Course Handbook

BEng(Hons) Electrical and Electronic Engineering

2019-2020

Dr Stephen Sigurnjak
School of Engineering

Please read this Handbook in conjunction with the University's Student Handbook.

All course materials, including lecture notes and other additional materials related to your course and provided to you, whether electronically or in hard copy, as part of your study, are the property of (or licensed to) UCLan and MUST not be distributed, sold, published, made available to others or copied other than for your personal study use unless you have gained written permission to do so from the Dean of School. This applies to the materials in their entirety and to any part of the materials.

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1. Welcome to the course

Welcome to Electrical and Electronic Engineering at UCLan. We hope to provide you with an interesting and challenging education, and to develop competences appropriate to Electrical and Electronic Engineering.

Please read the handbook carefully as it is a source of information on the academic, administrative and operational aspects of your course and it is intended to explain what is required of you. Feel free to discuss any aspects with myself or any member of the course team.

Enjoy your time studying with us!

Stephen Sigurnjak – Course Leader for BEng(Hons) Electrical and Electronic Engineering

1.1 Rationale, aims and learning outcomes of the course

The BEng (Hons) Electrical and Electronic Engineering course aim is to develop graduates with a broad understanding of current technology and practice in electronic engineering, covering the relevant aspects of analogue and digital electronic systems and additional specialist areas according to the option modules studied.

The course is three years (BEng) in duration when studying full time, plus an extra year if an industrial placement is included. Satisfactory completion of an industrial placement leads to the award: BEng (Hons) Electrical and Electronic Engineering with Industrial Placement.

- To provide a focused education at an academic level appropriate for the target awards: BEng(Hons) Electronic Engineering BEng(Hons) Electronic Engineering with Placement, as well as the exit awards
- To meet the requirements for accreditation of the programme by the Institution of Engineering and Technology (IET).
- To produce resourceful, competent, clear-thinking professional engineers with a range of skills and experience relevant to today's engineering industry.
- To equip graduates of the programme with knowledge, skills, experience, and understanding which underpin a professional career in engineering.

Specifically, the Electrical and Electronic Engineering course aims to provide graduates with a broad understanding of current technology and practice in electrical and electronic engineering, covering the relevant aspects of analogue electronics, digital electronics, power systems and power electronics, plus additional specialist areas according to the option modules studied.

The discipline of electrical and electronic engineering encompasses a wide skills base and the emphasis of this course is placed on electrical and electronic system design rather than that of individual component devices. By concentrating on the principles fundamental to system level design, the course equips graduates with the knowledge, skills and confidence to thrive in the rapidly evolving field of electronic engineering, produce designs suitable for a variety of applications and the transferrable skills to find employment in a diverse set of industrial and commercial sectors.

The full program specifications, including learning outcomes, are provided as appendices.

1.2 Course Team

Names and contact details of the key members of the team.

Academic Lead for Engineering
Martin Varley
Computing & Technology Building, room CM149
☎ 01772 893272 (ext. 3272), ✉ mrvarley@uclan.ac.uk

Electronics Engineering Programme Course Leader
Stephen Sigurnjak
Computing & Technology Building, room CM132
☎ 01772 893305 (ext. 3305), ✉ ssigurnjak@uclan.ac.uk

Retention Co-ordinator
Patrick Ryan
Computing & Technology Building, room CM024
☎ 01772 893273 (ext. 3273), ✉ pryan1@uclan.ac.uk

Industrial Placements Tutor
Joel Allison
Computing & Technology Building, room CM131
☎ 01772 893251 (ext.3251), ✉ jallison@uclan.ac.uk

ERE Joint Course Leader (China)
Wei Quan
Computing & Technology Building, room CM124
☎ 01772 895168 (ext. 5168), ✉ wquan@uclan.ac.uk

ERE Projects Co-ordinator (undergraduate)
Javad Yazdani
Computing & Technology Building, room CM138
☎ 01772 892685 (ext. 2685), ✉ jyazdani@uclan.ac.uk

1.3 Expertise of staff

Each member of staff that will be teaching you has had many years' experience of the subject, this may have been gathered via research and scholarly activities or by experience in industry. Many members of staff are actively involved in research and enterprise activities which enrich the curriculum that you will be studying.

1.4 Academic Advisor

You will be assigned an Academic Advisor who will provide additional academic support during the year. They will be the first point of call for many of the questions that you might have during the year. Your Academic Advisor will be able to help you with personal development, including developing skills in self-awareness, reflection and action planning.

1.5 Administration details

Campus Admin Services provides academic administration support for students and staff and are located in the following hubs which open from 8.45am until 5.15pm

Monday to Thursday and until 4.00pm on Fridays. The hub can provide general assistance and advice regarding specific processes such as extenuating circumstances, extensions and appeals.

Allen Building
Medicine
Dentistry
telephone: 01772 895566
email: AllenHub@uclan.ac.uk

Harris Building
Lancashire Law School
Humanities and the Social Sciences
Centre for Excellence in Learning and Teaching
telephone: 01772 891996/891997
email: HarrisHub@uclan.ac.uk

Foster Building
Forensic and Applied Sciences
Pharmacy and Biomedical Sciences
Psychology
Physical Sciences
telephone: 01772 891990/891991
email: FosterHub@uclan.ac.uk

Computing and Technology Building
Art, Design and Fashion
Computing
Journalism, Media and Performance
Engineering
telephone: 01772 891994/891995
email: CandTHub@uclan.ac.uk

Greenbank Building
Sport and Wellbeing
Management
Business
telephone: 01772 891992/891993
email: GreenbankHub@uclan.ac.uk

Brook Building
Community, Health and Midwifery
Nursing
Health Sciences
Social Work, Care and Community
telephone: 01772 891992/891993
email: BrookHub@uclan.ac.uk

1.6 Communication

The University expects you to use your UCLan email address and check regularly for messages from staff. If you send us email messages from other addresses they risk being filtered out as potential spam and discarded unread.

1.7 External Examiner

The External Examiners for the ERE courses are:

Dr Osman Tokhi
Department of Automatic Control and Systems Engineering, University of Sheffield

Dr Andrew Tickle
Lecturer in Electrical and Electronic Engineering, Coventry University

External Examiner reports for the Engineering courses can be accessed electronically via the Engineering@UCLan Blackboard pages.

2. Structure of the course

2.1 Overall structure

Figures 1 and 2 overleaf illustrate the programme structure for BEng (Hons) Electronical and Electronic Engineering courses respectively. These courses exist as part of the Modular Credit Accumulation and Transfer Scheme (MODCATS). The award requires that a student pass 360 credits total for BEng (Hons).

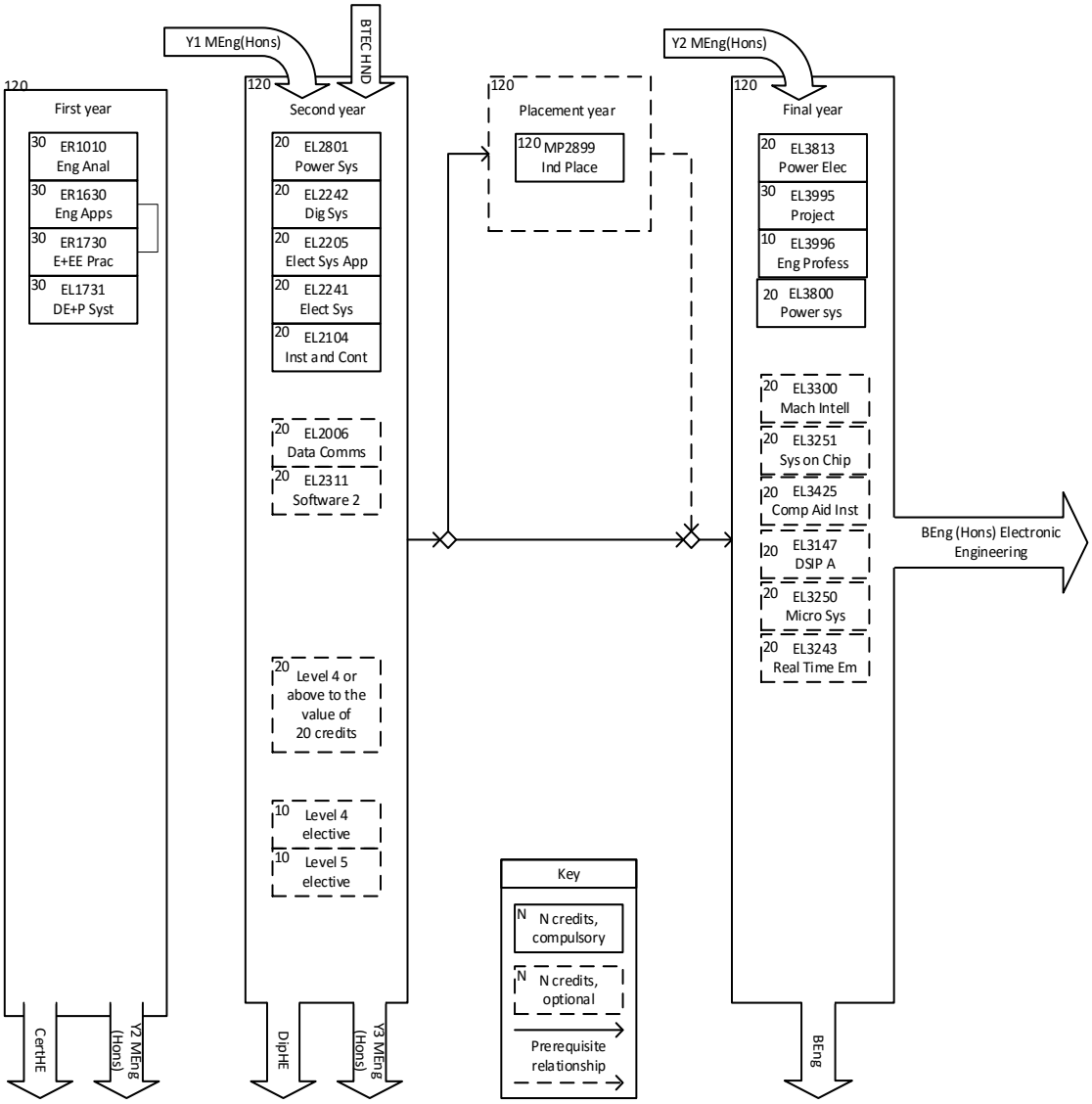
Each full-time year of study requires you to pass modules to the value of 120 credits. Most modules on the programmes are standard sized and worth 20 credits, although there are examples of modules worth 10, 30 and 40 credits. Students wishing to follow part time study are counselled by a member of staff and a suitable programme of study developed. There is also a foundation year entry route and details of that year can be found in the appendix.

Specific credit requirements for the target awards:

BEng (Hons) Electrical and Electronic Engineering requires 360 credits including a minimum of 220 at level 5 or above and a minimum of 100 at level 6.

BEng (Hons) Electrical and Electronic Engineering with Industrial Placement requires 360 credits including a minimum of 220 at level 5 or above and a minimum of 100 at level 6, plus satisfactory completion of the Placement module MP2899.

Figure 1 BEng EE Programme Structure



University of Central Lancashire

BEng (Hons) Electronic Engineering

Programme Structure

Specific credit requirements for the exit awards:

BEng Electrical and Electronic Engineering requires 320 credits including a minimum of 180 at level 5 or above and a minimum of 40 at level 6.

Diploma of Higher Education requires 240 credits including a minimum of 100 at Level 5 or above

Certificate of Higher Education requires 120 credits including a minimum of 100 at Level 4 or above.

2.2 Modules available

Each module is a self-contained block of learning with defined aims, learning outcomes and assessment. A standard module is worth 20 credits. It equates to the learning activity expected from one sixth of a full-time undergraduate year. Modules may be developed as half or double modules with credit allocated up to a maximum of 120 credits per module.

The modules that you will be studying in your course are detailed below

Level 4 – Stage 1			
Module Code	**Module Title**	**Description**	**Credits**
ER1010	Engineering Analysis	Mathematical underpinning for engineering applications to support further study in engineering and technology.	30
ER1630	Engineering Applications	Introduction to computer based analysis and data acquisition for processing in engineering applications.	30
ER1730	Electronics and Electronic Engineering Practice	Introduction of fundamentals of electronic devices and circuits, circuit analysis methods, use of ECAD software, basic fault finding and laboratory equipment use	30
ER1731	Digital Electronics and Programmable Systems	Development and understanding of basic concepts applicable to digital systems and programmable systems such as microcontrollers.	30

Level 5 – Stage 2.1 (BEng)			
Module Code	**Module Title**	**Description**	**Credits**
EL2801	Power Systems	Underpinning knowledge of power systems and driving these using power electronics	20
EL2241	Electronic Systems	Circuit analysis & design with emphasis on processing and conversion of analogue signals.	20
EL2242	Digital Systems	Develop digital system design skills, in dedicated hardware and microcontroller based systems.	20
EL2205	Electronic Systems Applications	Develop and apply skills in managing execution of small & group project work, in context of electronic system design.	20
EL2311	Software Development 2	Application of high-level and object orientated tools & techniques in engineering.	20
EL2006	Data Communications	Underlying principles of digital communications networks.	20
EL2104	Instrumentation and Control	Development of control systems using feedback for application in a wide variety of applications	20

Level 6 – Stage 2.2 (BEng)			
Module Code	**Module Title**	**Description**	**Credits**
EL3250	Microcontroller Systems	Design and implement a microcontroller system through the acquisition of skills in	20

		embedded software development and hardware interfacing.	
EL3995	Project	Undertake an individual project, meeting an engineering requirement, integrating relevant technical knowledge & skills	30
EL3996	Engineering Professionalism	Appreciation of the social and environmental aspects of a career in engineering.	10
EL3243	Embedded Real Time Systems	Real-time & concurrent systems methodology. Theory & practice for design & use of embedded real-time systems.	20
EL3251	System on Programmable Chip	Methods for specifying, designing and deploying a digital system on programmable integrated circuits (e.g. an FPGA).	20
EL3147	Digital Signal & Image Processing A	Fundamental topics in the fields of DSP & DIP: acquisition, representation & analysis methods for signals & images, digital filter design, image manipulation & enhancement.	20
EL3813	Power Electronics and Applied Power Electronics	Continuation of power electronics and control of systems using this with direct applications	20
EL3800	Power Systems Operation and Control	Topics relating to power generation and control of these. Generators, PV power systems etc	20
EL3300	Machine Intelligence	Fundamental topics in the fields of machine intelligence and machine learning.	20
EL3425	Computer Aided Instrumentation	Specify, select, apply and develop microcomputer-based systems for data acquisition and to control test equipment.	20

2.3 Course requirements

Discussions about your progression through the course normally take place in February each year. It is an opportunity for you to make plans for your study over the next academic year. The course team will tell you about the various modules / combinations available and you will both agree on the most appropriate (and legal) course of study for you.

The prescribed modules for the first year of the Electronics Engineering and Robotics Engineering undergraduate courses are identical, thereby enabling students to change their course after the first year. Changes would also be possible following the second year, but these would be more restricted and dependent on the particular modules studied.

If you do not feel capable of completing your chosen course of study then advice may be given on alternative routes or exit awards. However, it is not usually prudent to make decisions about this until results are known in June. Most likely you will be advised to finish all your modules to the best of your abilities and to seek advice once results are available.
If you wish to discuss your progression, or discuss a change of programme (e.g. from BEng to MEng) you should speak to your course leader or another member of the course team.

Students applying for transfers from other Universities are required to complete the accreditation of certificated prior learning (ACPL). The UCLan regulations do not allow APL of more than ⅔ of the modules required for an award. The latest entry point for external applicants transferring into the courses is the second year. All applicants transferring into the BEng and MEng courses must have accredited prior certified learning.

2.4 Module Registration Options

Discussions about your progression through the course normally take place in February each year. It is an opportunity for you to make plans for your study over the next academic

year. The course team will tell you about the various modules / combinations available and you will both agree on the most appropriate (and legal) course of study for you.

2.5 Study Time

2.5.1 Weekly timetable

A timetable will be available once you have enrolled onto the programme, through the Student Portal.

2.4.2 Expected hours of study

20 credits is a standard module size and equals 200 notional learning hours. For a typical module you may have a 2 hour lecture, and a 1 hour tutorial/laboratory session, leaving you approximately 3 hours for self-directed study (further reading, tutorial questions, assignments, revision). This is thinking time – not coffee and biscuits time! Often you will be working in groups for practical work and you should try and arrange to meet up outside the scheduled class times. You will also need to use equipment such as computer and laboratory facilities for practical work, again sometimes outside the scheduled class times.

Explain to your students the hours of commitment required in a typical working week for both attendance and personal study, you may also need to incorporate reference to work based or placement learning requirements where relevant.

2.4.3 Attendance Requirements

You are required to attend all timetabled learning activities for each module. Notification of illness or exceptional requests for leave of absence must be made to:

Martin Varley (Academic Lead for Engineering):

☎ +44 1772 893272 | ✉ mrvarley@uclan.ac.uk

Absences due to illness must be reported to the Computing and Technology student hub:

Computing and Technology Hub:

☎ +44 1772 891994 | ✉ candthub@uclan.ac.uk

You are encouraged to seek the advice of your Academic Advisor and/or Course Leader if your personal circumstances make it difficult to meet your study obligations

3. Approaches to teaching and learning

3.1 Learning and teaching methods

The electronics and robotics engineering programmes use a number of different assessment techniques that will allow you to demonstrate your understanding of concepts and issues covered. These may be broadly categorised as ‘examination’ and ‘coursework’, but several different types are used, e.g. open-book exams, closed-book exams, laboratory reports, practical assessments in the laboratory, computer simulation and analysis, written reports etc.

Evidence of achievement, upon which assessment will be based, will be gained through a programme of practical exercises, assignments and exams. Each week you may be involved in some practical work such as a laboratory exercise, a computer-based assignment, group or individual project work etc. You will often work in groups and make group presentations but

you will write up and submit work individually so that you gain credit for your contribution, not that of somebody else.

It should be emphasised that the purpose of assessment is to not only grade you, and provide information to facilitate management of the course, but also to provide feedback to you. In this way you can monitor your own progress, refine your own judgement of your abilities and regulate it accordingly.

You should keep all the returned work in a file and you may have to submit this at the end of the year for the external examiners to assess.

Individual module leaders will distribute information on the methods of assessment used, and their weighting, at the start of each module.

3.2 Study skills

The university offers a number of services to aid you in your studies, this is detailed on the following webpage:

https://www.uclan.ac.uk/students/study/study_support.php

You are also encouraged to discuss any issues that you may have with your academic advisor.

3.3 Learning resources

3.3.1 Learning Information Services (LIS)

Generic information is available in the student handbook on the services that LIS offer. In addition the School of Engineering has a specific webpage maintained by our subject librarian, this can be found at the following link:

http://www.uclan.ac.uk/students/study/library/Engineering_guide.php

3.3.2 Electronic Resources

Most of your modules will have a Blackboard eLearn site associated with it for distribution of learning material. This may include lecture notes, additional reading, web links, tutorial exercises, past exam papers and so forth.

More general information such as Programme Specifications, External Examiner's reports and information about the Industrial Placements can be found on the Engineering blackboard pages

You can access Blackboard online through the Student Portal, please ensure that you have access to this.

3.4 Personal development planning

Personal development planning (PDP) is a reflection on learning, performance and achievement and allows you to plan for personal, educational and career development. As

learning is a lifelong process the work in the PDP is not assessed. There are many similarities with work based learning and Continued Professional Development (CPD) –

4. Student Support

Within the school of engineering you will find many people will be happy to help you. For module related support, you would normally contact the module tutor in the first instance. Likewise for course enquiries your course leader will assist. Your academic advisor will also be able to provide support and direction on a number of matters. For more general enquiries the you can visit any one of the hubs. There are helpful guides available online too, just visit: http://www.uclan.ac.uk/students/

4.1 Academic Advisors

Academic Advisers provide help for students with problems and are responsible for overseeing the progress of students, their welfare, academic counselling and guidance. Your Academic Adviser is allocated when you enrol. You must see your Academic Adviser when requested and meet at least once per semester. Ensure they know you and have your current email address.

Please seek help relating to lecture material and practical classes from the module tutor in the first instance. If necessary make an appointment to seek additional support. Please remember that academic staff are busy people and may not be able to give you instant help.

Although Academic Advisers and Course Leaders will deal with most of the day-to- day questions which arise, the Head of School is always willing to see students and an appointment can be made through the Student Hub. Advice relating to administrative issues may be obtained from the Student Hub.

4.2 Students with disabilities

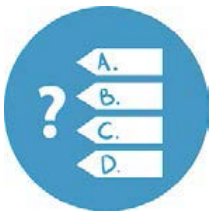
If you have a disability that may affect your studies, please either contact the Disability Advisory Service - disability@uclan.ac.uk - or let one of the course team know as soon as possible. With your agreement information will be passed on to the Disability Advisory Service. The University will make reasonable adjustments to accommodate your needs and to provide appropriate support for you to complete your study successfully. Where necessary, you will be asked for evidence to help identify appropriate adjustments.

The School of Engineering Disability Tutor is: Dr J. Yazdani, Email: JYazdani@uclan.ac.uk

4.3 Students' Union

The Students' Union offers thousands of volunteering opportunities ranging from representative to other leadership roles. We also advertise paid work and employ student staff on a variety of roles. You can find out more information on our website: http://www.uclansu.co.uk/

5. Assessment



5.1 Assessment Strategy

The assessment strategy for each module will be outlined within the module. The modules will be assessed either as coursework or by a combination of coursework and examinations with the weightings reflecting the course content (theory/practical). Each of the assessments that you complete will assess a series of learning outcomes defined in the modules.

Note that within some modules you may complete assessments that do not carry marks, these are termed formative and are an opportunity for you to gain feedback on your progress that will help you in your summative (mark carrying) assessments.

5.2 Notification of assignments and examination arrangements

This information will be provided within the module session and on blackboard, for examinations you will be informed on your timetable

5.3 Referencing

For most of your assignments you will be expected to do some further reading, and you are required to think and produce increasingly original work around the work of others. **Do not fall into the 'plagiarism trap' either deliberately or by accident.** You need to give suitable credit to those that have produced the work that you are using.
You should reference any information you have refer to in your assignment using the Harvard referencing system (a guide to this system can be found on the WISER Blackboard space, accessed through the student portal).
You find information on the Harvard referencing system on the internet (google 'Harvard Referencing').

5.4 Confidential material

In the cases where Engineering students might use confidential information you should take guidance from your module tutor on your ethical and legal responsibilities to respect confidentiality and maintain anonymity of individuals within their assignments.

5.5 Cheating, plagiarism, collusion or re-presentation

Please refer to the information included in section 6.6 of the University Student Handbook for full definitions. The University uses an online Assessment Tool called Turnitin. A pseudo-Turnitin assignment will be set up using the School space on Blackboard to allow students to check as many drafts as the system allows before their final submission to the 'official' Turnitin assignment. Students are required to self-submit their own assignment on Turnitin and will be given access to the Originality Reports arising from each submission. In operating Turnitin, Schools must take steps to ensure that the University's requirement for all summative assessment to be marked anonymously is not undermined and therefore Turnitin reports should either be anonymised or considered separately from marking. Turnitin may also be used to assist with plagiarism detection and collusion, where there is suspicion about individual piece(s) of work.

6. Classification of Awards

The University publishes the principles underpinning the way in which awards and results are decided in Academic Regulations. Decisions about the overall classification of awards are made by Assessment Boards through the application of the academic and relevant course regulations.

7. Student Feedback

You can play an important part in the process of improving the quality of this course through the feedback you give.

In addition to the on-going discussion with the course team throughout the year, there are a range of mechanisms for you to feedback about your experience of teaching and learning. We aim to respond to your feedback and let you know

of our plans for improvement.

The Students Union can support you in voicing your opinion, provide on-going advice and support, and encourage your involvement in all feedback opportunities. They will be requesting that you complete the National Student Survey (during semester 2 for students in their final year of study) or the UCLan Student Survey (all other students).

The Students' Union and University work closely together to ensure that the student voice is heard in all matters of student-life. We encourage students to provide constructive feedback throughout their time at university, through course reps, surveys and any other appropriate means.

7.1 Student Staff Liaison Committee meetings (SSLCs)

Details of the Protocol for the operation of SSLCs is included in section 8.2 of the University Student Handbook.

8. Appendices

8.1 Programme Specification(s)

UNIVERSITY OF CENTRAL LANCASHIRE

Programme Specification

This Programme Specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided.

Sources of information on the programme can be found in Section 17

1. Awarding Institution / Body	University of Central Lancashire
2. Teaching Institution and Location of Delivery	University of Central Lancashire (Preston Campus) University of Central Lancashire (Cyprus Campus) Wigan and Leigh College (Year 3 Only)
3. University School/Centre	School of Engineering (Preston) School of Sciences (Cyprus)
4. External Accreditation	Institution of Engineering and Technology (to be sought on first graduating cohort) Cyprus Agency for Quality Assurance & Accreditation Cyprus Scientific and Technical Chamber (ETEK)
5. Title of Final Award	BEng (Hons) Electrical and Electronic Engineering
6. Modes of Attendance offered	Full Time; Part Time; Sandwich
7. UCAS Code **7b JACS Code**	H600 Electronic Engineering (100163)
8. Relevant Subject Benchmarking Group(s)	QAA Subject Benchmarking Statement: Engineering (2016)
9. Other external influences	Engineering Council UK-SPEC, Accreditation requirements of IET, QAA Academic Infrastructure Codes of Practice, Science, Technology, Engineering & Mathematics (STEM) government initiatives, Technical Chamber (ETEK). Engineering Degree Apprenticeship Standards
10. Date of production/revision of this form	May 2018

11. Aims of the Programme
• To meet the requirements for accreditation of the programme by the Institution of Engineering and Technology and the Cyprus Scientific and Technical Chamber (ETEK)
• To produce resourceful, competent, clear-thinking professional engineers with a range of skills and experience relevant to today's engineering industry.
• To equip graduates of the programme with knowledge, skills, experience, and understanding which underpin a professional career in engineering.
The BEng (Hons) Electrical and Electronic Engineering course aims to provide graduates with a broad understanding of current technology and practice in electrical and electronic engineering, covering the relevant aspects of analogue and digital electronic engineering, electrical power generation and distribution and control of electrical machines as well as additional specialist areas according to the option modules studied. The discipline of electrical and electronic engineering encompasses a wide skills base and the emphasis of this course is placed on electrical power electronics and the control or electrical machines suitable for industry, this encompasses elements of system level design, programming and mathematical principals. The course equips graduates with the knowledge, skills and confidence to thrive and develop to gain suitable employment in the rapidly changing world of electrical and electronic engineering. The skills gained on the course are also transferable to a diverse set of industrial and commercial sectors. An optional Industrial Placement Year (Year 3) is available, aimed at providing students with relevant and broadening industrial experience to consolidate their learning at Level 4 and Level 5, inform their academic studies at Level 6 and enhance their subsequent early career development (available at UCLan/Preston only)

12. Learning Outcomes, Teaching, Learning and Assessment Methods

UK-SPEC, published by the Engineering Council, is the standard for accredited engineering degrees in the UK. The IET serve as an accrediting institution licensed by the Engineering Council and publish their own interpretation of UK-SPEC.

UK-SPEC presents General Learning Outcomes (GLO) categorised in a form wholly compatible with the UCLan equivalents, alongside a more detailed set of Specific Learning Outcomes (SLO). In the following sections A to D learning outcomes for the programme are grouped according to the standard UCLan format, cross-referenced (in brackets) to the corresponding SLOs from the IET interpretation of UK-SPEC.

A. Knowledge and Understanding

A1 Evaluate, compare and contrast the essential concepts and physical principles of the Electrical and Electronic Engineering discipline:

(i) applicable to electronic component and circuit design; instrumentation and measurement; signal processing, conditioning and conversion; communications systems **(SM1p, EP2p)**

(ii) applicable to digital and programmable system design, associated methodologies of programming and hardware description languages **(SM1p, EP2p)**

(iii) applicable to power systems, generation, distribution and control of high current and voltage applications **(SM1p, EP2p)**

A2 Apply knowledge and understanding of mathematics underpinning the Electrical and Electronic Engineering discipline; system analysis, computational algorithms **(SM2p)**

A3 Evaluation of the wider commercial and economic context of engineering, applicable business and management techniques, relevant social and legal constraints **(ET2p, ET3p, ET5p)**

A4 Explain sustainability issues and ability to produce engineering solutions which promote sustainable development **(ET4p)**

Teaching and Learning Methods

Teaching and learning methods include traditional lectures, tutorials, laboratory work, directed self-study, and project work.

Assessment methods

Written assessment methods include examinations, laboratory-based and research-based assignments, tutorial questions, log books and formal reports.

Oral assessment methods include interviews and presentations

Practical skills are assessed using assignment work, and demonstrations.

B. Subject-specific skills

B1 Application of engineering principles, general physical principles and underlying engineering science to the analysis and solution of engineering problems **(SM3p, EA1)**

B2 Development and appraisal of theoretical and quantitative models and computer software for the simulation, design and verification of electrical and electronic systems and devices **(EA2p, EA3p)**

B3 Manage costs in order to produce system designs which both meet defined requirements and are economically viable **(D5p)**

B4 Demonstrate practical competencies in laboratory and workshop skills required for the test, measurement and fabrication of electrical and electronic systems and devices. **(EP2p, EP3p)**

B5 Evaluation of the wider multidisciplinary context within which engineering knowledge is applicable **(EP1p)**

B6 Application of the codes of practice, standards and quality management processes applicable to electronic systems design, adopting these where appropriate to the design process **(EP6p, EP7p)**

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Oral assessment methods include interviews and presentations

Practical skills are assessed using assignment work, and demonstrations.

C. Thinking Skills

C1 Ability to apply and evaluate systems to the top-level design of electrical and electronic systems, and the decomposition & synthesis of sub-systems using appropriate technologies **(EA4p)**

C2 Ability to define a problem including understanding customer needs **(D1p,D2p)**

C3 The ability to creatively apply engineering principles to establish innovative solutions and to ensure their fitness for purpose **(D4p)**

C4 Manage design processes and evaluate outcomes **(DEp)**

C5 Exercise of engineering judgement accounting for professional & ethical responsibilities **(ET1p)**

C6 Ability to analyse and interpret unfamiliar problems, apply unfamiliar concepts and manage the inherent technical uncertainty **(EP8p)**

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Assessment methods

Written assessment methods include examinations, laboratory-based and research-based assignments, tutorial questions, log books and formal reports.

Oral assessment methods include interviews and presentations

Practical skills are assessed using assignment work, and demonstrations.

D. Other skills relevant to employability and personal development

D1 Effective exploitation of literature, locate and critically evaluate information from a variety of sources **(EP4p)**

D2 Communicate in an accurate, persuasive and succinct form, via a variety of media **(GLO)**

D3 Independence, self-awareness, and the intrinsic motivation to develop technical proficiencies and achieve goals without external influence **(GLO)**

D4 Work effectively as part of a team **(GLO)**

D5 Personal development planning, self-directed learning and reflection for future CPD **(GLO)**

Teaching and Learning Methods

Teaching and learning methods include traditional lectures, tutorials, laboratory work, directed self-study, and project work.

Assessment methods

Written assessment methods include examinations, laboratory-based and research-based assignments, tutorial questions, log books and formal reports.

Oral assessment methods include interviews and presentations

Practical skills are assessed using assignment work, and demonstrations.

13. Programme Structures*				**14. Awards and Credits***
Level	**Module Code**	**Module Title**	**Credit Rating UK/ECTS**	
Level 6		**Preston Route**		**BEng (Hons) Electrical and Electronic Engineering**
		Compulsory Modules:		
	EL3995	Project	30	
	EL3996	Engineering Professionalism	10	**Preston**
	EL3813	Power Electronics †	20	Requires 360 credits
	EL3800	Power Systems Operation and Control†	20	including a minimum of 220 at Level 5 or above, and a minimum of 100 at Level 6, including the Project. The Project module cannot be compensated.
		Option Modules:		
	EL3300	Machine Intelligence^	20	
	EL3251	System on Programmable Chip^	20	
	EL3425	Computer Aided Instrumentation^	20	**Wigan and Leigh (Top-Up)**
	EL3250	Microcontroller Systems	20	Requires 120 Credits at level 6
	EL3243	Real-Time Embedded Systems^	20	
	EL3147	Digital Signal and Image Processing A	20	**Cyprus**
		Cyprus Route		Requires 480 credits (240 ECTS) including a minimum of 220 at Level 5 or above, and a minimum of 100 at Level 6, including the Project. The Project module cannot be compensated.
		Compulsory Modules:		
	EL3995	Project	30/15	
	EL3996	Engineering Professionalism	10/5	
		Optional Modules:		
	EL3250	Microcontroller Systems	20/10	
	EL3803	Engineering Economics	10/5	**BEng**
	EL3805	Project Management	10/5	**Electrical and Electronic Engineering**
	EL3808	Digital Communications	20/10	
	EL3147	Digital Signals and Image Processing	20/10	**Preston**
	EL3801	Wireless, Mobile and Fibre-optic Communications	20/10	Requires a minimum of 320 credits with 180 at Stage 2,
	EL3807	Mobile Technologies	20/10	including Level 5 or above,
	EL3800	Power Systems Operation and Control	20/10	and a minimum of 40 at Level 6. The Project module cannot
	EL3802	Renewable Energy Sources	20/10	be compensated.
	EL3813	Power Electronics	20/10	
	EL3806	Electrical Services	10/5	**Wigan and Leigh (Top-Up)**
		Wigan and Leigh		Requires 80 Credits at level 6
		Compulsory Modules:		**Cyprus**
	ER3501	Operations Management**	20	Requires a minimum of 440
	ER3503	Circuits, Networks and Electromagnetic Waves**	20	credits (220 ECTS) with 180 at Stage 2, including Level 5 or above, and a minimum of

		Plus a choice of:		60 at Level 6. The Project module cannot be compensated.
	ER3599	Engineering Project **	20	
	ER3590	Extended Engineering Project**	40	
		Optional Modules (2 or 3 from the routes below):		
		Power Engineering Stream		
	ER3502	Control Engineering**	20	
	ER3521	Fundamentals of Electrical Machines, Generation, Transmission and Distribution Plant**	20	
	ER3522	Power Electronics**	20	
		Electronic Engineering Stream		
	ER3511	Signals and Systems **	20	
	ER3512	Electronic Systems**	20	
	ER3513	Digital Signal Processing**	20	
Level 5		**Industrial placement:** (required for sandwich award but does not contribute to degree award for level 5)	120 (notional credits)	**Satisfactory completion of the Industrial Placement leads to a degree 'with Industrial Placement'.**
	MP2899	Industrial Placement (6 modules)		CertHE and DipHE are not available as sandwich awards.
Level 5		**Preston Route**		**Diploma of Higher Education**
		Compulsory Modules:		
	EL2801	Power Engineering	20	**Preston**
	EL2205	Electronic System Applications	20	Requires 240 credits including a minimum of 220 credits at Level 4 or above and at least 100 credits at level 5 or above.
	EL2241	Electronic Systems	20	
	EL2242	Digital Systems	20	
	EL2104	Instrumentation and Control^	20	
		Option Modules:		
	EL2006	Data Communications††	20	**Cyprus**
	EL2311	Software Development 2^	20	Requires 360 credits (180 ECTS) including a minimum of 220 credits at Level 4 or above and at least 100 credits at level 5 or above.
	Elective	(Level 4 or above)^		
		Cyprus Route		
		Compulsory Modules:		
	EL2801	Power Engineering	20/10	
	EL2205	Electronic Systems Applications	20/10	
	EL2241	Electronic Systems	20/10	
	EL2242	Digital Systems	20/10	
	EL2100	Signals and Control Systems	20/10	
	EL2006	Data Communications	20/10	
Level 4		**Preston Route**		**Certificate of Higher Education**
		Compulsory Modules:		

	ER1010	Engineering Analysis^	30	**Preston**
	ER1630	Engineering Applications^	30	Requires 120 credits at Level
	ER1730	Electronics and Electronic Engineering Practice^	30	4 or above.
	ER1731	Digital Electronics and Programmable Systems^	30	**Cyprus** Requires 240 credits (120 ECTS) including a minimum of 100 credits at Level 4 or above.
		Cyprus Route		
		Compulsory Modules (Year 2):		
	EL1242	Digital Electronics*	20/10	
	EL1802	Applied Physics*	20/10	
	EL1205	Electronic Engineering Practice*	20/10	
	EL1785	Electronics and Instrumentation*	20/10	
	AP1841	Introduction to Mechanics*	20/10	
	EL1903	Computational Mathematics for Engineers*	10/5	
	EL1901	Probability Theory for Engineers*	10/5	
		Compulsory Modules Cyprus (Year 1):		
	CO1407	Introduction to Programming*	20/10	
	EL1801	Electrical Engineering Fundamentals*	20/10	
	EL1902	Calculus and Linear Algebra for Engineers*	20/10	
	CO1406	Algorithms and Data Structures*	20/10	
	EF1705	General English I*	20/10	
	EF1706	General English II*	20/10	

- † = Core only in Preston, optional module in Cyprus
- †† = Core in Cyprus, optional module in Preston
- ^ = Modules run only in Preston
- * = Modules run only in Cyprus
- **= Modules run only at Wigan & Leigh College

15. Personal Development Planning

Various PDP-related issues are presented and discussed throughout the course, including specific sessions on aspects such as time management, preparation for assessments, review and reflection, postgraduate opportunities, etc. PDP guidance specifically for these ERE courses is provided, with relevant issues being discussed in several of the modules, most notably the practical-based modules ER1630, ER1730, EL1205, EL2205 and the final year project module. The use of an effective Academic Advisor system, with a named lecturer responsible for each of the Year 1 and Year 2, is helpful in this respect as well as in selection of optional modules. Issues related to the Industrial Placement year (Year 3) are discussed in sessions (MP2899), held during the second year of study, and during placement visits for students on Industrial Placement. Final Year students' Academic Advisor is their individual Project Supervisor, who they will meet regularly throughout the year. There is also a named Final Year Tutor who deals with issues specific to the final year.

The University also has central PDP guidance and support, and reference to this is made in the Student Handbook.

Development of Wigan and College:

On entry to the programme you will be allocated an Academic Advisor who will supervise the PDP elements in the technical tutorial and the project sessions. Activities typically involve a range of self-assessment exercises and suggested development activities. The student's progress is measured against personal milestones which are discussed and reviewed. The results of the activities and exercises are to form a PDP portfolio, students are advised to utilise the professional PDP packages available by the relevant engineering institutions.

16. Admissions criteria
(including agreed tariffs for entry with advanced standing)
**Correct as at date of approval. For latest information, please consult the University's website.*

Preston

112 UCAS Points including Maths and Physics at C or STEM at C. Each application is treated as an individual and assessed on work experience, personal statement and other studies.

BETC Extended Diploma: Distinction, Merit, Merit including Maths units.
Pass Access Couse: 112 UCAS Points
International Baccalaureate: Pass Diploma with 112 UCAS points from Higher Level subjects & HL5 in required subject
IELTS: 6.0 With no score lower than 5.5
GCSE: 5 At grade C/4 including Maths and English or equivalent

Cyprus

- For entry to year 1 of the programme, the normal requirement is a score of 16.5/20 or above in the Apolytirion (High School Leaving Certificate) including subjects areas such as Mathematics, Science or Technology; or 200 A level points in subject areas such as Mathematics, Science or Technology; or any other international equivalent.
- For advanced entry into the programme, the minimum entry requirements would be one of the following: 280 A level points or equivalent; or a relevant Foundation Certificate from a recognised institution.
- Students with an Apolytirion (High School Leaving Certificate) score of 18.5/20 or above, or 300 A2 level points or equivalent and has an IELTS score of 6.0 or equivalent may apply for exemption from no more than 10% of the programme, equivalent to a maximum of 2 modules (40 UK credits/20 ECTS) out of their 24 module programme. These two modules could only any English Language modules
- Applicants without a grade C or above in GCSE English will have to show a good grasp of the English language and will require 5.0 IELTS (or equivalent) for entry into year 1 or 6.0 IELTS (or equivalent) for entry to year 2 of the degree.
- Applications from individuals with non-standard qualifications or relevant work / life experience who can demonstrate the ability to cope with and benefit from degree-level studies are welcome to apply and will be considered on an individual basis.

Wigan and Leigh

Applicants from BTEC HND programmes in Engineering must possess 240 credits at levels 4 and 5 of which 120 must be at level 5.

QCF:
Normally an overall Merit grade or above for the HND is required, merit grades in Further Analytical Methods for Engineers are essential.

RQF:

Normally an overall Merit grade or above for the HND is required, a merit grade in Further Mathematics is essential.

Applications from applicants with alternative qualifications are welcome.

We reserve the right to interview applicants. Once your application has been processed you will be sent a letter stating the date you that you are required to attend, and information outlining what will be required.

17. Key sources of information about the programme

School and course webpages:
http://www.uclan.ac.uk/schools/engineering/index.php
http://www.uclan.ac.uk/information/courses/beng_electrical_and_electronics.php
http://www.uclancyprus.ac.cy/en/courses/school-sciences/undergrauate-courses/beng-hons-electrical-electronic-engineering/
https://www.wigan-leigh.ac.uk/courses/electrical-electronic-engineering/beng-hons-electrical-and-electronic-engineering-top-degree-awarded-uclan

- **Factsheet for Electronic Engineering courses**
- **UCAS information**
- **External Influences:**
  http://www.theiet.org/academics/accreditation/policy-guidance/synopsis_handbook.cfm
  http://www.engc.org.uk/professional-qualifications/standards/uk-spec
  http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Engineering10.pdf
  http://www.etek.org.cy/site-menu-82-en.php

18. Curriculum Skills Map

Please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed

Level	Module Code	Module Title	Core (C), Compulsory (COMP) or Option (O). Preston/Cyprus	Programme Learning Outcomes																		
				Knowledge & Understanding				Subject-specific skills						Thinking skills						Other skills relevant to employment and personal development		
				A1	A2	A3	A4	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5
LEVEL 6	EL3250	Microcontroller Systems	COMP/O					X	X											X	X			
	EL3995	Project	COMP/COMP	X		X		X	X	X	X	X	X	X	X	X	X		X	X	X	X		X
	EL3996	Engineering Professionalism	COMP/COMP			X	X					X	X					X		X	X			X
	EL3813	Power Electronics and Applied Power Electronics	COMP/O	X				X	X		X		X	X						X	X	X	X	
	EL3800	Power Systems Operation and Control	COMP/O	X		X	X	X	X	X		X	X	X	X			X			X			
	EL3300	Machine Intelligence	O/NA		X			X	X					X							X			
	EL3251	System on Programmable Chip	O/NA	X		X		X	X		X			X							X			
	EL3425	Computer Aided Instrumentation	O/NA	X				X	X					X	X					X	X			
	EL3147	Digital Signal and Image Processing A	O/O	X	X			X	X		X	X		X						X	X			
	EL3808	Digital Communications	NA/O		X			X	X				X							X	X			
	EL3801	Wireless, Mobile and Fibre-Optic Communications	NA/O	X	X			X	X		X		X	X			X			X	X	X		
	EL3802	Renewable Energy Sources	NA/O	X		X	X	X	X	X		X	X	X	X			X			X			
	EL3806	Electrical Services	NA/O	X			X	X	X		X		X	X	X	X					X			
	EL3803	Engineering Economics	NA/O			X				X					X			X		X	X		X	
	EL3805	Project Management	NA/O			X	X			X					X		X	X		X	X		X	X
	EL3807	Mobile Technologies	NA/O	X	X			X	X		X		X	X			X			X	X	X		
	EL3243	Embedded Real-Time Systems	NA/O	X	X			X	X		X			X		X	X			X	X			
	ER3501	Operations Management	Comp		X		X	X		X		X		X	X	X		X	X	X	X	X	X	X
	ER3503	Circuits, Networks and EM Waves	Comp	X	X	X									X	X	X			X		X		
	ER3599	Engineering Project	C	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X
	ER3590	Extended Engineering Project	C	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X		X
	ER3502	Control Engineering	O	X	X	X		X	X		X		X		X	X	X			X		X		

	ER3521	Machines, Transmission, and Distribution	O	✗	✗	✗	✗	✗	✗		✗		✗		✗	✗	✗			✗		✗		

Level	Module Code	Module Title	Core (C), Compulsory (COMP) or Option (O). Preston/Cyprus	Programme Learning Outcomes																				
				Knowledge & Understanding				Subject-specific skills						Thinking skills						Other skills relevant to employment and personal development				
				A1	A2	A3	A4	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5
LEVEL 6	ER3522	Power Electronics	O	✗	✗	✗		✗	✗		✗		✗		✗	✗	✗			✗		✗		
	ER3511	Signals and Systems	O	✗		✗							✗		✗		✗			✗		✗		
	ER3512	Electronic Systems	O	✗	✗	✗		✗	✗		✗		✗		✗	✗	✗			✗		✗		
	ER3513	Digital Signal Processing	O	✗	✗	✗		✗	✗		✗		✗		✗	✗	✗			✗		✗		

NOTE: The Industrial Placement module MP2899 is taken by Sandwich students and leads to an award (Honours Degree or Degree) 'with Industrial Placement' the module does not contribute to the overall degree mark for final grading. The specific Learning Outcomes unique to this module, and addressed within it, are:

(1) Apply the basic knowledge and skills acquired during academic study at Level 4 and Level 5 in a professional engineering environment
(2) Contribute independently and confidentially to team and individual engineering projects
(3) Describe the position of engineering as a dimension of business activity
(4) Demonstrate a mature and professional attitude to work

18. Curriculum Skills Map (Part B: Levels 4 & 5)

Please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed

Level	Module Code	Module Title	Core (C), Compulsory (COMP) or Option (O). Preston/Cyprus	Programme Learning Outcomes																				
				Knowledge & Understanding				Subject-specific skills						Thinking skills						Other skills relevant to employment and personal development				
				A1	A2	A3	A4	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5
LEVEL 5	EL2801	Power Engineering	COMP/COMP	X				X	X		X			X		X				X	X	X	X	
	EL2205	Electronic Systems Applications	COMP/COMP	X	X	X		X	X	X	X			X	X		X			X	X			
	EL2241	Electronic Systems	COMP/COMP	X	X			X	X		X									X	X	X	X	
	EL2242	Digital Systems	COMP/COMP					X	X		X										X			
	EL2311	Software Development 2	O/NA		X			X			X		X		X	X					X			
	EL2006	Data Communications	O/COMP	X	X			X	X		X										X			
	EL2100	Signals & Control Systems	NA/COMP	X	X			X	X		X			X						X	X			
	EL2104	Instrumentation and Control	COMP/NA	X	X			X	X		X			X						X	X			
	EL2011/3	SIM	O/NA	X																	X	X		
LEVEL 4	ER1010	Engineering Analysis	COMP/NA		X			X													X			
	ER1630	Engineering Applications	COMP/NA	X			X	X	X					X						X	X			X
	ER1730	Electronics and Electronic Engineering Practice	COMP/NA	X	X			X	X	X	X				X		X			X	X	X		X
	ER1731	Digital Electronics and Programmable Systems	COMP/NA	X	X			X	X		X			X	X		X			X	X			
	EL1205	Electronic Engineering Practice	NA/COMP	X				X	X	X	X	X			X		X				X	X		X
	EL1242	Digital Electronics	NA/COMP	X	X			X	X		X				X					X	X			
	AP1841	Introduction to Mechanics	NA/COMP					X	X		X					X				X	X	X	X	
	EL1785	Electronics & Instrumentation	NA/COMP	X	X			X	X		X			X							X			
	EL1802	Applied Physics	NA/COMP	X	X			X												X	X	X		
	EL1902	Calculus and Linear Algebra for Engineers	NA/COMP		X																X			

EL1903	Computational Mathematics	NA/COMP		✗															✗			
EL1901	Probability Theory for Engineers	NA/COMP		✗															✗			
CO1407	Introduction to Programming	NA/COMP	✗	✗				✗						✗				✗			✗	✗	✗
EL1801	Electrical Engineering Fundamentals	NA/COMP	✗	✗			✗	✗		✗					✗				✗	✗	✗	✗	
CO1406	Algorithms and Data structure	NA/COMP	✗	✗				✗						✗				✗			✗	✗	✗
EF1705	General English I	NA/COMP																	✗	✗		✗	✗
EF1706	General English II	NA/COMP																	✗	✗		✗	✗

Note: *Mapping to other external frameworks, e.g. professional/statutory bodies, will be included within Student Course Handbooks*

19. LEARNING OUTCOMES FOR EXIT AWARDS:

For **each exit award available**, list learning outcomes relating to the knowledge and understanding, subject specific skills, thinking, other skills relevant to employability and personal development that a typical student might be expected to gain as a result of successfully completing each level of a course of study.

Learning outcomes for the award of: CertHE Electronic Engineering

Preston
Requires 120 credits at level 4 or above:

- (A2) Apply knowledge and understanding of mathematics underpinning the Electrical and Electronic Engineering discipline; system analysis, computational algorithms
- Demonstrate basic knowledge and understanding of the basic concepts, and fundamental physical principles of Electrical Engineering (A1, A2), and be able to apply them theoretically and practically to analyse simple fundamental Electrical Engineering problems (B1, B2), develop basic creative skills to be in a position to establish and analyse simple Electrical Engineering solutions (C3). Develop skills in performing literature survey (D1), communicating ideas (D2) and working independently (D3)
- Demonstrate sufficient knowledge and understanding of the concepts in Software Engineering and Programming (A1, A2), and be able to apply them theoretically and practically to solve programming problems related to electrical and electronic engineering (B2), develop ability to define a problem including understanding customer needs (C2). Develop and working independently (D3) and as part of a team (D4)

Cyprus

Requires 120 credits (60 ECTS) including a minimum of 100 credits at Level 4 or above. The learning outcomes include:

- (A2) Apply knowledge and understanding of mathematics underpinning the Electrical and Electronic Engineering discipline; system analysis, computational algorithms
- Demonstrate basic knowledge and understanding of the basic concepts, and fundamental physical principles of Electrical Engineering (A1, A2), and be able to apply them theoretically and practically to analyse simple fundamental Electrical Engineering problems (B1, B2), develop basic creative skills to be in a position to establish and analyse simple Electrical Engineering solutions (C3). Develop skills in performing literature survey (D1), communicating ideas (D2) and working independently (D3)
- Demonstrate sufficient knowledge and understanding of the concepts in Software Engineering and Programming (A1, A2), and be able to apply them theoretically and practically to solve programming problems related to electrical and electronic engineering (B2), develop ability to define a problem including understanding customer needs (C2). Develop and working independently (D3) and as part of a team (D4)

Learning outcomes for the award of: DipHE Electronic Engineering

Preston
Requires 240 credits including a minimum of 220 credits at level 4 or above and at least 100 credits at level 5 or above. The learning outcomes in addition to the above:

- Demonstrate knowledge and understanding of mathematics, Mechanics and Applied Physics, Digital Electronics, Electronics and Instrumentation (A1, A2)
- Develop subject specific skills in and be in a position to apply principles and solve problems in Mechanics, Applied Physics, Digital Electronics, Instrumentation and Electronics (B1) and be in a position to practically apply the theory (B2) by demonstrating practical competences in the lab in Digital Electronics, Instrumentation and Electronics (B4). Evaluation of the wider multidisciplinary context in Electronic Engineering (B4, B5)
- Be in a position to carry out Personal development planning, self-directed learning and reflection for future CPD (D5) and Manage design processes and evaluate outcomes in Electronic Engineering (C4)

Cyprus

Requires 240 credits (120 ECTS) including a minimum of 100 credits at Level 4 or above. The learning outcomes in addition to the above:

- Demonstrate knowledge and understanding of mathematics, Mechanics and Applied Physics, Digital Electronics, Electronics and Instrumentation (A1, A2)
- Develop subject specific skills in and be in a position to apply principles and solve problems in Mechanics, Applied Physics, Digital Electronics, Instrumentation and Electronics (B1) and be in a position to practically apply the theory (B2) by demonstrating practical competences in the lab in Digital Electronics, Instrumentation and Electronics (B4). Evaluation of the wider multidisciplinary context in Electronic Engineering (B4, B5)
- Be in a position to carry out Personal development planning, self-directed learning and reflection for future CPD (D5) and Manage design processes and evaluate outcomes in Electronic Engineering (C4)

Learning outcomes for the award of: BEng Electrical and Electronic Engineering

Preston

Wigan and Leigh College

Requires 360 credits including a minimum of 220 at level 5 or above and a minimum of 80 at level 6 including the project. The Project module cannot be compensated.

The learning outcomes in addition to the above are:

- Demonstrate advanced and specialized knowledge and understanding and develop specific practical and problem solving skills skills in specialized areas of Electrical and Electronic Engineering in topics relating to either Telecommunications and Mobile Technologies, Renewable Energy Systems or to other Electrical and Electronic Engineering topics (A1, A2, B1, B2, B3, B4)
- Evaluate the wider multidisciplinary context within which engineering knowledge is applicable (B5)
- Application of the codes of practice, standards and quality management processes applicable to power systems operation and electronic system design (B6)
- Exercise of engineering judgement, accounting for professional & ethical responsibilities (C5)
- Ability to analyse unfamiliar problems, apply unfamiliar concepts and manage the inherent technical uncertainty (C6)

Cyprus

Requires a minimum of 440 credits (220 ECTS) with 180 at Stage 2, including Level 5 or above, and a minimum of 60 at Level 6. The Project module cannot be compensated.

The learning outcomes in addition to the above are:

- Demonstrate advanced and specialized knowledge and understanding and develop specific practical and problem solving skills skills in specialized areas of Electrical and Electronic Engineering in topics relating to either Telecommunications and Mobile Technologies, Renewable Energy Systems or to other Electrical and Electronic Engineering topics (A1, A2, B1, B2, B3, B4)
- Evaluation of the wider multidisciplinary context within which engineering knowledge is applicable (B5)
- Application of the codes of practice, standards and quality management processes applicable to power systems operation and electronic system design (B6)
- Exercise of engineering judgement, accounting for professional & ethical responsibilities (C5)

- Ability to analyse unfamiliar problems, apply unfamiliar concepts and manage the inherent technical uncertainty (C6)