Programme Specification

Mechatronics [GlosColl]

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Section 1: Key Programme Details

Part A: Programme Information

Programme title: Mechatronics [GlosColl]

Highest award: FdSc Mechatronics

Interim award: CertHE Mechatronics

Awarding institution: UWE

Affiliated institutions: Gloucestershire College

Teaching institutions: Gloucestershire College

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

Modes of delivery: Part-time

Entry requirements:

For implementation from: 01 September 2018

Programme code: H73A00

Section 2: Programme Overview, Aims and Learning Outcomes

Part A: Programme Overview, Aims and Learning Outcomes

Overview: Foundation Degree programmes are designed to enable learners to benefit from the interpretation of ideas and the experience of practice, within the wider context of employment and one in which knowledge, understanding and skills are clearly integrated. By focusing on learning within a work context, that is underpinned by both vocational and academic understanding Foundation Degrees should demonstrate learning outcomes that are explicitly relevant to both employers', and perhaps also professional, needs. Furthermore, consideration of sustainability in the application of the knowledge, understanding and skills achieved should enable successful progression both within employment and to honours level or to other qualifications.

Features of the programme: The College has strong employer links which are used to inform the curriculum by identifying changing skill needs and gaps in provision. Employers also actively participate in aspects of course delivery.

Educational Aims: The generic outcomes identified below are taken from the descriptor for the qualification that has been used to represent the level 5 within the Frameworks for Higher Education Qualifications. By comparison, holders of Foundation Degrees should be able to demonstrate:

Knowledge and critical understanding of the well-established principles in their field of study and the way in which those principles have developed

Successful application in the workplace of the range of knowledge and skills learnt throughout the programme

Ability to apply underlying concepts and principles outside the context in which they were first studied, and the application of those principles in a work context

Knowledge of the main methods of enquiry in their subject(s), and ability to evaluate critically the appropriateness of different approaches to solving problems in their field of study and apply these in a work context

An understanding of the limits of their knowledge, and how this influences analyses and interpretations based on that knowledge in their field of study and in a work context

Typically, holders of Foundation Degrees would be able to:

Use a range of established techniques to initiate and undertake critical analysis of information, and to propose solutions to problems arising from that analysis in their field of study and in a work context

Effectively communicate information, arguments, and analysis, in a variety of forms, to specialist and non-specialist audiences, and deploy key techniques of the discipline effectively in their field of study and in a work context

Undertake further training, develop existing skills, and acquire new competences that will enable them to assume responsibility within organisations

Qualities and transferable skills necessary for employment and progression to other qualifications requiring the exercise of personal responsibility and decision-making and the ability to utilise opportunities for lifelong learning

Programme Learning Outcomes:

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

Knowledge and Understanding

A1. Scientific principles and methodology necessary to underpin mechatronic and systems engineering, to enable appreciation of its scientific and engineering context in support of understanding of future developments and technologies (ESD)

A2. Mathematical principles necessary to underpin electrical and electronic engineering and mathematical methods, tools and notations used in the analysis of electrical, electronic and mechatronic engineering problems

A3. Electronic components, transducers, sensors; actuators, motors and their control

A4. The properties, characteristics and selection of materials used in mechanical and electromechanical components and systems (ESD)

A5. The application of a systems approach to product realization that encompasses integration of mechanical, electrical and software engineering

A6. Project management techniques which may be used to achieve engineering objectives in the workplace

Intellectual Skills

B1. The ability to use a broad spectrum of technologies/techniques to solve design problems (ESD)

B2. Demonstrate cognitive skills in thinking with respect to the design and development of solutions for real-world problems

B3. Critically review available literature relevant to the subject discipline

B4. Ability to investigate and define a problem and identify design constraints including environmental and sustainability limitations, health and safety and risk assessment issues (ESD)

B5. The skills of selecting and applying scientific principles in the modelling and analysis of mechatronic engineering problems (ESD)

B6. Ability to understand the management processes for engineering

Subject/Professional Practice Skills

C1. Select and apply appropriate quantitative methods and computer software tools for the evaluation, analysis and solution of engineering problems

C2. Apply experimental methods in the laboratory relating to engineering design, manufacture and test

C3. Undertake practical testing of design ideas through laboratory work or simulation with technical analysis and critical evaluation of results

C4. Use of relevant design, test and measurement equipment

C5. Knowledge and understanding of workshop/laboratory practice including safety and environmental considerations

Transferable Skills and other attributes

D1. To communicate using professional standards of English, both orally and in writing including, for instance, the results of echnical investigations, to peers and/or to "problem owners"

D2. To manage his or her own time; to meet deadlines

D3. To work with others, being aware of the benefits and problems which teamwork can bring, having gained insights into the problems of team-based development in the workplace

D4. To express problems in appropriate notations

D5. To gain experience of, and develop further skills in, learning independently of structured class work, including the use of on-line facilities to further self-study and workplace experience where appropriate

D6. To read and use literature sources appropriate to the discipline to support learning activities

Assessment strategy: A broad range of assessment strategies are used ensuring that both theoretical and practical aspects of the learning outcomes are assessed. There will be a strong focus on learning through the work environment through work-based projects and learning in the workplace.

Testing of the knowledge base is through assessed coursework (individual and group), laboratory work, oral presentation, observed group meetings, through tasks undertaken under controlled conditions and through formal examinations.

Student support: The programme is delivered by Gloucestershire College and to which the following statements apply:

Staff:

Academic staff who teach on this programme are academically well qualified up to MSc level, have relevant extensive industrial experience and have extensive teaching experience. They hold PGCE qualifications and are experienced in dealing

with the needs of mature and part-time students.

Teaching Facilities:

Students on this programme will benefit from excellent teaching facilities including well-equipped workshops and laboratories in the new Docklands campus, well equipped Electronics and Mechatronic Lab and state-of-the-art classrooms with Interactive Whiteboards and Internet connections. The Labs are equipped with PCs and Laptops with specialist software. Virtual Learning Environment that the students can access 24/7.

Students also have access to the engineering and library facilities at UWE.

Equipment:

The educational experience of students on this programme will be enhanced by the use of equipment such as computer based test instrumentation, microprocessor and microcontroller development systems, PLC Trainers electro mechanical rigs and specialist software, including electronic and mechanical Computer Aided Design.

Student Support:

The College is committed to widening participation in learning, including enhancing progression into HE provision. It has high quality learning support services which are used to address the barriers to learning faced by many learners in the area, including ESOL needs, child care barriers, physical disability barriers, financial and personal problems and cultural barriers. There are specific learner support arrangements for flexible learners in the workplace and extensive support mechanisms for managing mentoring programmes. 'Well organised additional learning support for students' was identified as a key strength in our last inspection report. All students receive tutorials for academic and pastoral support. Additional support will be provided through

The Learning Gateway (i.e. a library)

IT suites used for tutorial sessions

HE Student Support Pack

A Work-Based Learning department to support work placements

Industrial Support:

The College has strong employer links which are used to inform the curriculum by identifying changing skill needs and gaps in provision. Employers also actively participate in aspects of course delivery.

Students have access to student support services at UWE.

Progression to Independent Study:

Many modules require students to carry out independent study, such as research for projects and assignments, and a full range of facilities are available to help students with these. The philosophy is accordingly to offer students both guided support and opportunities for independent study.

Guided support, mainly in the form of timetabled sessions, takes the form of lectures, tutorials, seminars and practical laboratory sessions. Students are expected to attend all sessions on their timetable, this is especially important because of the high content of practical lab work in the programme.

The progression to independent study is also assisted by the nature of the support offered in individual modules. Typically, module leaders will provide a plan for the module indicating the activities to be carried out and the forms of learning to be undertaken during the delivery of the module, with a view to encouraging students to plan ahead and to take responsibility for managing their time and resources.

Engineering Facilities:

Students can take full advantage of the fully stocked and dedicated Labs, machining, welding and fabrication workshops, and laboratories equipped with the latest CAD/CAM, CNC, Materials, Pneumatic/Hydraulics, Programmable Logic Control, Electronics and Process Control Technology give them unrivalled access to the latest industry standard training and education. Dedicate PCs and Laptops with industry standard software are available to students. To further enhance our CAD/CAM provision we recently purchased a new CNC machining centre enabling the link between 3D modelling software, machining simulation and computerised manufacturing. In addition, we have 3D prototyping technologies, standard Robotics, PLC, Process Control and other Instrumentation and Control technologies and hardware. Foundation degree students will have full access to the above facilities as well as to general purpose teaching rooms and ILT equipped teaching spaces. The students also have access to a well-stocked library with virtual learning facility and electronic resources.

Library and IT Provision:

The Gloucestershire College main library site is located centrally within the College in the main block and at the heart of College provision. We subscribe to a wide range of electronic resources to support the whole curriculum including eBooks and databases. All our e-resources are available through the virtual learning environment, MOODLE and we are linking relevant curriculum resources directly to courses within MOODLE. We use GC Portal for access to our e-resources outside of College. As students of The University of the West of England students have the opportunity to:

access a range of specialist laboratories and IT rooms at UWE in addition to the College facilities.

access a range of university’s library and online resources.

Gloucestershire and UWE library services work closely together.

Key spaces for group projects, individual workspaces, networked PCs:

Library facilities, student learning spaces, IT facilities, PC-lab provision

Technology Enhanced Learning (TEL):

The main repository for on-line learning materials at HE level in recent years has been the VLE (Blackboard/Moodle). This is now extensively used by all engineering staff as well as students as the first port of call for unit specific materials. The vast majority of these materials have been developed and been made available by the teaching staff, and these include subject and lesson notes, presentations, schemes of work and assignments as well as links to other resources (e.g. hyperlinks). All networked and VLE resources, including networked software applications, are available via any internet connection for any enrolled student via the remote access link on the College website. For those specialist software applications that are not available over the network, CDROMs with student licences are issued.

The current software resources available include the standard Windows Office packages plus specialist software to service current engineering curriculum needs.

Pastoral Care:

Our Learning Support team offers a wide range of support for students with additional learning needs and disabilities, including:

Dyslexia, dyspraxia and dyscalculia

Autism and Asperger’s syndrome

Sensory impairment

Physical disability

British Sign Language signer

In-class support

Access arrangements for examinations

Assistive technology

Personal care

Study support (including brailing, audio, note-taking)

Transition support for students with SEN statements / LDA's (S139a) / EHCPs

Student Representatives:

It is important that students are able to communicate to the Programme Manager any issues they may have concerning the programme and The University of the West of England requires each programme to have at least one student representative from each year of the programme. Student Representatives are elected by the student group and will attend the Programme Committee meetings at the College. He or she will be able to raise issues and concerns on behalf of fellow students with members of the Programme Team. The student representative can also relay student concerns to module leaders and staff at any time.

Employability:

All students on FdSc Mechatronics will be employed and the course will offer them career progression through academic and professional development. The college has a dedicated career advice and guidance team to support the students throughout the course.

Students also have access to the UWE Careers and Employability Guidance.

Part B: Programme Structure

Year 1
The student must take 90 credits from the modules in Year 1.

Year 1 Compulsory Modules
The student must take 90 credits from the modules in Compulsory modules.

Module Code	Module Title	Credit
UFMF7C-30-1	Design, Materials and Manufacturing (Work Based Learning) - Not Running 2023-24	30
UFMFP8-15-1	Electrical and Electronic Principles A 2023-24	15
UFMFVA-15-1	Electrical and Electronic Principles B 2023-24	15
UFMFJ9-30-1	Engineering Mathematics 2023-24	30

Year 2
The student must take 75 credits from the modules in Year 2.

Year 2 Compulsory Modules
The student must take 75 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFQ8-30-2	Electrical Technology 2024-25	30
UFMFL9-15-2	Mathematics for Signals and Control 2024-25	15
UFMFH3-30-1	Stress & Dynamics 2024-25	30

Year 3
The student must take 75 credits from the modules in Year 3.

Year 3 Compulsory Modules
The student must take 75 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFV7-15-2	Control 2025-26	15
UFMF88-30-2	Design and Electromechanical Systems 2025-26	30
UFMF8C-15-2	Project Management (Work Based Learning) 2025-26	15
UFMFMA-15-2	Signal Processing and Circuits 2025-26	15

Part C: Higher Education Achievement Record (HEAR) Synopsis
Designed in conjunction with key national and multi-national employers, the FdSc Mechatronics programme provides graduates with the mix of skills and capabilities required by UK business for the specification, design and delivery of mechatronic systems and solutions, including safety critical systems, as required by the aerospace, transport, medical, military and other services.

Delivered partly in the workplace, the programme develops technically competent individuals who think and communicate effectively and who can conduct inquiry, solve problems, undertake critical analysis and deliver effective mechatronic systems solutions in a constantly changing business context.

It provides a solid foundation for lifelong learning, emphasising the development of knowledge, skills and professional values essential to the practice of systems development. It also provides a stepping stone for advanced entry into a BEng Hons or MEng programme.

Part D: External Reference Points and Benchmarks
The valuable experience gained from the FdSc Electronic and Computer Engineering validated by UWE has been used in development of the Mechatronics

Foundation Degree. The course is closely aligned with FdSc Mechatronics (Bridgwater College) programme. The experience has been invaluable in understanding the partnership operational requirements, working with our peers and in ensuring the curriculum meets all stakeholder expectations.

The engineering benchmarks for foundation degree qualifications and undergraduate degrees (QAA UK Quality Code for HE) provided the guidelines for the design of the programme in conjunction with SEMTA. In particular, the Engineering Subject Benchmark Statement (2015) regarding the characteristics of engineering graduates, and the Foundation Degree Qualification Benchmark (2010) defining the characteristics of foundation degrees have influenced the design of the programme.

The learning outcomes, professional practice and transferable skills that have been written into the Foundation Degree has taken these Benchmark statements into consideration addressing them in order to ensure the graduates have the required level of skills, knowledge within a vocational workplace context.

In addition, all modules in the programme have been written to conform to the learning outcomes required by the Engineering Council UK. This is mandatory for accredited engineering programmes. The specific outcomes are largely based on the IET Handbook of Learning Outcomes for BEng and MEng Programmes.

The Engineering Council learning outcomes have been used to allow for a smooth transition to a BEng Hons or MEng programme and to prepare for accreditation of the FdSc to IEng. The modules have been designed to ensure adequate and appropriate coverage of these outcomes across the levels of study.

University strategies and policies:

The programme is designed to address skills shortages in the STEM related sectors. It provides and alternative route into HE for apprentices thus addressing the aim of widening participation. It enhances collaborative opportunities with regional and multi-national employers.

The programme design strives to address UWE's 2020 strategy priorities "Ready and Able Graduates" and "Strategic Partnerships- Connections and Networks".

Gloucestershire College's Teaching, Learning and Assessment Strategy and Workbased Learning policy has informed the development, structure and planned delivery of the FdSc Mechatronics.

Gloucestershire College has strong employer links which are used to inform the curriculum by identifying changing skill needs and gaps in provision. Feedback from employers has formed an important part of the development of this programme.

The programme has been designed in conjunction with industrial partners (including GE Aviation (Bishops Cleeve), GE Oil & Gas (Nailsea), Renishaw, Ultra Electronics, G-TEM, Spirax Sarco, Versarien, Poeton, GET – Gloucestershire Engineering Training and others) to provide a study route for higher engineering apprentices in the mechatronics and related industries. It has been developed via a number of stakeholder meetings held at GlosCol. This included current and past students.

This ensures that the programme meets the requirements of major employers regionally, nationally and globally in providing the blend of academic and vocational skills needed by modern engineers.

Modules within the programme are also delivered within UWE and in partner institutions. This Foundation degree has been developed in conjunction with academic and industrial partners with the intention of being a feed into the MEng/BEng (Hons) Electronic Engineering.

This programme is designed to provide the opportunity for advanced entry into any of the following undergraduate programmes subject to satisfactory completion of the foundation degree:

MEng/BEng (Hons) Electronic Engineering degrees

Part E: Regulations

Approved to University Regulations and Procedures.