PROGRAMME SPECIFICATION

1. Key Information

Programme Title:	BEng (Hons) Electrical and Electronic Engineering
Awarding Institution:	Buckinghamshire New University
Teaching Institution(s):	Buckinghamshire New University
Subject Cluster:	3D Design
Award Title (including separate Pathway Award Titles where offered):	BEng (Hons) Electrical and Electronic Engineering
Pathways (if applicable)	None
FHEQ level of final award:	6
Other award titles available (exit qualifications):	Certificate of Higher Education Diploma of Higher Education BEng Electrical and Electronic Engineering
Accreditation details:	This programme is designed to meet the aims and learning outcomes specified by the UK Engineering Council in its requirements for Accreditation of Higher Education Programmes (AHEP). These fully satisfy the educational requirements for Incorporated Engineer (IEng) status and partially satisfy the educational requirements for Chartered Engineering (CEng) status. The programme will be seeking accreditation from the for Institution of Engineering and Technology (IET) upon completion of the first cohort and potentially will be backdated by IET (subject to approval/consent) up to five years.
Length of programme:	3 years
Mode(s) of Study:	Full Time
Mode of Delivery:	In person (on-site) delivery
Language of study:	English
QAA Subject Benchmark(s):	QAA Subject Benchmark Statement Engineering (March 2023)
Other external reference points (e.g. AHEP Standard):	Institution of Engineering and Technology (IET)
Course Code(s):	
UCAS Code(s):	
Approval date:	
Date of last update:	

2. Programme Summary

This programme will provide you with the ability to identify and engineer solutions to complex challenges using innovation and creativity. This programme will prepare you to become a high-quality graduate of a bright mind generation who will innovate beyond current practises within the field of electrical and electronic engineering.

The technology-based economy is focusing on electronically controlled and independent digital systems, smart communication devices, mechatronics, microprocessor systems, electrical machines, All-Electric Vehicles, Smart Grid and Sustainable power network, automation, and robotics, controlled remotely by smart technology using green energy resources. This programme will equip you with the tools and techniques you will need to develop new digital products that meet local, national, and global needs.

This degree programme will be delivered over 3 years, full-time. During the programme you will develop and advance your knowledge and skills, building upon previous learning. You will participate in an ambitious project of work throughout the programme to showcase your creativity, originality, and individual engineering expertise in a project, demonstrating employability skills.

Engineering is vitally important for the national economy with a high percentage of all employment in the United Kingdom being aligned to the Engineering and Manufacturing sectors. Demand for trained Engineers both regionally and nationally has never been so great. This programme will prepare you for an exciting career in these high demand sectors.

3. Programme Aims and Learning Outcomes

Programme Aims

This programme aims to:

1. Enable learners to have a thorough understanding and knowledge of scientific and engineering principles, analysis, tools, and practices

2. Provide learners with key knowledge, understanding and skills to employ contemporary and innovative electrical and electronic engineering methodologies, techniques, algorithms

3. Produce graduates who can use a sound, evidence-based approach in applying innovative technologies, processes and systems and leadership skills

4. Develop learners with critical understanding and leadership of professional framework, engineering ethics, social and cultural values in engineering and other business contexts in developing products and services

Programme Learning Outcomes

Knowledge and Understanding (K)

On successful completion of the programme, you will be able to:

ID	Learning Outcome
K1	Develop detailed and systematic skills, knowledge and understanding of a range of scientific and engineering principles, tools and processes used in solving engineering design and technological problems.
K2	Explore a range of tools and techniques, including digital approaches, to modelling, simulating and analysing complex electrical and electronic engineering products and services to achieve optimum solutions.
K3	Synthesise scientific knowledge and skills in formulating and analysing engineering design concepts and techniques whilst considering client, financial, environmental, quality, statutory and safety objectives.
K4	Demonstrate knowledge of testing a range of computer-based simulation software and electro-technical manufacturing processes for the integration of design functions from concept to realisation of electrical and electronic engineering circuits and systems.

Analysis and Criticality (C)

On successful completion of the programme, you will be able to:

ID	Learning Outcome
C1	Examine appropriate techniques and methods for solving electro-mechanical, numerical and scientific problems for system modelling.
C2	Evaluate business contexts with respect to strengths and weaknesses, opportunities, and threats to develop methods to counteract or exploit such aspects in developing sustainable solutions for electrical and electronic engineering field.
C3	Analyse the importance of linking academic knowledge and skills with industry, research, and development.
C4	Assess relevant engineering materials and their processing methods for the development and implementation of sustainable and practical solutions to engineering problems.
C5	Reflect on your own creativity in problem solving and your application of knowledge across discipline areas.

Application and Practice (P)

On successful completion of the programme, you will be able to:

ID	Learning Outcome
P1	Employ efficiently advanced modelling, simulation, and analysis packages in engineering design.
P2	Design with a range of innovative technologies, such as electronic, electro-mechanical, mechatronics, Industry 4.0, instrumentation, control, robotics and automation techniques, in the process of product development and manufacturing.

P3	Implement engineering design projects both individually and in a group utilising a methodical and disciplined approach to satisfy client, financial, environmental, quality, statutory and safety requirements.
P4	Devise engineering algorithms for products and services considering their lifecycle, circular economy principles, green skills and sustainability considerations.
P5	Apply suitable planning, implementation, and presentation techniques in carrying out major individual project.

Transferable skills and other attributes (T)

On successful completion of the programme, you will be able to:

ID	Learning Outcome
T1	Work effectively in collaboration with others, by identifying and working towards targets for personal, career, and professional development.
T2	Communicate effectively by oral, written, and visual means including highly specialised manual and computer-based methods for engineering systems and presentation.
T3	Apply principles of hi-tech, revolutionary, and green technologies effectively when using electrical and electronic engineering and electronic computer-aided design and simulation software.
T4	Investigate and define a problem and identify constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues, intellectual property; code of practice and standards.
T5	Evaluate business customer and user requirements to apply advanced problem-solving skills in the development of creative systems engineering.

Graduate Attributes

The BNU Graduate Attributes of: Knowledge and its application; Creativity; Social and ethical awareness and responsibility; and Leadership and self-development focus on the development of innovative leaders in professional and creative capacities, who are equipped to operate in the 21st Century labour market and make a positive impact as global citizens.

Graduates will achieve comprehensive knowledge and understanding of engineering design (K1), will be pragmatic, seek to achieve sustainable solutions (K4, C4, P4). Graduates will be effective problem solvers, able to apply creative, critical, and evidence-based planning and thinking to conceive innovative responses to future challenges (P1) in engineering and convey ideas effectively (T2-T3) to a range of audiences for a variety of purposes (C1-C5). They will be risk, cost and value-conscious, ethical, social, cultural, environmental, health and safety aware (P3), familiar with the nature of business and enterprise in the creation of economic and social value (K5, P4). Graduates will develop the ability to engage with dynamic traditions of thought (K2-K3), the ability to apply their knowledge in real-time practice across multi-disciplinary and multi-professional contexts (P3-P4) in designing engineering products and services. They will appreciate the global dimensions of engineering, commerce, and communication, to formulate and operate within appropriate codes of conduct, be professional in their outlook, capable of team working and effective communicators (T1-T5). Graduates will engage in professional, intellectual, and ethical behaviour, and develop the potential to be

entrepreneurial and take leadership roles (K4-K5), becoming well prepared for living, learning, and working in a digital society (P2, T2-T3) within their chosen careers.

4. Entry Requirements

The University's general entry requirements will apply to admission to this programme with the following additions / exceptions:

- A typical offer will require a UCAS tariff score of between 100-128 points
- A minimum of two full A-levels, preferably in Mathematics and a Science based subject or 120 credits in an Engineering BTEC at level 3 (or equivalent) is required.
- Applications are welcomed from candidates without the formal qualifications outlined above providing 5+ years of relevant industry experience can be provided and discussed at interview.
- Every application is considered on an individual basis.
- Applicants will need to complete an interview and/or demonstrate a portfolio of work, further guidance is given on the interview and portfolio advice pages.
- Applicants with a HNC and/or a Foundation Degree in Engineering (or equivalent) may have the opportunity to join this programme at an advanced entry point in accordance with our accreditation of prior learning (APL) process.
- For further details of our international English entry requirements, please visit our international pages.

5. Programme Structure

BEng (Hons) Electrical and Electronic Engineering

Level	Modules (Code, Title and Credits)	Exit Awards
Level 4	**Core modules:** CAD4080 Mathematics for Engineers (20) CAD4079 Science and Materials for Engineers (20) CAD4076 Fundamentals of Electrical and Electronic Engineering (20) CAD4083 Computer Aided Design and Simulation (20) CAD4086 Modelling and Analysis of Electromechanical Systems (20) CAD4087 Individual Engineering Project and Management (20)	**Certificate of Higher Education**, awarded on achievement of 120 credits at Level 4
Level 5	**Core modules:** CAD5111 Circuit analysis and three-phase systems (20) CAD5112 Analogue and Digital Electronics (20) CAD5117 PLC, Microprocessor and Embedded Systems lab (20) CAD5096 Sensors, actuators, and instrumentation (20) CAD5118 Control Systems Engineering and Mechatronics (20) CAD5049 Power system analysis, Smart Grids and All-Electric Vehicles (20)	**Diploma of Higher Education**, awarded on achievement of 240 credits, including a minimum of 120 credits at Level 5
Level 6	Core modules: CAD6061 Leadership and Management (20) CAD6062 Advanced Power Electronics, Machines and Drives (20) CAD6063 Emerging and Sustainable technologies for Engineers (20) CAD6021 Research Project (40) **Option modules:** Choose one module to the total of 20 credits: CAD6064 Robotics, Automation and Industry 4.0 (20)	

	CAD6065 Control and Automation of Sustainable Electrical Power Network (20)	

Please note: Not all option modules will necessarily be offered in any one year. Other option modules may also be introduced at a later stage enabling the programme to respond to changes in the subject area. Also note that a maximum of 20 credits in a bachelor's degree programme can be compensated. Major projects/Dissertation (group and individual) must not be compensated.

6. Learning, Teaching and Assessment

Learning and teaching

Active practice-based teaching, learning and authentic assessment methods adopted will embrace a wide range of approaches around a core of individual/dissertation projects and workshop tuition, where currency will be maintained through strong links with allied professions and industries. The programme is structured to allow learners to take increasing responsibility for the content and direction of their work, and to become increasingly independent in their studies as the programme progresses, they include the following strategies and techniques:

- Workshop, groupwork and practical sessions development of required skills
- Lectures to transfer the basic and complex theory of the topic
- Seminars will be used for smaller groups to discuss and analyse the subjects
- Tutorials used for one-to-one assistance and continued support
- Blackboard for e-learning and transfer of information
- Laboratories will be used for the testing and proving of theory
- Research and industrial visits: to provide depth and context to the learning

Digital technologies and industry standard software will be used in the relevant modules. Computer-based simulation software will be used along with practical and discrete components to model, simulate and evaluate information such as modelling, development and analysis of engineering systems, specifications, bills for materials, green skills, sustainability, Net-Zero and health and safety etc., in the teaching of relevant modules. This will foster deep learning enabling learners to see how the contents delivered in different modules are interrelated to provide holistic concepts of engineering technology, sustainable design, and integration of model-based systems engineering, and services for effective design and operation of manufacturing technologies.

Discussions may be around elements of cutting-edge developments in the field/ industry 2030, with exposure for learners of technology in the workplace and what future technology may be available not only in the next 2-3 years but in the next 10-15 years.

The teaching strategies employed throughout the programme are those judged to be the most appropriate for each module at each stage and level of the programme with a strong emphasis on practice-based learning and workplace simulation. They include the following:

Lectures

This is the most formal teaching strategy used during the programme. Lectures are used for the delivery of a body of theoretical information to a large group of learners, and this is most effective when followed by a seminar, tutorials, or group discussion. The lecture format may also be used to introduce a module or a project to the whole cohort, and in all cases, lectures will be supported by supplementary information in the form of handouts, or links to Blackboard or similar virtual learning environment (VLEs). This supplementary information will reinforce learning and expand upon the information conveyed through the lecture, tutorials or other exercises carried out in the learner's own time. On occasion, guest lecturers (GLs) and Associate Lecturers (ALs) will be used where specific areas of expertise are required, and to launch external competitions and industrial collaboration projects.

Seminars

These are seen as an essential teaching tool, and can vary from large group seminars, which provide formal debate, to impromptu discussion sessions with small groups, which may follow on from a lecture, demonstration, or video. Seminars will be promoted to encourage learners from a range of programmes within the faculty to attend, to allow cross fertilisation of ideas and networking.

Critiques

All learners are required to present their work to the rest of the cohort and to the programme team on a regular basis. All learners, including those from other levels, are welcome to take part, but numbers are kept low, as this is less intimidating for those presenting. The onus is on the learner to take responsibility for presenting their work in the most appropriate manner. This is an extremely effective teaching strategy, encouraging learners to become increasingly articulate and confident in discussing their work as they enter critical debate. This also acts as a communication vehicle to allow dissemination of good practice between all the learners and the staff.

Tutorials

Group and individual tutorials are used throughout all levels of the programme. Each learner also has a personal tutor; someone who follows their progress but is also available to discuss other more personal problems that may occur, and where necessary refer them elsewhere for assistance, help and support. Learners may request a personal tutorial as and when necessary. For the final Level 6 project dissertation, learners are given a regular weekly timetabled tutorial. The role of the tutor is to provide advice, support, guidance, and constructive feedback/feedforward on the learner's work as it develops.

Blackboard

Blackboard is the University's choice of computer software for our virtual learning environment (VLE). It supports online teaching and learning and can be accessed by registered learners and staff via the University's intranet system or by the Internet from any location. Blackboard has become a key learning support tool whereby staff and learners can communicate through text and images. Resources available within the `environment` include, programme information, module materials that can comprise of anything from lecture notes to video clips, discussion forums for communication between staff and learners, administrative information such as calendars, and the setting and marking of online assessments. Blackboard facilitates an inordinately flexible and remotely available teaching and learning world.

Workshop and Practical Sessions

Practical sessions will allow the acquisition of specific skills and techniques, and highlight the health and safety requirements of materials, equipment, and processes. Cohorts will be split into small group sizes to ensure that each learner has full access to each process. These will be expressed in their final project when they will have to demonstrate that they are able to coordinate their learning and use the knowledge learnt to apply to project management.

Most of the modules are designed with practical skills assessments. Learning will be consolidated practicing a range of given practical skill-based case studies in the electro-mechanical and simulation labs to prepare for them for the assessments. Learners are expected to use the simulation lab to critically evaluate/analyse the practical-oriented

engineering case studies for their individual and dissertation projects. Learners will also develop a range of prototypes for their coursework and projects using the electro-mechanical lab and equipment.

Laboratories

Lab sessions allow learners to practically apply the theoretical aspects of the programme, for example mathematical and physical science that has been introduced in more formal lectures, and therefore gain another perspective on the academic material. The more relaxed atmosphere of the lab environment allows and encourages learner experimentation.

Assessment

A variety of authentic assessment methods are used as appropriate to each module which will suit all types of learning styles. The forms of assessment have been chosen to motivate learners to achieve and create positive learning opportunities. The assessments are predominantly coursework, which include:

- Portfolio
- Project output
- Written assignment/documentation
- Report (individual and group)
- Computer-based tests
- Set exercises - worksheets, to be completed as required usually in the learner's own time
- Presentations (such as poster and oral, individual and group, publication standard summary paper)
- Laboratory exercises and report
- Practical Skills assessment
- Proposal
- Dissertation
- Examination

Portfolio:

The Portfolio provides learners with the opportunity to explore and demonstrate work-based examples to design and create live products. Within engineering, a typical portfolio consists of problems and case studies for real-world applications. Learners will solve problems through analysis and application of theory, engineering laws/theorem and report their findings. For case studies, learners will use mathematical models, algorithms, and scientific methods with a range of simulation and practical evidence using simulation, electromechanical, 3D design and practical laboratories and comment on the results/outcomes. Commentary must evaluate the outcomes and recommend the further action(s) as appropriate. The length of portfolio for:

- Level 4: 15-20 pages with 1000 words commentary [for 100% weighting]
- Level 5: 18-25 pages with 1000 words commentary [for 100% weighting]
- Level 6: 25-35 pages with 1000 words commentary [for 100% weighting]

Project output:

Learners will interpret organisationally specific, customer and stakeholder requirements into technical specifications. For example, customer requirements for a product are to ensure safety in all-electric vehicles while the learners use relevant technical terms such as response time of a protection circuits and systems. The assessment will be designed to set a response time; i.e. such as 2 seconds and learners have to simulate the system to achieve ‘’repose time to 2 seconds prior to developing the live product/circuit’’.

Constructive verbal and written formative feedback and feedforward are shared to develop progress on project work, directed study activities, class exercises. Progress on summative assessments will be provided using constructive verbal/ written feedback and feedforward during individual tutorials, group critiques or seminar sessions and peer feedback. Formative feedback opportunities will be provided to monitor and reflect on progress, identifying areas of achievement as well as focusing on objectives for future development.

Authentic assessment criteria reflect the progressively independent learning expected as learners progress throughout the programme. This reinforces the practical nature of the programme, supported by theoretical research and critical writing.

Contact Hours

You can expect to receive approximately 12 hours of scheduled learning activities per week. These will include lectures, seminars, workshops, practical sessions, or placement hours. A full breakdown of contact hours can be found in individual module descriptors.

7. Programme Regulations

This programme will be subject to the University’s *Regulations for Taught Programmes*.

8. Support for learners

The following systems are in place to support you to be successful with your studies:

- The appointment of a personal tutor to support you through your programme
- A programme handbook and induction at the beginning of your studies
- Library resources, include access to books, journals, and databases - many of which are available in electronic format – and support from trained library staff
- Access to Blackboard, our Virtual Learning Environment (VLE), which is accessible via PC, laptop, tablet, or mobile device
- Access to the MyBNU portal where you can access all University systems, information, and news, record your attendance at sessions, and access your personalised timetable
- Academic Registry staff providing general guidance on University regulations, exams, and other aspects of students and course administration
- Central student services, including teams supporting academic skills development, career success, student finance, accommodation, chaplaincy, disability, and counselling
- Support from the Bucks Students’ Union, including the Students’ Union Advice Centre which offers free and confidential advice on University processes.

9. Programme monitoring and review

BNU has a number of ways for monitoring and reviewing the quality of learning and teaching on your programme. You will be able to comment on the content of their programme via the following feedback mechanisms:

- Formal feedback questionnaires and anonymous module ‘check-ins’
- Participation in external surveys
- Programme Committees, via appointed student representatives
- Informal feedback to your programme leader

Quality and standards on each programme are assured via the following mechanisms:

- An initial event to approve the programme for delivery
- An annual report submitted by the External Examiner following a process of external moderation of work submitted for assessment
- The Annual Monitoring process, which is overseen by the University’s Education Committee
- Review by the relevant PSRB(s)
- Periodic Subject Review events held every five years
- Other sector compliance and review mechanisms

10. Internal and external reference points

Design and development of this programme has been informed by the following internal and external reference points:

- The Framework for Higher Education Qualifications (FHEQ)
- The QAA Subject Benchmark Statement – see detailed mapping below
- The BNU Qualifications and Credit Framework
- The BNU Grading Descriptors
- The University Strategy

Mapping of Subject Benchmark (e.g.: QAA2023) Statement to Programme Learning Outcomes

Subject Benchmark Statement	**Knowledge and understanding (K)**					**Analysis and Criticality (C)**					**Application and Practice (P)**					**Transferable skills and other attributes (T)**				
Benchmark / Standard requirement	**K1**	**K2**	**K3**	**K4**	**K5**	**C1**	**C2**	**C3**	**C4**	**C5**	**P1**	**P2**	**P3**	**P4**	**P5**	**T1**	**T2**	**T3**	**T4**	**T5**
Engineering																				
Science, mathematics and engineering principles	x		x		x	x					x			x	x					
Engineering analysis, including use of computational tools and techniques			x		x				x		x	x		x	x		x	x		
design, creativity, and innovation, including applying an integrated or systems approach			x			x			x				x						x	
Engineering and society, incorporating sustainability, ethics, risk, security and equity, diversity and inclusion	x		x			x		x	x				x							
Engineering practice, including teamwork, project management and use of practical equipment.		x	x		x	x	x	x	x				x		x					

Mapping of Programme Learning Outcomes to Modules

Programme Learning Outcome	**Knowledge and understanding (K)**					**Analysis and Criticality (C)**					**Application and Practice (P)**					**Transferable skills and other attributes (T)**				
Module Code (Core)	**K1**	**K2**	**K3**	**K4**	**K5**	**C1**	**C2**	**C3**	**C4**	**C5**	**P1**	**P2**	**P3**	**P4**	**P5**	**T1**	**T2**	**T3**	**T4**	**T5**
Level 4																				
Mathematics for Engineers			X			X								X				X		X
Science and Materials for Engineers	X	X				X	X			X	X		X			X		X		X
Fundamentals of Electrical and Electronics Engineering	X		X				X	X	X				X	X				X		X
Individual Engineering Project and Management	X		X		X	X			X					X		X		X		
Computer Aided Design and Simulation			X	X				X	X	X	X		X	X				X		
Modelling and Analysis of Electromechanical Systems		X			X	X	X			X		X			X		X		X	X
Level 5																				
Circuit Analysis and Three-phase Systems			X					X			X		X			X	X		X	X
Analogue and Digital Electronics	X			X	X	X			X	X	X	X						X	X	

Programme Learning Outcome	**Knowledge and understanding (K)**					**Analysis and Criticality (C)**					**Application and Practice (P)**					**Transferable skills and other attributes (T)**				
Module Code (Core)	**K1**	**K2**	**K3**	**K4**	**K5**	**C1**	**C2**	**C3**	**C4**	**C5**	**P1**	**P2**	**P3**	**P4**	**P5**	**T1**	**T2**	**T3**	**T4**	**T5**
PLC, Microprocessor and Embedded Systems Lab		X	X	X	X		X				X	X						X	X	
Sensors, Actuators and Instrumentation	X	X	X		X	X	X	X		X	X		X				X	X		X
Control Systems Engineering and Mechatronics	X	X	X		X		X		X		X	X				X		X		
Power Systems Analysis, Smart Grids and All-Electric Vehicles	X		X	X	X	X	X				X		X	X			X	X		
Level 6																				
Leadership and Management				X			X	X	X			X	X					X	X	
Advanced Power Electroncis, Machines and Drives			X		X			X	X	X	X	X						X		X
Research Project		X			X	X	X						X		X	X	X			X
Emerging and Sustainable Technologies for Engineers	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X			
Robotics, Automation and Industry 4.0	X	X	X	X	X	X	X	X	X	X	X	X		X				X		

Programme Learning Outcome	Knowledge and understanding (K)					Analysis and Criticality (C)					Application and Practice (P)					Transferable skills and other attributes (T)				
Module Code (Core)	**K1**	**K2**	**K3**	**K4**	**K5**	**C1**	**C2**	**C3**	**C4**	**C5**	**P1**	**P2**	**P3**	**P4**	**P5**	**T1**	**T2**	**T3**	**T4**	**T5**
Control and Automation of Sustainable Electrical Power Networks	X	X	X	X	X	X	X	X	X	X	X			X				X		