UNIVERSITY OF PLYMOUTH

PROGRAMME QUALITY HANDBOOK 2022-23

FdSc Electrical Electronic Engineering

Welcome and Introduction

Welcome and Introduction to FdSc Electrical Electronic Engineering.

Welcome to FdSc Electrical Electronic Engineering delivered at Kings Road Campus by City College Plymouth.

This programme has been designed to develop and practically apply a broad knowledge base of electrical and electronic systems theory as well as essential skills required in the field of Electrical and Electronic Engineering.

Students will initially study a range of underpinning theories covering science, mathematics, electrical and electronic principles, management theory and design and microprocessor control. Candidates will then progress on to more advanced applications of the theories in areas including Electrical Power, Analogue and Digital Electronics and Industrial Control and Mechatronics. Students will also undertake a Work-Based Project to practically demonstrate the essential management and research skills required at this level of study and within the workplace. This will be driven by close liaison with employers to ensure that delivery is both current and relevant, thus enhancing the employability skills of students.

This programme has been designed to equip you with the skills and knowledge base required to work in your chosen specialism or other graduate opportunities. It is also a platform from which you can undertake additional vocational and academic qualifications.

This Programme Quality handbook contains important information including:
The approved programme specification
Module records

Note: The information in this handbook should be read in conjunction with the current edition of:
Your Programme Institution & University Student Handbook which contains student support-based information on issues such as finance and studying at HE

Programme Specification

FdSc Electrical and Electronic Engineering

Final award title	FdSc Electrical and Electronic Engineering
Level X Intermediate award title(s)	N/A
Level X Intermediate award title(s)	N/A
UCAS code	H602
JACS code	H600
Awarding Institution:	University of Plymouth
Teaching institution(s):	City College Plymouth
Accrediting body(ies)	

Distinctive Features of the Programme and the Student Experience

The Foundation Degree programme comprises 12 core modules of 240 credits, which is equivalent to the first two years of study on a Degree level programme

This programme has been designed to develop and practically apply a broad knowledge base of electrical and electronic systems theory as well as essential skills required in the field of Electrical and Electronic Engineering.

Students will initially study a range of underpinning theories covering science, mathematics, electrical and electronic principles, and management theory and design and microprocessor control. Candidates will then progress on to more advanced applications of the theories in areas including Electrical Power, Analogue and Digital Electronics and Industrial Control and Mechatronics. Students will also undertake a Work-Based Project to practically demonstrate the essential management and research skills required at this level of study and within the workplace. This will be driven by close liaison with employers to ensure that delivery is both current and relevant, thus enhancing the employability skills of students.

Delivery will be supported by practical activities using industry standard hardware and software development environments within specialist workshop/ laboratory areas and supplemented by practical activities to allow for evaluation of modern design tools and methods. This will take full advantage of the College's £13m investment in the state-of-the-art Regional Centre of Excellence for STEM.

A range of assessment methods are used to ensure that students have gained a thorough grounding in not only the underlying principles but also how they apply in practical, industrial applications. Close links have been established with local industries, which drives the development and continuous updating of the course. This ensures that the skills learnt are relevant to employment in the engineering sector both locally and globally. It also provides the underpinning research based academic skills required of managers within industry and to allow successful candidates to continue into further, higher level studies. It is a college commitment to maintain on-going links with appropriate industries to ensure that assessment and delivery are, where appropriate, practical and work-based.

Delivery is planned to be flexible to accommodate both our part time and full time students. Employed, part time students will undertake a day release delivery model to ensure that the impact on employers is kept to a minimum.

Relevant QAA Subject Benchmark Group(s)

The subject benchmark statement (2015)$_1$ defines the academic standard expected of graduates with an engineering degree. The defined learning outcomes are those published by the Engineering Council in the UK-SPEC UK standard for professional engineering competence www.engc.co.uk Third edition

The QAA, foundation degree benchmarks[3] and the QAA Quality Code[4]

1. http://www.qaa.ac.uk/en/Publications/Documents/SBS-engineering-15.pdf
2. http://www.engc.org.uk/engcdocuments/internet/Website/UK-SPEC%20third%20edition%20(1).pdf
3. http://www.qaa.ac.uk/en/Publications/Documents/Foundation-Degree-qualification-benchmark-May-2010.pdf
4. http://www.qaa.ac.uk/AssuringStandardsAndQuality/quality-code/Pages/default.aspx

Programme Structure

The Programme of study comprises of 240 module credits across level 4 and level 5 with 120 credits per level. The aim of the programme is to develop skills consistent with Engineering Council and Engineering Subject Benchmarks. Due to our strong links with employers in the city and high number of part time learners who are already employed in industry our programme has been developed to provide for the varied roles across the city as Electrical Electronic Engineers, as well as provide a solid grounding to our full time students wishing to further their study or enter employment.

Programme Structure for the Foundation Degree in Electrical and Electronic Engineering (full-time)

Stage 1			
Module Code	**Module Title**	**No. of Credits**	**Core / Optional**
CITY 1077	Engineering Mathematics	20	Core
CITY 1078	Engineering Science	20	Core
CITY 1079	Digital and Analogue Devices and Circuits	20	Core
CITY 1080	Project Design and Business Management	20	Core
CITY 1081	Electrical and Electronic Principles	20	Core
CITY 1082	Microprocessor Systems and High Level Programming	20	Core
Stage 2			
CITY 2075	Electrical Power	20	Core
CITY 2076	Further Analogue Electronics	20	Core
CITY 2077	Further Digital Electronics	20	Core
CITY 2078	Applications of Power Electronics	20	Core
CITY 2079	Work-based Learning Project	20	Core
CITY 2081	Industrial Control Systems and Mechatronics	20	Core

Programme Structure for the Foundation Degree Electrical Electronic Engineering (part-time)

Stage 1			
Module Code	**Module Title**	**No. of Credits**	**Core / Optional**
CITY 1077	Engineering Mathematics	20	Core
CITY 1078	Engineering Science	20	Core
CITY 1079	Digital and Analogue Devices and Circuits	20	Core
CITY 1080	Project Design and Business Management	20	Core
Stage 2			
CITY 1081	Electrical and Electronic Principles	20	Core
CITY 1082	Microprocessor Systems and High Level Programming	20	Core
CITY 2075	Electrical Power	20	Core
CITY 2076	Further Analogue Electronics	20	Core
Stage 3			
CITY 2077	Further Digital Electronics	20	Core
CITY 2078	Applications of Power Electronics	20	Core
CITY 2079	Work-based Learning Project	20	Core
CITY 2081	Industrial Control Systems and Mechatronics	20	Core

Programme Aims

This programme in line with the Engineers Council aims to:

1. Establish broad foundation knowledge on which to develop further skills as technology advances and to enable students to apply engineering principles to the analysis and design of electronic, electric power and renewable energy systems.
2. Develop knowledge and skills to 'learn through design' via practical and project based work, particularly within the context of electrical and electronic design.
3. Develop knowledge of the business implications of engineering decisions and a knowledge of the inter-relationship between the market, engineering activities and the management structures
4. Prepare the students to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills.

Programme Intended Learning Outcomes

Knowledge and understanding

On successful completion graduates should have developed:

1. A sound theoretical approach to the application of technology in electrical / electronic engineering practice.
2. Appropriate theory and practical skills to design, develop, manufacture, construct, commission, operate, maintain, decommission and re-cycle electrical / electronic engineering processes, systems, services and products.
3. A sound evidence-based approach to problem-solving and contribute to continuous improvement.

Cognitive and intellectual skills

On successful completion graduates should have developed the ability to:

1. Identify, review and select techniques, procedures and methods to undertake electrical / electronic engineering tasks.
2. Analyse results to solve electrical and electronic engineering problems, apply technology and implement solutions.
3. Implement design solutions and contribute to their evaluation.

Key and transferable skills

On successful completion graduates should have developed the ability to:

1. Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data.
2. Work independently or as a member of a team.

Employment related skills

On successful completion graduates should have developed:

1. Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment.
2. Knowledge of relevant codes of conduct.
3. Appropriate Work based learning through Projects and practical assessments.

Practical skills

On successful completion graduates should have developed:

1. The ability to select and use appropriate equipment to perform engineering tests.
2. The ability to monitor, analyse and evaluate the performance of electrical and electronic circuits.

Admissions Criteria, including APCL, APEL and DAS arrangements

All applicants must have GCSE (or equivalent) Maths and English at Grade C or above.

Entry Requirements for FdSc Electrical Electronic Engineering	
A-level/AS-level	Normal minimum entry requirements are 56 on new UCAS Tariff at A-level to include Grade D in Maths or Physics
BTEC National Diploma/QCF Extended Diploma	Candidates are interviewed before an offer is made. But an equivalent of 56 UCAS points in an Engineering Subject
Access to Higher Education at level 3	Candidates are interviewed before an offer is made. Pass an Access to HE Diploma in Science with an equivalent of 56 UCAS points
Welsh Baccalaureate	Normal minimum entry requirements are an equivalent of 56 on new UCAS Tariff include Maths, Physics or Engineering
Scottish Qualifications Authority	Normal minimum entry requirements are an equivalent of 56 on new UCAS Tariff include Maths, Physics or Engineering
Irish Leaving Certificate	Normal minimum entry requirements are an equivalent of 56 on new UCAS Tariff include Maths, Physics or Engineering
International Baccalaureate	Normal minimum entry requirements are an equivalent of 56 on new UCAS Tariff include Maths, Physics or Engineering
Non Standard Qualifications with experience	All non-standard applicants are interviewed by the tutor and screened centrally to ensure impartial oversight.

Level 5 entry:

Progression from the HNC Electrical and Electronic Engineering is guaranteed, If a student is studying part time, and know they wish to progress they will study two level 5 modules in addition to the level 4 modules in order to complete the Part time FdSc course within 3 years, this has been approved by exception to regulations. The two level 5 modules which will be studied as a short course are:

CITY 2075	Electrical Power
CITY 2076	Further Analogue Electronics

Progression

Until the college has acquired partial accreditation through IET Students will not be able to progress on to the 3rd year of the BSc in Electrical and Electronic Engineering due to the requirements of IET accreditation with the University. All progressing students will only be allowed progression on to year 2 at the University until accreditation has been approved.

Exceptions to Regulations

Through application the college has been granted exception to regulations to allow part time students to APCL 120 level 4 credits and a further 40 credits at level 5 into year 3 of FdSc Electrical and Electronic Engineering if they have passed the HNC and studied a further 40 credits of level 5 modules as a short course during their part time year 2 of study. The two level 5 modules will be :
CITY2075 Electrical Power and CITY 2076 Further Analogue Electronics.

Transitional Arrangements

The College is currently delivering both an HNC and FdSc Electrical and Electronic Engineering. It is planned that all students currently enrolled on these programmes will remain enrolled on the old programme structure to support in ensuring the meeting of programme level learning outcomes. Any student moving from old HNC will transfer to old FdSc.

However – due to the identified issues with over-assessment at element level the team will be submitting minor changes for some key modules on the old programme structure to support in ensuring alignment with the Plymouth University Assessment Policy for existing students.

All new students from September 2017 will enrol on the completely new structure.

Additional Guidance for Learning Outcomes:

To ensure that the module is pitched at the right level check your intended learning outcomes against the following nationally agreed standards

- Framework for Higher Education Qualifications

  http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/FHEQ08.pdf
- Subject benchmark statements
  http://www.qaa.ac.uk/ASSURINGSTANDARDSANDQUALITY/SUBJECT-GUIDANCE/Pages/Subject-benchmark-statements.aspx
- SEEC level descriptors http://www.seec.org.uk/academic-credit/seec-credit-level-descriptors-2010 (scroll to pdf link at bottom of page)
- Professional, regulatory and statutory (PSRB) accreditation requirements (where necessary e.g. health and social care, medicine, engineering, psychology, architecture, teaching, law)
- QAA Quality Code http://www.qaa.ac.uk/AssuringStandardsAndQuality/quality-code/Pages/default.aspx

Appendix 13.1 – Learning Outcomes map

LEVEL 4				
FHEQ Descriptors	Subject Benchmark(s)	Programme Aims	Programme Outcomes	Core Modules linked to outcomes
Students will have demonstrated: Knowledge of the underlying concepts and principles associated with their areas of study;	A2, Use appropriate scientific, technical or engineering principles.	Establish broad foundation knowledge on which to develop further skills as technology advances and to enable students to apply engineering principles to the analysis and design of electronic, electric power and renewable energy systems.	A sound theoretical approach to the application of technology in electrical / electronic engineering practice.	CITY1077 Engineering Mathematics CITY1078 Engineering Science CITY1079 Digital and Analogue Devices and Circuits CITY1080 Project Design and Business Management CITY1081 Electrical and Electronic Principles CITY1082 Microprocessors and High Level Programming
Ability to evaluate and interpret these within the context of that area of study;	A1, Review and select appropriate techniques, procedures and methods to undertake tasks. B1, Identify problems and apply appropriate methods to identify causes and achieve satisfactory solutions. B2, Identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety, security and environmental impact. D1, Use oral, written and electronic methods for the communication in English1 of technical and other information.	1. Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills. 2. Establish broad foundation knowledge on which to develop further skills as technology advances and to enable students to apply engineering principles to the analysis and design of electronic, electric power and renewable energy systems. 4. Provide the opportunity to 'learn through design' via practical and project based work, particularly within the context of electrical and electronic design.	8.1.2) Appropriate theory and practical skills to design, develop, manufacture, construct, commission, operate, maintain, decommission and re-cycle electrical / electronic engineering processes, systems, services and products. 8.1.3) A sound evidence-based approach to problem-solving and contribute to continuous improvement.	CITY1077 Engineering Mathematics CITY1078 Engineering Science CITY1079 Digital and Analogue Devices and Circuits CITY1080 Project Design and Business Management

Ability to present, evaluate and interpret qualitative and quantitative data;	D2,Present and discuss proposals.	Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills.	8.3.1) Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data.	CITY1080 Project Design and Business Management
Students will be able to: Evaluate the appropriateness of different approaches to solving problems related to their area of study;	A1, Review and select appropriate techniques, procedures and methods to undertake tasks. A2, Use appropriate scientific, technical or engineering principles. B1, Identify problems and apply appropriate methods to identify causes and achieve satisfactory solutions.	Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills.	8.1.3) A sound evidence-based approach to problem-solving and contribute to continuous improvement. 8.2.1) The ability to Identify, review and select techniques, procedures and methods to undertake electrical / electronic engineering tasks.	CITY1077 Engineering Mathematics CITY1078 Engineering Science CITY1080 Project Design and Business Management CITY1082 Microprocessors and High Level Programming
Communicate the results of their study accurately and reliably and with structured and coherent argument	D1, Use oral, written and electronic methods for the communication in English1 of technical and other information.	Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills.	8.3.1) Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data.	CITY1080 Project Design and Business Management CITY1082 Microprocessors and High Level Programming
Undertake further training and develop new skills within a structured and managed environment	E4, Carry out and record CPD necessary to maintain and enhance competence in own area of practice including: • Undertake reviews of own development needs • Plan how to meet personal and organisational objectives • Carry out planned (and unplanned) CPD activities • Maintain evidence of competence	Establish broad foundation knowledge on which to develop further skills as technology advances and to enable students to apply engineering principles to the analysis and design of electronic, electric power and renewable energy systems. Provide the opportunity to 'learn through design' via practical and project based work, particularly within the context of electrical and electronic design.	8.4.1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment.	CITY1077 Engineering Mathematics CITY1078 Engineering Science CITY1079 Digital and Analogue Devices and Circuits CITY1080 Project Design and Business Management CITY1081 Electrical and Electronic Principles CITY1082 Microprocessors and High Level Programming

	development • Evaluate CPD outcomes against any plans made • Assist others with their own CPD.	Provide an awareness of the business implications of engineering decisions and a knowledge of the inter-relationship between the market, engineering activities and the management structures Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills.		
Students will also have: The qualities and transferable skills necessary for employment requiring the exercise of some personal responsibility	C1, Work reliably and effectively without close supervision, to the appropriate codes of practice. E1, Comply with the Code of Conduct of your institution. E2, Manage and apply safe systems of work.	Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills.	8.4.1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment.	CITY1077 Engineering Mathematics CITY1078 Engineering Science CITY1079 Digital and Analogue Devices and Circuits CITY1080 Project Design and Business Management CITY1081 Electrical and Electronic Principles CITY1082 Microprocessors and High Level Programming

LEVEL 5				
FHEQ Descriptors	Subject Benchmark(s)	Programme Aims	Programme Outcomes	Core Modules linked to outcomes
Students will have demonstrated: Knowledge and critical understanding of the well-established principles of their area of study and the way in which those principles have developed;	A1, Maintain and extend a sound theoretical approach to the application of technology in engineering practice. B2, Contribute to the design and development of engineering solutions. B3, Implement design solutions and contribute to their evaluation.	Establish broad foundation knowledge on which to develop further skills as technology advances and to enable students to apply engineering principles to the analysis and design of electronic, electric power and renewable energy systems. Provide the opportunity to 'learn through design' via practical and project based work, particularly within the context of electrical and electronic design.	8.1.1) A sound theoretical approach to the application of technology in electrical / electronic engineering practice. 8.1.2) Appropriate theory and practical skills to design, develop, manufacture, construct, commission, operate, maintain, decommission and re-cycle electrical / electronic engineering processes, systems, services and products. 8.1.3) A sound evidence-based approach to problem-solving and contribute to continuous improvement.	CITY2075 Electrical Power CITY2076 Further Analogue Electronics CITY2077 Further Digital Electronics CITY2078 Applications of Power Electronics CITY2079 Work-based Learning Project CITY2081 Industrial Control Systems and Mechatronics
Ability to apply underlying concepts and principles outside the context in which they were first studied, including where appropriate, the application of those principles in an employment context;	A2, Use a sound evidence-based approach to problem-solving and contribute to continuous improvement. B1, Identify, review and select techniques, procedures and methods to undertake engineering tasks. B2, Contribute to the design and development of engineering solutions.	Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills. Provide the opportunity to 'learn through design' via practical and project based work, particularly within the context of electrical and electronic design.	8.1.3) A sound evidence-based approach to problem-solving and contribute to continuous improvement. 8.2.1) The ability to Identify, review and select techniques, procedures and methods to undertake electrical / electronic engineering tasks. 8.2.2) The ability to use results of analysis to solve electrical and electronic engineering problems, apply technology and implement solutions.	CITY2075 Electrical Power CITY2076 Further Analogue Electronics CITY2077 Further Digital Electronics CITY2078 Applications of Power Electronics CITY2079 Work-based Learning Project CITY2081 Industrial Control Systems and Mechatronics

	B3, Implement design solutions and contribute to their evaluation.		8.3.1) Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data. 8.5.1) The ability to select and use appropriate equipment to perform engineering tests. 8.5.2) The ability to monitor, analyse and evaluate the performance of electrical and electronic circuits. 8.4.1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment.	
Knowledge of the main methods of enquiry in the subject relevant to the named award, and ability to evaluate critically the appropriateness of different approaches to solving problems in the field of study;	A1, Maintain and extend a sound theoretical approach to the application of technology in engineering practice. A2, Use a sound evidence-based approach to problem-solving and contribute to continuous improvement. B2, Contribute to the design and development of engineering solutions. B3, Implement design solutions and contribute to their evaluation. C1, Plan for effective project implementation.	1. Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills. 2. Establish broad foundation knowledge on which to develop further skills as technology advances and to enable students to apply engineering principles to the analysis and design of electronic, electric power and renewable energy systems. 4. Provide the opportunity to 'learn through design' via practical and project based work, particularly within the context	8.1.3) A sound evidence-based approach to problem-solving and contribute to continuous improvement. 8.5.1) The ability to select and use appropriate equipment to perform engineering tests. 8.5.2) The ability to monitor, analyse and evaluate the performance of electrical and electronic circuits. 8.2.1) The ability to Identify, review and select techniques, procedures and methods to undertake electrical / electronic engineering tasks. 8.2.2) The ability to use results of analysis to solve electrical and electronic engineering problems, apply	CITY2075 Electrical Power CITY2078 Applications of Power Electronics CITY2079 Workbased Learning Project CITY2081 Industrial Control Systems and Mechatronics

		of electrical and electronic design.	technology and implement solutions. 8.2.3) The ability to Implement design solutions and contribute to their evaluation.	
An understanding of the limits of the knowledge, and how this influences analyses and interpretations based on that knowledge	A2, Use a sound evidence-based approach to problem-solving and contribute to continuous improvement.	Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills. Provide the opportunity to 'learn through design' via practical and project based work, particularly within the context of electrical and electronic design.	8.1.1) A sound theoretical approach to the application of technology in electrical / electronic engineering practice. 8.1.3) A sound evidence-based approach to problem-solving and contribute to continuous improvement. 8.2.2) The ability to use results of analysis to solve electrical and electronic engineering problems, apply technology and implement solutions. 8.2.3) The ability to Implement design solutions and contribute to their evaluation. 8.3.1) Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data. 8.4.1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment.	CITY2079 Work-based Learning Project
Students will be able to: Use a range of established techniques to initiate and	A2, Use a sound evidence-based approach	Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving,	8.1.1) A sound theoretical approach to the application of technology in electrical /	CITY2078 Applications of Power Electronics CITY2079 Work-based Learning Project CITY2081 Industrial Control Systems and Mechatronics

undertake critical analysis of information, and to propose solutions to problems arising from that analysis;	to problem-solving and contribute to continuous improvement. B1, Identify, review and select techniques, procedures and methods to undertake engineering tasks. B3, Implement design solutions and contribute to their evaluation.	application and diagnostic skills.	electronic engineering practice. 8.1.2) Appropriate theory and practical skills to design, develop, manufacture, construct, commission, operate, maintain, decommission and re-cycle electrical / electronic engineering processes, systems, services and products. 8.1.3) A sound evidence-based approach to problem-solving and contribute to continuous improvement. 8.2.1) The ability to Identify, review and select techniques, procedures and methods to undertake electrical / electronic engineering tasks. 8.2.2) The ability to use results of analysis to solve electrical and electronic engineering problems, apply technology and implement solutions. 8.2.3) The ability to Implement design solutions and contribute to their evaluation. 8.5.1) The ability to select and use appropriate equipment to perform engineering tests. 8.5.2) The ability to monitor, analyse and evaluate the performance of electrical and electronic circuits.	

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; Undertake further training, develop existing skills and acquire new competences that will enable them to assume significant responsibility within organisations.	D1, Communicate in English2 with others at all levels. D2, Present and discuss proposals. D3, Demonstrate personal and social skills. E4, Carry out and record CPD necessary to maintain and enhance competence in own area of practice.	Provide the opportunity to 'learn through design' via practical and project based work, particularly within the context of electrical and electronic design. Establish broad foundation knowledge on which to develop further skills as technology advances and to enable students to apply engineering principles to the analysis and design of electronic, electric power and renewable energy systems.	8.3.1) Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data. 8.5.2) The ability to monitor, analyse and evaluate the performance of electrical and electronic circuits. 8.4.1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment. 8.4.3) Appropriate Work based learning through Projects and practical assessments.	CITY2079 Work-based Learning Project CITY2075 Electrical Power CITY2076 Further Analogue Electronics CITY2077 Further Digital Electronics CITY2078 Applications of Power Electronics CITY2079 Work-based Learning Project CITY2081 Industrial Control Systems and Mechatronics
Students will also have: The qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and decision-making	E4, Carry out and record CPD necessary to maintain and enhance competence in own area of practice. E5, Exercise responsibilities in an ethical manner.	Establish broad foundation knowledge on which to develop further skills as technology advances and to enable students to apply engineering principles to the analysis and design of electronic, electric power and renewable energy systems. Provide the opportunity to 'learn through design' via practical and project based work, particularly within the context of electrical and electronic design. Provide an awareness of the business implications of engineering decisions and a knowledge of the inter-relationship between the market, engineering activities and the management structures Provide the opportunity to develop communication, data collection and analysis, ingenuity, problem solving, application and diagnostic skills.	8.1.1) A sound theoretical approach to the application of technology in electrical / electronic engineering practice. 8.1.2) Appropriate theory and practical skills to design, develop, manufacture, construct, commission, operate, maintain, decommission and re-cycle electrical / electronic engineering processes, systems, services and products. 8.1.3) A sound evidence-based approach to problem-solving and contribute to continuous improvement. 8.2.1) The ability to Identify, review and select techniques, procedures and methods to undertake electrical / electronic engineering tasks. 8.2.2) The ability to use results of analysis to solve electrical and electronic engineering problems, apply technology and implement solutions. 8.2.3) The ability to Implement design solutions and contribute to their evaluation 8.3.1) Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data. 8.3.2) Work independently or as a member of a team.	CITY2075 Electrical Power CITY2076 Further Analogue Electronics CITY2077 Further Digital Electronics CITY2078 Applications of Power Electronics CITY2079 Work-based Learning Project CITY2081 Industrial Control Systems and Mechatronics

			8.4.1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment. 8.4.2) Knowledge of relevant codes of conduct. 8.4.3) Appropriate Work based learning through Projects and practical assessments. 8.5.1) The ability to select and use appropriate equipment to perform engineering tests. 8.5.2) The ability to monitor, analyse and evaluate the performance of electrical and electronic circuits.	

Appendix 13.2 Assessment against modules Map

	CITY1077 Engineering Mathematics (Core)	CITY1078 Engineering Science (Core)	CITY1079 Digital and Analogue Devices (Core)	CITY1081 Electrical and Electronic Principles (Core)	CITY1080 Project Design and Business Management (Core)	CITY1082 Microprocessor Systems and High Level Programming (Core)	CITY2075 Electrical Power (Core)	City2076 Further Analogue Electronics (Core)	CITY2077 Further Digital Electronics (Core)	CITY2078 Application of Power Electronics (Core)	CITY2079 Work-based Learning Project (Core)	CITY2081 Industrial Control systems and Mechatronics (Core)
Essay												
Report		□			□	□			□			□
Engineering Problem Assignment	□			□			□			□		
Portfolio											□	
Exam	□	□	□	□			□			□		
In Class Test								□				
Practical								□				□
Presentation			□		□	□			□		□	

Appendix 13.3 Skills against modules Map

	Engineering Mathematics (Core)	Engineering Science (Core)	Digital and Analogue Devices (Core)	Electrical and Electronic Principles (Core)	Project Design and Business Management (Core)	Microprocessor Systems and High Level Programming (Core)	Electrical Power (Core)	Further Analogue Electronics (Core)	Further Digital Electronics (Core)	Application of Power Electronics (Core)	Work-based Learning Project (Core)	Industrial Control systems and Mechatronics (Core)
Essay Writing												
Report Writing		■			■	■			■			■
Presentation skills			■		■	■			■		■	
Project Planning / Management					■						■	■
Research	■	■	■	■	■	■	■	■	■	■	■	■
IT Skills			■	■	■	■		■	■		■	■
Team Work					■						■	■
Evaluation	■	■	■	■	■	■	■	■	■	■	■	■
Data Analysis	■	■	■	■	■	■	■	■	■	■	■	■

Appendix 13.4 Work based Learning Map

FHEQ level: 5				
WBL Activity	**Prog Intended LO**	**Related Modules**	**Assessed LO**	**Range of Assessments**
Presentation of work based scenario	8.1.2) Appropriate theory and practical skills to design, develop, manufacture, construct, commission, operate, maintain, decommission and re-cycle electrical / electronic engineering processes, systems, services and products. 8.3.1) Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data.	CITY1080 Project Design and Business Management	LO3. Demonstrate an understanding of ethical sustainability for waste management, carbon allowance and carbon footprint reduction methodologies. LO4. Demonstrate an understanding of the practical and commercial constraints affecting the design and management of renewable and distributed energy generation.	P1 – Presentation of evidence
Industrial visit/Guest lecturer	8.4.1) Good student centred learning skills which will promote lifelong learning and a commitment to continuing professional development to achieve flexibility within the work environment. 8.4.2) Knowledge of relevant codes of conduct. 8.4.3) Appropriate Work based learning through Projects and practical assessments.	CITY2075 Electrical Power	LO1: Describe and compare methods of conventional and alternative power generation. LO2: Appraise and analyse power transformers and their application. LO3: Evaluate and analyse power distribution circuits, configuration, testing and utilisation LO4: Investigate and analyse AC electrical machines, applications and operating characteristics. LO5: Investigate and analyse DC electrical machines and associated control systems.	C1 – Coursework guided by Industrial liaison P1 – Practical, work-based activities
		CITY2078 Applications of Power Electronics	LO1. Describe the construction and evaluate the operation of power electronic devices. LO2. Analyse and evaluate the circuit configurations used in single and polyphase rectifiers and converters. LO3. Describe various circuit configurations of Linear and Switched Mode power supplies. LO4. Describe and compare various circuit configurations to achieve speed control of AC and DC motors.	

			LO5. Describe harmonic generation as well as harmonic reduction in industrial plant and the principles governing EMC.	
		CITY2079 Work-based Learning Project	LO1: Research, specify, design, build and test an engineering project in a discipline specific area. LO2: Construct a hardware prototype and test to specification. LO3: Design and implement software to interface with hardware designed. LO4: Write a technical report and give a formal presentation. LO5: Develop the project further to include enhanced technical elements.	
		CITY2081 Industrial Control Systems and Mechatronics	LO2 To develop an understanding of the components in a typical mechatronic system LO3 To develop an understanding of programming techniques used in mechatronic systems LO4 To design and evaluate a simple mechatronic system	
Trade fair style presentation (Employers to be invited)	8.2.1) The ability to Identify, review and select techniques, procedures and methods to undertake electrical / electronic engineering tasks. 8.2.3) The ability to Implement design solutions and contribute to their evaluation. 8.3.1) Communicate ideas and information; through verbal and written forms using appropriate terminology and presentation of data.	CITY2079 Work-based Learning Project CITY2081 Industrial Control Systems and Mechatronics	LO3: Design and implement software to interface with hardware designed. LO4: Write a technical report and give a formal presentation. LO3 To develop an understanding of programming techniques used in mechatronic systems LO4 To design and evaluate a simple mechatronic system	P1 – Presentation of work-based designs
Where possible, assessment will be supported either by workplace visits or guest lecturers from within industry. Practical elements will be tailored to specific students to ensure that employed students will carry out activities related to their workplace; Full time students will be encouraged to liaise with local employers to guide their choice of project to ensure currency with local workplace requirements.				

Module Records

SECTION A: DEFINITIVE MODULE RECORD. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.

MODULE CODE: CITY 1077	**MODULE TITLE**: Engineering Mathematics

CREDITS: 20	**FHEQ LEVEL**: 4	**JACS CODE**: G160

PRE-REQUISITES: N	**CO-REQUISITES**: N	**COMPENSATABLE**: Y

SHORT MODULE DESCRIPTOR:
To develop the student's mathematical ability and to apply principles to the solution of engineering problems and to make use of mathematical computer based packages.

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ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		**COURSEWORK**		**PRACTICE**	
E1 (Formally scheduled)	50%	**C1**	50%	**P1**	
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:

- To gain a solid foundation in algebra, trigonometry, functions and calculus in order to associate and recognise the importance of mathematics in the analysis of engineering problems
- To develop mathematical problem solving simultaneously with other science and engineering modules.

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner **will be expected to be able to:**

LO1. use basic mathematical techniques to solve engineering problems of an electrical, mechanical or civil engineering nature.
LO2. recognise and solve 1st and 2nd order ordinary differential equations
LO3. understand the use of complex number and matrix theory in practical engineering applications
LO4. understand a variety of techniques of differential and integral calculus to calculate various functions in their associated applications in engineering

DATE OF APPROVAL: May 2017	**FACULTY/OFFICE: Academic Partnerships**
DATE OF IMPLEMENTATION: Sep 2017	**SCHOOL/PARTNER: City College Plymouth**
DATE(S) OF APPROVED CHANGE:	**TERM: All Year**

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process. Some parts of this page may be used in the KIS return and published on the extranet as a guide for prospective students. Further details for current students should be provided in module guidance notes.

ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 119**
MODULE LEADER: Owais Raja	**OTHER MODULE STAFF: N/A**

Summary of Module Content

Revision of Algebra and Arithmetic

Basic number and arithmetic operations, algebraic techniques including evaluation of formula, rearranging formula, solving simple equations, laws of logarithms, laws of indices, etc. These skills will be built upon throughout the delivery of each individual topic in this module.

Trigonometric functions and graphs

Simple trigonometric functions of sine, cosine, tangent and hyperbolic functions of $\sinh^{-1}$, $\cosh^{-1}$ and $\tanh^{-1}$. The applications of these functions in engineering including vectors and waveform combination.

Complex numbers

Addition, subtraction, multiplication and division of complex numbers in Polar and Cartesian form. The Argand diagram. The modulus and argument. Applications in engineering.

Differential Calculus

Basic differentiation techniques of polynomial, trigonometric, exponential and logarithmic functions. Further techniques including the product, quotient and chain rules. Engineering applications to optimisation and higher order differentials.

Integral calculus

Basic integration techniques of polynomial, trigonometric and exponential functions. Further techniques including integration by parts and substitution. The methodical applications of definite and indefinite integration with and without engineering scenarios including the interpretation of areas under a curve.

Matrices

General arithmetic operations on matrices. Solve equations by using the inverse matrix method and apply to engineering problems. Understand the different types of solutions: no, unique and infinite solutions. Diagonalisation to find eigenvalues and corresponding eigenvectors.

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	Comments/Additional Information
Lecture	60	30 x 2 hour lectures
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Guided self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments***
Written exam	E1	Module Examination	100%	LO1,3
Coursework	C1	Assignment	100%	LO2,4

Updated by: Owais Raja Date: July 2022	**Approved by**: Alan Austin Date: July 2022

Recommended Texts and Sources

The recommended texts for the course are:

Kuldeep Singh (2011) Engineering Mathematics Through Applications [Paperback] Palgrave Macmillan; 2nd edition edition

Stroud, K.A. and Booth, D.J. (2013) *Engineering mathematics*. 7th edn. Basingstoke: Palgrave Macmillan.

Stroud, K.A. and Booth, D.J. (2011) *Advanced engineering mathematics*. 5th edn. Basingstoke: Palgrave Macmillan.

Bird, J. (2017) Higher engineering mathematics. 7th edn. London: Routledge.

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY1078	MODULE TITLE: Engineering Science

CREDITS: 20	FHEQ LEVEL: 4	JACS CODE: H100

PRE-REQUISITES: N	CO-REQUISITES: N	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
An introduction to mechanical principles, energy transfer and AC electrical theory. Mechanical principles including solid mechanics, statics, dynamics and mechanical vibrations. Modes of heat transfer and energy losses. Electrical principles and single phase AC theory.

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ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)	50%	**C1**	50%	**P1**	
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL: Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:
To investigate the fundamental scientific principles which underpin the design and operation of engineering systems.
To give a mechanical and electrical overview which will provide the basis for further study in specialist areas of engineering.

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner **will be expected to be able to:**
LO1. Demonstrate an understanding of basic static and dynamic mechanical systems
LO2. Investigate energy transfer in thermal and fluid systems
LO3. Recognise and recall how DC theory relates to simple electrical machines
LO4. Show knowledge and awareness of the fundamental principles of single phase AC theory

DATE OF APPROVAL: June 2017	FACULTY/OFFICE: Academic Partnerships
DATE OF IMPLEMENTATION: Sept 2017	SCHOOL/PARTNER: CCP
DATE(S) OF APPROVED CHANGE:	TERM: All Year

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process. Some parts of this page may be used in the KIS return and published on the extranet as a guide for prospective students. Further details for current students should be provided in module guidance notes.

ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 115**

MODULE LEADER: George Audu	**OTHER MODULE STAFF: Andrew Reed**

Summary of Module Content

Statics and Dynamics: SF and BM, bending stresses. Torsion . Uniform acceleration linear and angular. Newton's laws of motion, mass moment of inertia, kinetic energy, effects of friction. Vibrations, SHM, forcing and damping. Energy Transfer: Heat transfer: conduction, convection, radiation, thermal conductivity, forced convection, black and grey body radiation. insulated surfaces. Viscosity: boundary layer formation, laminar and turbulent flow, pressure loss in pipes. Energy losses: dynamic viscosity, power loss in bearings. pipe friction losses.
Electrical Principles: Conductors, insulators, voltage and current. Ohm's law, Kirchhoff''s law. Power: Electro-magnetic induction, transformers, Lenz's and Faraday's laws. Generator and motor principles. Single Phase AC theory: Non-resonant circuits: R-C-L circuits; Argand diagrams. Resonant circuits, L-C series and parallel, resonant frequency, Power factor correction, Complex waveforms: graphical analysis, odd and even-harmonics, phase shift, non-linear characteristics.

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	50	25 x 2 hour lectures
Lab time	10	5 x 2 hour lab time (Contact)
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Guided self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Written exam	E1	End of Module Examination	100%	LO1, LO2
Coursework	C1	Assignment *(Report on in class experiments)*	100%	LO3, LO4

Updated by: Andrew Reed Date: July 2022	**Approved by**: Alan Austin Date: July 2022

The recommended texts for the course are:

Bolton, W. (2004) Higher engineering science. 2nd edn. Amsterdam, [Pays-Bas]: Newnes (an imprint of Butterworth-Heinemann Ltd).
Tooley, M.H., Dingle, L., BA, M.T. and Technol.., A. (2012) Engineering science: For foundation degree and higher national. New York: Elsevier Science.
Bacon, D H and Stephens, R C (2000) Mechanical technology, Industrial Press, New York

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY1079	MODULE TITLE: Digital and Analogue Devices and Circuits

CREDITS: 20	FHEQ LEVEL: 4	JACS CODE: H651

PRE-REQUISITES: N	CO-REQUISITES: N	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This module provides learners with a practical understanding of a range of digital and analogue devices and circuits in common use within Electrical/Electronic Engineering Systems. Students will analyse the operational principles associated with a number of fundamental electronic building blocks and will consolidate their learning through the practical build, testing and presentation of real circuits.

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ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)	50%	**C1**		**P1**	50%
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL : Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:
To give the learner a sound knowledge of the operational principles of a range of digital and analogue devices and circuits
To develop the skills necessary to design construct and test common analogue and digital circuits.

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner **will be expected to be able to:**

LO1. Describe the operation and characteristics of arrange of analogue devices and circuits
LO2. Describe the operation and use of a range of logic devices
LO3. Design and test, using computer simulation and/or practical build an analogue circuit to a given specification
LO4. Design and test, using computer simulation and/or practical build a digital circuit to a given specification

DATE OF APPROVAL: June 2017	FACULTY/OFFICE: Academic Partnerships
DATE OF IMPLEMENTATION: Sept 2017	SCHOOL/PARTNER: CCP
DATE(S) OF APPROVED CHANGE:	TERM: All Year

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process. Some parts of this page may be used in the KIS return and published on the extranet as a guide for prospective students. Further details for current students should be provided in module guidance notes.

ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 119**

MODULE LEADER: Andrew Reed	**OTHER MODULE STAFF: George Audu**

Summary of Module Content

Devices – dc and small signal operation of diodes and transistors, DC power supplies – operation, design and test of linear and switched mode power supplies.
Operational amplifiers – ideal and practical op-amps, operation, design and test of common operational amplifier circuits, use of simulation software.
Digital electronic circuits – logic devices and elements, combinational logic design, sequential logic circuit design, use of simulation software.

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	44	22 x 2hr sessions
Lab Work	16	8 x 2hr lab sessions
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Written exam	E1	End of Module Examination	100%	LO1, LO2
Practice	P1	Presentation of digital circuit design and operation	100% 50% - presentation 50% - Supporting documentation (e.g. poster/handout)	LO3, LO4

Updated by: Andrew Reed Date: July 2022	**Approved by**: Alan Austin Date: July 2022

The recommended texts for the course are:

Floyd, T.L. (2014) *Digital fundamentals*. 11th edn. Boston, MA, United States: Prentice Hall.
Learn about electronics - home page (2016) Available at: http://www.learnabout-electronics.org/ (Accessed: 21 November 2016).

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY1080	MODULE TITLE: Project Design and Business Management.

CREDITS: 20	FHEQ LEVEL: 4	JACS CODE: H221

PRE-REQUISITES: None	CO-REQUISITES: None	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This module introduces concepts of current energy / business / project management techniques in accordance with current professional practice within the engineering sector. The module is project and case study based, investigating different industrial scenarios.

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ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)		**C1**	60%	**P1**	40%
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL: Technology

Professional body minimum pass mark requirement:

MODULE AIMS:
To develop awareness of current business / project management techniques.
Investigate techniques to enhance the efficient use of energy and carbon footprint reduction methodologies. Investigate the management of distributed energy generation, energy conservation and business practice involving developing renewable energy technologies / protocols.

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner will be expected to be able to:

LO1. Identify and describe energy costing methodologies and the implications for the provision of engineering services.
LO2. Apply current business / marketing / project management techniques in an ethical and effective manner.
LO3. Demonstrate an understanding of ethical sustainability for waste management , carbon allowance and carbon footprint reduction methodologies.
LO4. Demonstrate an understanding of the practical and commercial constraints affecting the design and management of renewable and distributed energy generation.

DATE OF APPROVAL: June 2017	FACULTY/OFFICE: Academic Partnerships
DATE OF IMPLEMENTATION: Sept 2017	SCHOOL/PARTNER: CCP
DATE(S) OF APPROVED CHANGE:	TERM: All Year

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process. Some parts of this page may be used in the KIS return and published on the extranet as a guide for prospective students. Further details for current students should be provided in module guidance notes.

ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 119**

MODULE LEADER: George Audu	**OTHER MODULE STAFF:**

Summary of Module Content

Energy measurement, loading and costing techniques, energy and business management processes e.g. reduction, recovery and recycling in practice. Project leadership, financial and resource management techniques. Current and developing procedures in ethical sustainability for waste management and carbon allowance. Business management and costing techniques, carbon foot-printing, energy trading, emission / pollutant management. The basic concepts of distributed energy management, sustainable energy resources, and energy collection techniques.

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	60	30 x 2 hours sessions
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Directed self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Coursework	C1	Case Study	100%	LO1, LO2
Practice	P1	Presentation	100%	LO3, LO4

Updated by: George Audu Date: July 2022	**Approved by**: Alan Austin Date: July 2022

Capehart, B.L., Turner, W.C. and Kennedy, W.J. (2016) *Guide to energy management*. United States: Productivity Press.

Harris, D.J. (2011) *A guide to energy management in buildings*. London, United Kingdom: Taylor & Francis.

Nicholas, J.M. and Steyn, H. (2011) *Project management for engineering, business and technology.* 4th edn. New York, NY: Butterworth-Heinemann.

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY1081	MODULE TITLE: Electrical & Electronic Principles

CREDITS: 20	FHEQ LEVEL: 4	JACS CODE: H600

PRE-REQUISITES: None	CO-REQUISITES: None	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This module covers the Electrical Principles which learners in many branches of Electrical and Electronic Engineering need to understand. It builds on the elements of basic circuit theory and provides the basis for further study in the more specialist areas of Electrical and Electronic Engineering.

ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)	60%	**C1**	40%	**P1**	
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL : Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:
The aim of this module is to develop the skills necessary to analyse circuits and waveforms, by gaining an understanding of the principles of circuit theory, the behaviour of passive and reactive components, two-port networks, complex waves and circuit transients.

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of the module the learner will be expected to be able to:

LO1. Demonstrate an understanding of dc circuit theorems and be able to apply them to solve practical circuit problems. Understand the application of vectors and complex numbers to the solution of ac circuits.
LO2. Investigate and develop analytical models of transformers and two-port networks.
LO3. Demonstrate an understanding of the analysis and synthesis of complex waveforms.
LO4. Develop an understanding of the analysis of circuit transients**.**

DATE OF APPROVAL: June 2017	FACULTY: Academic Partnerships
DATE OF IMPLEMENTATION: Sept 2017	PARTNER: City College Plymouth
DATE(S) OF APPROVED CHANGE:	TERM: All Year

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process. Some parts of this page may be used in the KIS return and published on the extranet as a guide for prospective students. Further details for current students should be provided in module guidance notes.

ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 119**

MODULE LEADER: George Audu	**OTHER MODULE STAFF: Andrew Reed**

Summary of Module Content

Circuit Theory**-**transformation theorems and equivalent circuit parameters, circuit theorems, magnetically coupled circuits and series and parallel tuned circuits**.**
Two-port networks**-**network models applied to practical circuits, transformers, modelling of common two-port networks.
Complex waves**-**properties, analysis and synthesis of complex waves**.**
Laplace transforms**-**definition, use of transform tables, solution of first order systems for step and sinusoidal inputs, solution of second order systems to step inputs.

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	60	30 x 2 hour lectures
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Guided self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Written exam	E1	End of Module Examination	100%	LO1,LO2, LO4
Coursework	C1	Assignment- Analysis of complex AC wave form	100%	LO3

Updated by: George Audu Date: July 2022	**Approved by**: Alan Austin Date: July 2022

The recommended texts for this course are:

Hughes, E., Hiley, J. and McKenzie-Smith, I. (2016) *Hughes electrical and electronic technology*. Harlow, United Kingdom: Pearson Education.
Bird, J. (2013) *Electrical and electronic principles and technology*. 5th edn. London, United Kingdom: Routledge.
Bird, J. (2013) *Electrical circuit theory and technology*. 5th edn. London: Routledge.

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY1082	MODULE TITLE: Microprocessor Systems & High Level Programming

CREDITS: 20	FHEQ LEVEL: 4	JACS CODE: H221

PRE-REQUISITES: N	CO-REQUISITES: N	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This unit is intended to give learners an understanding of the general principles and concepts of programming in high level language, to create and test simple programs capable of interfacing with external hardware.

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ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)		**C1**	50%	**P1**	50%
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL :Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:
- To investigate the characteristics and use of microcontroller systems.
- To investigate microprocessor interfacing and communication methods.
- To design and develop high level code using structured programming methods.
- To create and apply test schedules for a given application.

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner **will be expected to be able to:**
LO1: Describe the internal architecture of a typical microprocessor/microcontroller system
LO2: Describe the interfacing and communication methods used to interact with a range of external hardware devices
LO3: Produce software to allow a microprocessor system to interact with external hardware using a structured design technique.
LO4: Use an appropriate development environment to implement, error check and test software compliance against a specification

DATE OF APPROVAL: June 2017	FACULTY/OFFICE: Academic Partnerships
DATE OF IMPLEMENTATION: Sept 2017	SCHOOL/PARTNER: CCP
DATE(S) OF APPROVED CHANGE: May 2017	TERM: All year

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

Items in this section must be considered annually and amended as appropriate, in conjunction with the Module Review Process. Some parts of this page may be used in the KIS return and published on the extranet as a guide for prospective students. Further details for current students should be provided in module guidance notes.

ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 119**

MODULE LEADER: Andrew Reed	**OTHER MODULE STAFF:**

Summary of Module Content

Microcontroller architecture and instruction set – ALU, RAM, ROM, stack, etc., Bus architecture, use of registers and embedded features, e.g. timers, ADC, comparators. RISC architecture.
Program design – use of an algorithmic approach, e.g. structure charts, pseudo code
Write program – use of a high level language and software debugging tools e.g. Integrated Development Environment (IDE) and simulation.
Data storage - Integers, floating-point, characters, Boolean, strings, arrays and files.
Program structures – Iterative and selection structures, functions / procedures.
Programming standards – appropriate syntax, use of comments, layout e.g. indentation and descriptive identifiers.
Test schedules – error types; test data, plan and record of testing

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	40	20 x 2 hour lectures
Practical	20	10 x 2 hour practical labs
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Directed self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Coursework	C1	Report 1	100%	LO1, LO2 Structured report
Practice	P1	Presentation	100% - Supporting documentation (e.g. poster/handout)	LO3, LO4 Report on design methodology and outcomes of testing

Updated by: Andrew Reed Date: July 2022	**Approved by**: Alan Austin Date: July 2022

The recommended texts for the course are:

Crisp, J. (2003), Introduction to microprocessors and microcontrollers, 2nd edition.Amsterdam:Newnes (an imprint of Butterworth-Heinemann Ltd).
Dumas II, J. (2017). Computer Architecture. Boca Raton: CRC Press. ISBN: 9781498772723
Gil de Lamadrid, J. (2018). Computer Organization, New York: Chapman and Hall/CRC. ISBN:9781351999755
Rafiquzzaman, M. Microcontroller theory and applications with the PIC18F. ISBN: 9780470947692- Publication Date: 2011
Tahir, M., Javed, K. (2017). ARM Microprocessor Systems. Boca Raton: CRC Press. ISBN:9781482259391

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY2075	MODULE TITLE: Electrical Power

CREDITS: 20	FHEQ LEVEL: 5	JACS CODE: H630

PRE-REQUISITES: N	CO-REQUISITES: N	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This module provides introduction to the principles, techniques and applications of electrical power engineering. The student will evaluate and analyse conventional and alternative electricity generation and utilisation, distribution, energy management and control systems. The student will also analyse AC and DC motors and generators, single and poly-phase transformers and associated device protection.

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ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)	60%	**C1**	40%	**P1**	
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL: Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:
- Provide an overview of conventional and alternative electricity generation
- Provide an ability to analyse and describe methods of power utilisation, distribution, energy management and control methodology.
- Provide an ability to analyse single and poly-phase transformers within power systems.
- Provide an understanding of AC and DC electrical machines, their characteristics and applications

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner will be expected to be able to:
LO1: Describe and compare methods of conventional and alternative power generation.
LO2: Appraise and analyse power transformers and their application.
LO3: Evaluate and analyse power distribution circuits, configuration, testing and utilisation
LO4: Investigate and analyse AC electrical machines , applications and operating characteristics.
LO5: Investigate and analyse DC electrical machines and associated control systems.

DATE OF APPROVAL: June 2017	FACULTY/OFFICE: Academic Partnerships
DATE OF IMPLEMENTATION: Sept 2018	SCHOOL/PARTNER: CCP
DATE(S) OF APPROVED CHANGE:	TERM: All Year

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

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ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 119**

MODULE LEADER: George Audu	**OTHER MODULE STAFF:**

Summary of Module Content

Conventional and alternative power generation and transmission.
Methods of power distribution (radial, ring, parallel) and protection, power factor correction.
Three phase systems – analysis of symmetrical and non-symmetrical current flow.
Single and poly-phase power transformers, operation, construction, operating principles, load / no load conditions, connection configuration and utilisation.
Operation, construction and control of Shunt, Series and Compound wound DC motors and generators.
Construction operation and analysis of Induction and Synchronous AC motors and generators.
Construction, application and control of AC "universal" motors.

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	60	30 x 2 hours delivered sessions
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Guided self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Written exam	E1	End of Module Examination	100%	LO2, LO4, LO5
Coursework	C1	Case Study	100%	LO1, LO3

Updated by: George Audu Date: July 2022	**Approved by**: Alan Austin Date: July 2022

The recommended texts for the course are:

Hughes, A., Drury, B. and Drury, W. (2013) *Electric motors and drives: Fundamentals, types and applications.* 4th edn. Oxford: Newnes (an imprint of Butterworth-Heinemann Ltd).
Hughes, E., Hiley, J. and McKenzie-Smith, I. (2016) *Hughes electrical and electronic technology*. Harlow, United Kingdom: Pearson Education.

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY2076	MODULE TITLE: Further Analogue Electronics

CREDITS: 20	FHEQ LEVEL: 5	JACS CODE: H652

PRE-REQUISITES: N	CO-REQUISITES: N	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This module extends the theory and practice of analogue circuits covered in previous studies. It will aim to link previously learnt theory into the practice of designing, building and testing real analogue circuits to given specifications.

ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)		**C1**		**P1**	75%
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)	25%	**A1**			

SUBJECT ASSESSMENT PANEL : Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:
- To impart a sound knowledge of the operational principles of common analogue circuits.
- To develop the skills necessary to analyse, simulate and construct analogue circuits to given specifications

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner **will be expected to be able to:**
1. Describe and analyse the effect of various types of feedback on analogue circuit operation and performance.
2. Design, simulate and construct common amplifier configurations.
3. Design, simulate and construct common oscillator circuits.
4. Design, simulate, and construct basic active filter configurations.

DATE OF APPROVAL: June 2017	**FACULTY/OFFICE: Academic Partnerships**
DATE OF IMPLEMENTATION: Sept 2018	**SCHOOL/PARTNER: CCP**
DATE(S) OF APPROVED CHANGE:	**TERM: All year**

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

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ACADEMIC YEAR: 2022/23	NATIONAL COST CENTRE: 119

MODULE LEADER: Andrew Reed	OTHER MODULE STAFF: George Audu

Summary of Module Content

Types of feedback -effect on circuit performance (gain, stability, bandwidth, distortion, noise and input and output impedance).
Types of amplifier- operational, power, tuned, analysis using equivalent circuits and software modelling.
Amplifier implementation to given specifications.
Oscillators- conditions for oscillation, common oscillator types, analysis and design of oscillators to meet given specifications.
Active filters-filter types and responses, analysis and design of common filters to meet given specifications

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	50	25 x 2 hour delivered sessions
Practical Sessions	10	5 x 2 hour practical circuit building
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Guided self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Written Exam	T1	In Class Test	100%	LO1
Practice	P1	Presentation of final design solutions with appropriate supporting documentation	100%	LO2, LO3, LO4

Updated by: Andrew Reed Date: July 2022	**Approved by** Alan Austin Date July 2022

The recommended texts for the course are:

Clayton, G and Winder, S (2003) Operational amplifiers, Butterworth-Heinemann, London
Floyd, T. (2018) Electronic Devices (Conventional Current Version), 10th Edition,
Pearson.
Tooley, M (2019) Electronic circuits: fundamentals and applications, Routledge
Bishop, O (2011) Electronics: circuits and systems, Newnes, Oxford
E-books and additional reading
Clayton, G and Winder, S, (2003) Operational amplifiers, (electronic book) Elsevier Science Newnes, Oxford. Available at:
https://www.academia.edu/40454776/Operational_Amplifiers_5th_Edition_George_Clayton_Steve_Winder?auto=download (accessed date 07/07/2021)
Tooley, M (2019) Electronic circuits: fundamentals and applications, (electronic book) Elsevier Science Newnes, Oxford. Available at: https://www.routledge.com/Electronic-Circuits-Fundamentals-and-Applications/Tooley/p/book/9780367421984 (Accessed date 07/07/2021)

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY2077	MODULE TITLE: Further Digital Electronics

CREDITS: 20	FHEQ LEVEL: 5	JACS CODE: H221

PRE-REQUISITES: N	CO-REQUISITES: N	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This module is intended to develop combinational and sequential logic design techniques, making use of industry standard Electronic CAD tools, and to introduce software for Programmable Logic Devices.

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ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)		**C1**	50%	**P1**	50%
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL : Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:
- To use formal design techniques to design advanced digital circuits.
- To introduce professional standard CAD design and simulation tools.
- To use computer simulation to verify logic designs.
- To use programmable logic devices to minimise component count
- To design and evaluate a digital system
- To introduce VHDL for the design and simulation of a hardware system.

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner **will be expected to be able to:**
LO1: Use formal design techniques to design advanced digital circuits to a given specification.
LO2: Use computer based tools to design, simulate and verify digital logic designs
LO3: Demonstrate an understanding of the use and design of PLD systems.
LO4: Demonstrate an understanding of digital logic design using VHDL.

DATE OF APPROVAL: Feb 2017	**FACULTY/OFFICE: Academic Partnerships**
DATE OF IMPLEMENTATION: Sept 2017	**SCHOOL/PARTNER: CCP**
DATE(S) OF APPROVED CHANGE:	**TERM: ALL YEAR**

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

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ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 119**

MODULE LEADER: Andrew Reed	**OTHER MODULE STAFF: George Audu**

Summary of Module Content

Minimisation techniques – e.g. Boolean algebra, Karnaugh maps, Quine-McCluskey technique.
Sequential logic devices – asynchronous and synchronous counters, minimization and elimination of hazards.
Design techniques – Finite State machines, Moore Mealy models.
Electronic CAD – use of software for simulation and verification of designs.
Program Logic Devices – use of PLDs to reduce component count.
VHDL for programmable logic, use of the development environment.

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	60	30 x 2 hour delivered sessions
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Guided self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Coursework	C1	Report 1	100%	LO1, LO2
Practice	P1	Presentation of VHDL design and methodology	50% - presentation 50% - Supporting documentation	LO3, LO4

Updated by: Andrew Reed Date: July 2022	**Approved by: Alan Austin** Date: July 2022

The recommended texts for the course are:

Arockia Bazil Raj, A. (2018), FPGA-Based Embedded System Developer's Guide, CRC Press,I SBN: 9781498796750

Ashenden, P J (2006), The designer's guide to VHDL (Third Edition), Elsevier Science, San Francisco. ISBN: 9780120887859

Floyd, T.L. (2015), Digital fundamentals. Harlow, United Kingdom: Pearson Education.

Green, D C (1999), Applied digital electronics, Pearson Education, Harlow.

Kinney, L and Roth, C H (2014) Fundamentals of logic design International Edition, Cengage Learning, Florence. ISBN: 9781133628484

Pedroni, V.A. (2010), Circuit design and simulation with VHDL. Cambridge, MA: MIT Press.

Roth, C.H. and Kinney, L. (2013), Fundamentals of logic design. 7th edition. Independence, KY: Nelson Engineering.

Sarkar, S (2014), Foundation of Digital Electronics and Logic Design, Pan Stanford, ISBN:9789814364584

Online resources:

Free Range VHDL: Factory, F.R. (2016) Free range factory. Available at: http://freerangefactory.org/ (Accessed: July 2021).

Altera Quartus University Program (For Quartus 19.0): May 2021) Available at: https://www.altera.com/support/training/university/materials-tutorials.html

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY2078	MODULE TITLE: Applications of Power Electronics

CREDITS: 20	FHEQ LEVEL:5	JACS CODE: H610

PRE-REQUISITES: N	CO-REQUISITES: N	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This module provides introduction to the principles, techniques and applications of power electronics. After an initial exploration of power device characteristics and application the student will be evaluate and analyse electronic power circuits for the control of AC/DC motors, Inverters, SMPU, industrial control and protection.

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ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)	60%	**C1**	40%	**P1**	
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL: Technology

Professional body minimum pass mark requirement:

MODULE AIMS:
- Provide a sound understanding of the role and application of power electronic devices.
- To analyse and evaluate power devices and circuits taking into account harmonic generation and circuit protection.
- To describe, compare and evaluate power control circuits for industrial applications.
- To describe and evaluate power circuits for the control of motors and plant.
- Provide a basic understanding of the role and application of EMC.

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of the module the learner will be expected to be able to:

LO1. Describe the construction and evaluate the operation of power electronic devices.
LO2. Analyse and evaluate the circuit configurations used in single and polyphase rectifiers and converters.
LO3. Describe various circuit configurations of Linear and Switched Mode power supplies.
LO4. Describe and compare various circuit configurations to achieve speed control of AC and DC motors.
LO5. Describe harmonic generation as well as harmonic reduction in industrial plant and the principles governing EMC.

DATE OF APPROVAL: June 2017	FACULTY/OFFICE: Academic Partnerships
DATE OF IMPLEMENTATION: Sept 2018	SCHOOL/PARTNER: CCP
DATE(S) OF APPROVED CHANGE:	TERM: All Year

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

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ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 20**

MODULE LEADER: George Audu	**OTHER MODULE STAFF: Andrew Reed**

Summary of Module Content

Fabrication and operation of power electronic devices.
Circuit configurations for single and multiphase rectification, converters and inverters.
Linear and Switched Mode power supplies.
PWM, Regulation, and power factor control.
Methods of AC and DC electronic motor control, investigating differing circuit configurations.
Basic analysis of harmonic generation, methods for limitation - including passive and active filtering.
Circuit protection techniques and power dissipation management.
Principles and methods of EMC in industrial practice.

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	60	30 x 2 hour delivered sessions
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Directed self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Written exam	E1	End of Module Examination	100%	LO1, LO2, LO3
Coursework	C1	Assignment	100%	LO4, LO5

Updated by: George Audu Date: July 2022	**Approved by**: Alan Austin Date: July 2022

The recommended texts for the course are:

Barnes, M. (2003) Practical variable speed drives and power electronics. Oxford: Newnes (an imprint of Butterworth-Heinemann Ltd).

Lander, C.W. and L, C.W. (1993) Power electronics. 3rd edn. New York: McGraw Hill Higher Education.

Bradley, D.A. (1995) Power electronics: 1995. 2nd edn. London, Angleterre: Chapman and Hall.

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY 2079	MODULE TITLE: Work Based Learning Project

CREDITS: 20	FHEQ LEVEL: 5	JACS CODE: H221

PRE-REQUISITES: N	CO-REQUISITES: N	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This module enables students to gain specific skills in the design, build, test and evaluation of an engineering project. Thereafter the student will be given the opportunity to develop aspects of project design to include additional technical elements or functions. Generic skills include the use of industry standard CAD tools, project construction and software development. Emphasis will be placed upon preparation for 'real world' work related projects.

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ELEMENTS OF ASSESSMENT *[Use HESA KIS definitions}*					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)		**C1**	60%	**P1**	40%
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL: Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:
The aim of this module is to enable students to research, specify, construct, design, evaluate and test a project in an engineering discipline.

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner **will be expected to be able to:**
LO1: Research, specify, design, build and test an engineering project in a discipline specific area.
LO2: Construct a hardware prototype and test to specification.
LO3: Design and implement software to interface with hardware designed.
LO4: Write a technical report and give a formal presentation.
LO5: Develop the project further to include enhanced technical elements.

DATE OF APPROVAL: June 2017	**FACULTY/OFFICE: Academic Partnerships**
DATE OF IMPLEMENTATION: Sept 2018	**SCHOOL/PARTNER: CCP**
DATE(S) OF APPROVED CHANGE:	**TERM: All Year**

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

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ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 119**

MODULE LEADER: Andrew Reed	**OTHER MODULE STAFF: George Audu**

Summary of Module Content

- Research skills and project planning.
- Electronic design skills and analysis of circuit designs.
- Programming skills, development of software and use of IDE.
- Design, build and test a project prototype to a given specification.
- Write a program for the target system and ensure functionality to a given specification.
- Develop prototype using schematic capture, circuit simulation and layout of a basic electronic circuit prototype.
- Write a technical report and provide a formal presentation
- Develop the project further to include enhanced technical elements

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	60	30 x 2 hour guided delivery and research
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Guided self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Coursework	C1	Portfolio	100%	LO1, LO4 & LO5
Practice	P1	Presentation of prototype and software solutions	100%	LO2 & LO3

Updated by: Andrew Reed Date: July 2022	**Approved by**: Alan Austin Date: July 2022

The recommended texts for the course are:
Dym, C.L., Little, P., Orwin, E.J. and Mudd, H. (2014) *Engineering design: A project-based introduction*. 4th edn. New York: John Wiley & Sons.
Nicholas, J.M. and Steyn, H. (2011) *Project management for engineering, business and technology*. 4th edn. New York, NY: Butterworth-Heinemann.

SECTION A: DEFINITIVE MODULE RECORD*. Proposed changes must be submitted via Faculty Quality Procedures for approval and issue of new module code.*

MODULE CODE: CITY2081	MODULE TITLE: Industrial Control Systems and Mechatronics

CREDITS: 20	FHEQ LEVEL: 5	JACS CODE: H730

PRE-REQUISITES: N	CO-REQUISITES: N	COMPENSATABLE: Y

SHORT MODULE DESCRIPTOR:
This module will introduce a multidisciplinary view of typical mechatronic systems integrating a number of engineering disciplines.
Learners will analyse individual elements before identifying the interface and control methods used to combine those elements into a complete system.
Learners will then apply formal design methodologies to implement and test a simple mechatronic system.

ELEMENTS OF ASSESSMENT					
WRITTEN EXAMINATION		COURSEWORK		PRACTICE	
E1 (Formally scheduled)		**C1**	50%	**P1**	50%
E2 (OSCE)		**C2**		**P3**	
T1 (in-class test)		**A1**			

SUBJECT ASSESSMENT PANEL: Technology

Professional body minimum pass mark requirement: n/a

MODULE AIMS:
- To introduce mathematical modelling of mechatronic systems
- To develop an understanding of the components in a typical mechatronic system
- To develop an understanding of programming techniques used in mechatronic systems
- To design and evaluate a simple mechatronic system

ASSESSED LEARNING OUTCOMES: (additional guidance below)
At the end of a module the learner **will be expected to be able to:**

LO1. Mathematically model a range of electro-mechanical components used in mechatronic systems
LO2. Understand the use and operation of a range of mechatronic system components
LO3. Apply programming techniques to mechatronic systems
LO4. Design, implement and test an industrial control system to a given specification

DATE OF APPROVAL: June 2017	FACULTY/OFFICE: Academic Partnerships
DATE OF IMPLEMENTATION: Sept 2018	SCHOOL/PARTNER: CCP
DATE(S) OF APPROVED CHANGE:	TERM: All Year

SECTION B: DETAILS OF TEACHING, LEARNING AND ASSESSMENT

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ACADEMIC YEAR: 2022/23	**NATIONAL COST CENTRE: 119**

MODULE LEADER: Andrew Reed	**OTHER MODULE STAFF: George Audu**

Summary of Module Content

Derive mathematical models for electrical and mechanical systems: 1st and 2nd order systems; differential equations; characteristics; responses to inputs; comparisons with real systems
Selection of suitable components for mechatronic systems: Central processor selection, e.g. PIC, AVR, PLC, embedded system; sensor technologies, e.g. resistive, capacitive, inductive, optical, and ultrasonic; actuator technologies, e.g. motors, stepper motors and solenoid valves; Interfacing methods.
Programming techniques: Assembly language; High level languages, e.g. C, Flowcharts, Ladder logic
System design to a given specification: Formal design techniques to meet appropriate standards and regulations; selection of appropriate system components.

SUMMARY OF TEACHING AND LEARNING		
Scheduled Activities	**Hours**	**Comments/Additional Information**
Lecture	40	20 x 2 hours delivery
Practical	20	10 x 2 hours design, build and test
Tutorial	15	Academic Support (Contact and VLE)
Independent Study	125	Guided self-study
Total	**200**	

Category	***Element***	***Component Name***	***Component weighting***	***Comments*** *Include links to learning objectives*
Coursework	C1	*Report on mechatronic theory*	100%	LO1, LO2
Practice	P1	*Presentation of practical development and testing with associated developmental documentation*	100%	LO3, LO4

Updated by: Andrew Reed Date: July 2022	**Approved by**: Alan Austin Date: July 2022

The recommended texts for the course are:

Bolton, W. (2015) *Mechatronics: Electronic control systems in mechanical and electrical engineering*. Harlow, United Kingdom: Pearson Education.
Bolton, W. (2015) *Programmable logic controllers*. Oxford, United Kingdom: Newnes (an imprint of Butterworth-Heinemann Ltd.)