Programme Specification

Instrumentation and Control Engineering {Foundation} [Oct][PT][GCET][8yrs]

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Section 1: Key Programme Details

Part A: Programme Information

Programme title: Instrumentation and Control Engineering {Foundation} [Oct][PT][GCET][8yrs]

Highest award: BEng (Hons) Instrumentation and Control Engineering

Interim award: BEng Instrumentation and Control Engineering

Interim award: DipHE Instrumentation and Control Engineering

Interim award: CertHE Instrumentation and Control Engineering

Awarding institution: UWE Bristol

Affiliated institutions: Global College of Engineering and Technology (GCET)

Teaching institutions: Global College of Engineering and Technology (GCET)

Study abroad: No

Year abroad: No

Sandwich year: No

Credit recognition: No

School responsible for the programme: FET Dept of Engineering Design & Mathematics, Faculty of Environment & Technology

Professional, statutory or regulatory bodies: Not applicable

Modes of delivery: Part-time

Entry requirements: For the current entry requirements see the UWE public website.

For implementation from: 01 October 2018

Programme code: H66113-OCT-PT-GE-H66113

Section 2: Programme Overview, Aims and Learning Outcomes

Part A: Programme Overview, Aims and Learning Outcomes

Overview: The programme is designed to provide the balance of theoretical and practical understanding needed to meet the demands of the instrumentation and control engineering in the industry for engineering practitioners, and in particular to meet the requirements for professional accreditation in partial fulfilment of CEng.

To produce graduates with a broad understanding of the discipline in conjunction with a detailed understanding of their chosen specialism of electronic systems and instrumentation.

The programme produces graduates with a wide range of expertise relevant to the instrumentation and control engineering industry. The programme covers a broad range of disciplines such as digital and analogue circuit design, power electronics, control, instrumentations, sensors and transducers, signal processing and project management. A number of developments have occurred in electronic engineering in recent times, although signals are analogue in nature, many electrical or electronic designs involve conversion to digital format as soon as possible and processing by microprocessor or digital integrated circuit. In recognition of this, this programme allows students to develop expertise particularly in system design, microprocessor hardware/software design and simulation and modeling techniques.

The programme has been designed to cater for students with both industrial and/or academic backgrounds, to develop problem solving skills and be able to demonstrate leadership in a number of engineering settings.

Features of the programme:

Educational Aims: Gain a sound knowledge and understanding of the fundamental principles governing the behaviour of instrumentation and control engineering and of the related mathematics;

Be capable of analysis of the behaviour of complex electronic, digital electronic or electrical systems;

Demonstrate a capacity for innovative and creative design and be able to draw on knowledge of fundamental principles and proven systems to further develop existing systems and to generate new systems which meet required specifications;

Have a broad knowledge and understanding of engineering theory, practices and applications and be able to use advanced techniques of analysis, synthesis and simulation, and implementation in the field of electronic engineering or electrical engineering,

Have developed the ability, interest and motivation to conduct independent study and keep abreast of future changes in technology and engineering practices.

Be able to work in a largely unsupervised way to undertake an individual research project and present the findings in a professional manner,

Be able to communicate clearly, concisely and persuasively with individuals and groups, using a professional standard of English, both orally and in writing.

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 electronic, instrumentation, control and systems engineering, to enable appreciation of its scientific and engineering context in support of understanding of future developments and technologies.

A2. Mathematical principles necessary to underpin electrical and electronic, instrumentation, control engineering and mathematical methods, tools and notations used in the analysis and solution of electrical and electronic engineering problems, number systems and their applications.

A3. The range of applicability of abstract models of electronic and control engineering components and their fundamental limitations in linear and non-linear circuit applications

A4. Electronic components, digital circuits and logic families and an ability to characterise them; ability to use combinatorial and sequential logic circuits; basic computer structure (microcomputer and DSP) their use in real-time applications. Ability to use HDL systems and techniques.

A5. System-on chip design methodologies and their application to the top-down design of electronic systems

A6. The commercial, ethical, economic and legal context of engineering processes, including sustainable development, risk management, health and safety and environmental legislation.

Intellectual Skills

B1. Demonstrate an understanding of the need for a high level of professional and ethical conduct in engineering

B2. The ability to investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues.

B3. Critically review available literature relevant to the subject discipline

B4. Demonstrate independent thinking in the design and development of solutions to real - world problems.

B5. The ability to select and apply appropriate computer-based methods for modelling and analysing problems in the fields relating to the design, manufacture and control of electrical and electronic components and systems.

B6. The ability to understand issues relating to the marketing of products and the management processes associated with their design and manufacture.

Subject/Professional Practice Skills

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

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

C3. Use relevant design, test and measurement equipment.

C4. Execute and manage multi-disciplinary projects.

C5. Undertake practical testing of design ideas through laboratory work or simulation with technical analysis and critical evaluation of results.

C6. Apply engineering techniques taking account of environmental, industrial and commercial constraints.

Transferable Skills and other attributes

D1. To communicate using professional standards of English, both orally and in writing, including, for instance, the results of technical 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 systems development.

D4. To use software in the context of problem - solving investigations, and to interpret findings.

D5. To express problems in appropriate notations.

D6. To gain experience of, and to develop skills in, learning independently of structured class work, including the use of on -line facilities to further self-study.

D7. To read and to use literature sources appropriate to the discipline to support learning activities.

Assessment strategy: The assessment strategy has been designed to test the programme learning outcomes.

Student support:

Part B: Programme Structure

Year 1
The student must take 60 credits from the modules in Year 1.

Year 1 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFEG-30-0	Engineering Experimentation 2021-22	30
UFMFBG-30-0	Foundation Mathematics: Algebra and Calculus 2021-22	30

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

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

Module Code	Module Title	Credit
UFCFGK-30-0	Professional and Academic Skills 2022-23	30
UFCEXX-30-0	Program Design and Implementation 2022-23	30

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

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

Module Code	Module Title	Credit
UFMFP8-15-1	Electrical and Electronic Principles A 2023-24	15
UFMFJ9-30-1	Engineering Mathematics 2023-24	30

UFMFCA-15-1	Practical Electronics 2023-24	15

Year 4
The student must take 60 credits from the modules in Year 4.

Year 4 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFN7-15-1	C Programming 2024-25	15
UFMFF8-30-1	Digital Principles 2024-25	30
UFMFVA-15-1	Electrical and Electronic Principles B 2024-25	15

Year 5
The student must take 60 credits from the modules in Year 5.

Year 5 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFL9-15-2	Mathematics for Signals and Control 2025-26	15
UFMFKA-30-2	Microcontrollers Applications Group Lab 2025-26	30
UFMFMA-15-2	Signal Processing and Circuits 2025-26	15

Year 6
The student must take 60 credits from the modules in Year 6.

Year 6 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFV7-15-2	Control 2026-27	15

UFMFNP-15-2	Measurements and Instrumentations 2026-27	15
UFMFHA-15-2	Project Management 2026-27	15
UFMFPK-15-2	Sensors, Transducers and Actuators 2026-27	15

Year 7
The student must take 60 credits from the modules in Year 7.

Year 7 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFW7-15-3	Control Systems Design 2027-28	15
UFCF95-15-3	Entrepreneurial Skills 2027-28	15
UFMF99-15-3	Intelligent and Adaptive Systems 2027-28	15
UFMFPP-15-3	Remote Sensing 2027-28	15

Year 8
The student must take 60 credits from the modules in Year 8.

Year 8 Compulsory Modules
The student must take 45 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMFX8-30-3	Engineering Project 2028-29	30
UFMFV8-15-3	Group Design and Integration Project 2028-29	15

Year 8 Optional Modules
The student must take 15 credits from the modules in Optional Modules.

Module Code	Module Title	Credit

UFMFE7-15-3	Analogue Electronic Design 2028-29	15
UFMFS7-15-3	Communications 2028-29	15
UFMFH8-15-3	Digital Signal Processing 2028-29	15
UFMFDE-15-3	Power Electronics 2028-29	15

Part C: Higher Education Achievement Record (HEAR) Synopsis

Designed in conjunction with key national and multi-national employers, the programme provides graduates with the mix of skills and capabilities required by UK business for the specification, design and delivery of measurements, instrumentation and control engineering and solutions, including safety systems, as required by the automation, oil and gas and electric power generation and distribution, aerospace, transport, medical, military and other industries.

Delivered in a way that develops technically competent individuals who think and communicate effectively and who can conduct inquiry, solve problems, undertake critical analysis and deliver effective electronic and embedded software 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.

Part D: External Reference Points and Benchmarks

The following reference points and benchmarks have been used in the design of the programme

QAA UK Quality Code for HE http://www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code

Framework for higher education qualifications (FHEQ):

http://www.qaa.ac.uk/publications/informationand-guidance/publication?pubID=2718#.Wm3lrkxuLIU

National Qualifications Framework

Engineering subject benchmark statements
http://www.qaa.ac.uk/en/Publications/Documents/SBSengineering-15.pdf.

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. SEEC level descriptors http://www.seec.org.uk/wp-content/uploads/2016/07/SEEC-descriptors-2016.pdf

IET Handbook of Learning Outcomes for BEng and MEng programmes: https://www.scribd.com/document/343619594/IET-Learning-Outcomes . The specific outcomes are derived from the requirements for electronic and digital engineering described in The IET Handbook of Learning Outcomes for BEng and MEng programmes.

Strategies

UWE Strategy 2020
The programme addresses the following UWE Strategic Priorities:
Priority 1 Outstanding learning
Priority 2 Ready and able graduates
Priority 4 Strategic partnerships, connections and networks

GCET
This programme addresses GCET strategies through the following:
To produce “Able and Ready to Work Graduates”
To develop Distinctive Curriculum.
To establish assessment and feedback processes that enhance and deepen learning.
To promote research-informed education and evidence-based practice that supports

an increasingly diverse student body.
To sustain and extend approaches to learning that further enhance the employability of GECT graduates and the career destinations they are able to reach.
To use technology and the campus environment to further enhance the student learning experience and teaching effectiveness within the context of a larger and more diverse student population

Staff research projects:

Research and industrial collaborations are key to several modules including UFMFHA-15-2, UFMFKA-30- 2, UFMFE7-15-3, and UFMFX8-30-3.

Employer interaction and feedback:
GCET works with a number of industrial partners through the Industrial Consultative Committee. Feedback from employers through their sponsored students also helped in the design of this programme. The programme provides part-time and flexible options which ensure an ongoing interaction with regional employers.

Part E: Regulations
Approved to University Regulations and Procedures.