Programme Specification

Mechatronics {Apprenticeship-UCW} [UCW]

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Section 1: Key Programme Details

Part A: Programme Information

Programme title: Mechatronics {Apprenticeship-UCW} [UCW]

Highest award: FdSc Mechatronics

Interim award: CertHE Mechanical Engineering

Awarding institution: UWE

Affiliated institutions: University Centre Weston

Teaching institutions: University Centre Weston, UWE

Study abroad: No

Year abroad: No

Sandwich year: No

Credit recognition: No

School responsible for the programme: CATE School of Engineering, College of Arts, Technology and Environment

Professional, statutory or regulatory bodies: Not applicable

Apprenticeship: ST0025; ST0289

Modes of delivery: Full-time

Entry requirements:

For implementation from: 01 September 2020

Programme code: H73F43

Section 2: Programme Overview, Aims and Learning Outcomes

Part A: Programme Overview, Aims and Learning Outcomes

Overview: The curriculum is designed for students seeking an engineering education closely aligned to engineering practice. Technical knowledge, engineering practice, business awareness and sustainability are integrated through projects and revisited to produce confident graduates able to apply their skills to novel situations and create engineering solutions that benefit society.

Professional development is placed at the heart of the curriculum. From day one, students are taken on a journey from student engineer to graduate engineer, preparing them for life as an engineering professional. Students will identify, develop and demonstrate competencies expected of a professional engineer in the workplace. Projects and activities, embedded throughout the curriculum, are designed to develop the engineering habits of mind such as: Problem-finding, Problem-solving, Visualising, Systems Thinking, Improving, and Adapting. Foundation principles of engineering science, skills and practice are integrated throughout all years of study.

Mechatronics engineers are employed throughout the engineering sector in the creation, maintenance and improvement of engineering operations. Consequently mechatronics graduates need to be able to integrate engineering knowledge skills from across engineering and be able to be an effective member of a multidisciplinary team. Mechatronics topics of engineering analysis, design, electronics, mechanical systems and manufacturing are developed throughout the core and taken to an advanced level in the optional modules. Sufficient electrical and electronic content has been included in the core programme for the study of engineering problems involving electromechanical and mechatronic systems.

The ability to work in multidisciplinary teams on projects that require a broader view of the role of engineering in industry and society is developed through the core programme using project weeks to bring students together in problem finding and solution spaces where students are able to interact with each other, academics and external practitioners.

The integration of knowledge, skills and practice allows the tacking of real engineering challenges and encourage students to engage with the wider role that mechanical engineers and specifically engineering habits of mind can play in tackling global challenges. This is an accessible and modern engineering curriculum designed to attract students from diverse backgrounds able to see the future role of engineering in industry and society.

Features of the programme: Immersive Project Work create student engineer community within curriculum.

Integrated Learning Framework and use of problem-based and project-based learning.

Industry informed curriculum.

Engineering Practice modules to scaffold the journey from student engineer to graduate engineer.

Professional and personal development embedded throughout all levels of the programme.

Interdisciplinary projects.

Real engineering problems in core curriculum where students can explore industrial, environmental and societal impact of discipline.

Mathematics skills aligned taught in engineering context.

Educational Aims: As a result of successful completion of this programme, a student will:

be able to work as a graduate mechanical engineer across the engineering sector able to work as an effective member of a multidisciplinary team.

have acquired the knowledge and understanding of scientific principles and methods necessary to underpin an education in engineering. The programme will provide insight into, and practical skills in, the creation and maintenance of engineering products and will explore the environmental impact of engineering.

have demonstrated an ability to integrate their knowledge and understanding of core subject material in order to solve a range of engineering problems either individually or as part of a team.

have developed and demonstrated understanding of the competencies and social responsibilities required by a professional engineer in the workplace and society. Activities to scaffold this development are embedded throughout the core curriculum to develop the engineering habits of mind. As a consequence, students will be able to critically appraise the value and effectiveness of future engineering innovations in the field in terms of business improvement and environmental sustainability.

have the requisite academic knowledge, skills and preparation for progression to level 6 programmes in appropriate engineering disciplines.

Programme Learning Outcomes:

On successful completion of this programme graduates will achieve the following learning outcomes.

Programme Learning Outcomes

PO1. Apply scientific and mathematical principles necessary to underpin mechatronics and associated mathematical methods, computational tools and notation used in the evaluation, integration and analysis of mechatronics problems.

PO2. Use systems incorporating digital hardware, software, communication, processing algorithms, interfacing circuits and parameter sensing and actuating devices.

PO3. Model mechatronic systems and be able to specify and assess technical designs.

PO4. Understand the manufacturing, financial and marketing implications of design proposals.

PO5. Apply advanced problem-solving skills and technical knowledge, using a systems approach, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal.

PO6. Communicate and operate effectively either as individuals or as members of a team.

PO7. Pursue independent study, undertake enquiry into novel and unfamiliar concepts and implement change in an engineering environment.

PO8. Make considered judgements and decisions on complex engineering issues in which not all facts and consequences are accurately known.

Assessment strategy: The assessment strategy for the new curriculum is designed to connect topics and levels within the curriculum and to enable students to reflect upon their development. The assessment methods on the programme are aligned to the requirements of the Institution of Engineering and Technology who place high importance on the demonstration of authentic and verifiable learning outcomes for each individual student. This consideration can lead to a reliance on written examinations and limit the scope for project or group work activities. We have therefore widened the range of activities within our examinations to include more open book examinations, questions based on pre-seen scenarios, questions that build on practical laboratory-based activities and computer-based examinations where students demonstrate the use of software to solve engineering problems. The assessment strategy is designed to work for large module cohorts, typically associated with this programme (130-300).

The above Factors influence and inform the design of this programme's assessment strategy.

In year 1 the Engineering Practice 1 module develops professional attributes and engineering habits of mind through activities and assessments that encourage reflections through a structured portfolio and presentations. As part of the portfolio we have the concept of a "passport" where students demonstrate key professional

skills such as workshop skills, library skills and health and safety awareness. This “replicates” part of the experience of an engineering apprentice but for one who is working in an academic environment.

The assessment strategies of the other core level 4 modules each designed to make sure that the content covered is connected. Solid Mechanics, Materials and Mathematical Modelling for Electronics and Robotics are strong examples of the design as students are assessed on key technical material during or at the end of the first semester, then moving to an exercise where the knowledge and skill is assessed in the context of an engineering design problem and then with a controlled assessment at the end of the module. The written examination references and builds upon design activities undertaken during the module and provides an efficient vehicle for integrating the different module elements and assessing individual knowledge. The assessment strategy is programmatic and connects the two immersive projects with the task from the first feeding into the second where a more technical treatment is considered bringing the content from these two modules together. The assessments at level 4 should create the culture required for students to embrace active learning styles.

At level 5 Signals and Systems and Analogue Electronic Systems all provide examples of how content and assessment is developed from level 4 to level 5. The immersive projects are used by the project orientated modules Engineering Practice 2 and Engineering Research.

The module Engineering Practice 2 takes over from the level 4 version and is a module that relies on the importance and creation of the team with key roles allocated and the dynamics of the team monitored through a regular peer assessment process. The problem to be tackled and forms the vehicle for the assessment is designed to be motivational and accessible and is assessed through group presentation.

Engineering Research is designed to have a significant impact on our operation. Students receive a series of lectures and seminars introducing them to topics such as effective project planning, academic literature review, ethics, data analysis,

technical resources. While these skills are nominally to prepare continuing students for further individual research at Level 6, these skills are important for appreciating research projects in industry.

Student support: Espresso Engineering and Espresso Maths drop-in support stations

Personality and professional strengths finding activity at start of programme

Mathematics diagnostic testing and follow-up interventions early in year 1

Development of group work skills and attributes

Academic mentors to provide continuity of support to SpLD students

Academic personal tutors

Video capture of course content delivery

E-assessments for rapid feedback

Part B: Programme Structure

Year 1
Year 1 is taught at UCW.

Year 1 Compulsory Modules
The student must take 120 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFKS-30-1	Engineering Practice 1 2023-24	30

UFMFFT-15-1	Mathematical Modelling for Electronics and Robotics 2023-24	15
UFMFJT-30-1	Principles of Electrical Engineering 2023-24	30
UFMFGT-15-1	Programming for Engineers 2023-24	15
UFMFLS-30-1	Solid Mechanics, Materials and Manufacturing 2023-24	30

Year 2
Year 2 is taught at UWE.

Year 2 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFPT-15-2	Analogue Electronic Systems 2024-25	15
UFMFQS-15-2	Engineering Practice 2 2024-25	15
UFMFMT-30-2	Signals and Systems 2024-25	30

Year 3
Year 3 is taught at UWE.

Year 3 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFQ8-30-2	Electrical Technology 2025-26	30
UFMFRS-15-2	Engineering Research 2025-26	15
UFMFUS-15-2	Systems Design 2025-26	15

Part C: Higher Education Achievement Record (HEAR) Synopsis

Graduates of this programme will be equipped with a broad understanding of mechanical analysis and design, combined with knowledge of engineering practice, information technology and project management.

The programme produces graduates with a broad-based ‘systems’ approach to engineering problem solving. Graduates from this programme will be equipped to work in multi-disciplinary teams, able to critically appraise existing ideas and practice and produce creative solutions to engineering problems.

Part D: External Reference Points and Benchmarks

Set out which reference points and benchmarks have been used in the design of the programme:

QAA UK Quality Code for HE

Framework for higher education qualifications (FHEQ)

Subject benchmark statement for Higher Education qualifications in engineering (October 2019)

Strategy 2030

University policies

Staff research projects

Relevant PSRB requirements: AHEP3 (Note programme is not accredited but PSRB requirements have been used to ensure progression to level 6 accredited programmes)

Level 6 Degree Apprenticeship standard ST0151

Industrial Advisory Board

Part E: Regulations

A: Approved to University Academic Regulations and Procedures