups, using the restricted list of components. The systems will then be manufactured by students and Technical Staff.

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.

As part of their practical experience within the module, students will undertake a series of five practical Engineering Production Technique (EPT) workshop sessions which will embed skills and knowledge of manual and automated manufacturing methods that are used in modern and advanced engineering. Knowledge of these skills and techniques will help to underpin the manufacturing decisions that students make within this module and throughout their academic journey and beyond.

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). They include: M2, C2, M4, C4, M5, C5, M8, C8, M9, C9, M10, C10, M11, C11, M12, C12, M13, C13, M15, C15, M16, C16. Further details of these learning outcomes can be found at https://www.engc.org.uk/ahep

Mode of Assessment

Type	Method	Description	Weighting	
Summative	Examination - practical/laboratory	Project 1 (20 Mins)	20 mins	20%
Summative	Examination - practical/laboratory	Project 2 (20 Mins)	20 mins	40%
Summative	Examination - practical/laboratory	Project 3 (20 Mins)	20 mins	40%

Referral	Coursework	Coursework; Individual evaluative report on Project 1 (1000 words); (20%)		20%
Referral	Coursework	Coursework; Individual evaluative report on Project 2 (2000 words); (40%)		40%
Referral	Coursework	Coursework; Individual evaluative report on Project 3 (2000 words); (40%)		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.