Programme Specification MEng Electronic Engineering

Date of Publication to Students [TBD]

NOTE: This specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes advantage of the learning opportunities that are provided. More detail on the specific learning outcomes, indicative content and the teaching, learning and assessment methods of each module can be found (1) at [Faculty web site address], (2) in the Module Specifications and (3) in the Student Handbook.

The accuracy of the information contained in this document is reviewed by the University and may be checked within independent review processes undertaken by the Quality Assurance Agency.

Awarding Institution / Body:	**Birmingham City University**
Teaching Institution:	**Birmingham City University**
Interim Awards and Final Award:	MEng Electronic Engineering MEng Electronic Engineering (SW) MEng Electronic Engineering (PT) MEng Electronic Engineering (FY) BEng Honours Electronic Engineering BEng Honours Electronic Engineering (SW) BEng Honours Electronic Engineering (PT) BEng Honours Electronic Engineering (FY) BEng Electronic Engineering BEng Electronic Engineering (SW) BEng Electronic Engineering (PT) BEng Electronic Engineering (FY) Diploma of HE in Electronic Engineering Certificate of HE in Electronic Engineering
Programme Title:	**Electronic Engineering**
Main fields of Study:	Mathematics, Electrical and Electronic principles, Analogue and Digital Electronics, Digital and Optical Communications, Embedded Systems, Microelectronics, Digital Signal Processing, Project Management and Professional Practice.
Modes of Study:	**Full-time** **Part-time** **Sandwich**
Language of Study:	**English**
UCAS Code:	**H600**

JACS Code:

Professional Status of the programme (if applicable):

The programme will be submitted for accreditation by the Institution of Engineering and Technology (IET) as fully-satisfying academic requirements for the fulfilment of Chartered Engineer (CEng) status.

Relevant subject benchmark statements and other external reference points used to inform programme outcomes:

QAA Benchmarking Group: Engineering**,** as specified in the Engineering Council UK-SPEC general and specific outcomes for programmes leading to CEng, published by the IET.

Programme philosophy and aims

The MEng Electronic Engineering programme will produce graduates with highly developed skills in electronic systems design, who will have the technical and management capability required by employers in a rapidly changing technological landscape. The curriculum meets the requirements of UK-SPEC, with a solid foundation of analytical and practical work. Specialisation is by way of pathways, option modules and research-focussed group project work, giving students the chance to make an informed choice of their future career direction. The pathways initially available offer specialisms in Microelectronics and Telecommunications. Employing option modules in the course structure allows topics and themes to be introduced or modified according to changing requirements from industry. The programme has outcomes relating to advanced study and industry awareness, with significant involvement in group-work in assignments and design projects.

These activities will help MEng students develop in areas such as planning and decision making, acting independently, accepting responsibilities, formulating ideas proactively, developing strategies, implementing and executing agreed plans, leading and managing teams, and evaluating achievement against specification.

The faculty has close links with major employers in the region to enhance the students learning experience through case studies, projects and industrial placements.

The aims of the programme are to:

- provide a stimulating and rewarding learning experience by way of scheduled lectures, labs, tutorials, seminars and support for related extra-curricular activity;
- develop knowledge, analytical and practical capability in engineering fundamentals, electrical and electronic principles, analogue and digital electronics, continuous and discrete signal processing, real-time embedded systems and programming, robotics and control, networking and

communication systems, project management and professional skills relevant to careers involving electronics;

- build an understanding of commercial, legal, ethical and environmental factors associated with electronic engineering;
- encourage the development of transferable and key skills applicable to employment and continuing professional development;
- lay a foundation for further study and research;
- offer students a qualification that satisfies accreditation requirements of relevant professional bodies.

Intended learning outcomes and the means by which they are achieved and demonstrated:

Learning Outcomes[1]

1. Knowledge and Understanding

On completion of the programme the student should be able to**:**

KU1. apply mathematical methods for analysis, modelling and simulation of applied electronic engineering systems;

KU2. understand fundamental concepts, principles, theories and technologies that underpin electronic engineering and show an awareness of new and emerging technologies;

KU3. use techniques for analysis, modelling, design, implementation and testing of analogue and digital electronic, digital signal processing, telecommunications and embedded systems;

KU4. apply organisational, teamwork and management approaches required by professional engineers;

KU5. show a broad understanding of commercial, ethical, regulatory and environmental factors and how they influence engineering solutions.

2. Intellectual Skills

On completion of the programme the student should be able to**:**

IS1. analyse and evaluate information from a variety of sources and in various formats used in electronic engineering;

IS2. specify requirements and devise and implement designs and solutions for electronic engineering systems demonstrating creativity and innovation;

IS3. apply professional judgment to engineering decisions taking account of relevant commercial, legal and regulatory factors;

IS4. argue rationally and draw independent conclusions based on a rigorous, analytical and critical assessment of argument, opinion and data;

IS5. evaluate electronic engineering techniques and products and make reasoned choices and recommendations.

[1] Guidance on the specification of learning outcomes is available from the Centre for the Enhancement of Learning and Teaching.

3. Practical Skills

On completion of the programme the student should be able to**:**

PS1. use laboratory and workshop equipment safely and record data competently;

PS2. apply tools and techniques for the design, implementation, testing and maintenance of electronic engineering systems;

PS3. use computer based systems and software for designing and modelling electronic systems and show an awareness of their limitations;

PS4. apply methodologies for research using primary, secondary, print and electronic sources and evaluate and present findings;

PS5. apply industry codes of practice and standards in the design and implementation of technical solutions.

.

4. Transferable/Key Skills

On completion of the programme the student should be able to**:**

TS1. participate effectively in group working in a leadership role being able to undertake technical functions and managing a delivery plan under changing circumstances;

TS2. manage time and prioritise workloads showing high levels of independent learning;

TS3. integrate a wide range of data from a variety of sources and apply to the solution of unfamiliar problems, being aware of the limitations of the solutions;

TS4. construct effective presentations through integration of the information to be presented with appropriate media and techniques;

TS5. source and utilise numerical and statistical data to support and reinforce conclusions and proposals;

TS6. make effective use of ICT technologies for the creation, storage, retrieval and dissemination of data, information and documentation;

TS7. research, use and adapt new methods and techniques in novel situations.

Learning teaching, and assessment methods used

Knowledge and understanding are acquired through a variety of methods, including formal lectures, tutorials and other directed independent learning activities and reinforced by laboratory tasks and seminars. Learning resources are made available on staff and module intranet pages, and through the Moodle VLE, to permit flexibility in engagement with the materials.

Analytical skills are developed through coursework tasks that encourage creativity and problem solving using a range of systems and technologies relevant to the electronic industry. Practical applications are a key feature of the course and are emphasised in course design and delivery. Small-group tutorial and practical work comprise up to two-thirds of timetabled sessions.

Learners are assessed both formatively and summatively by a number of methods, the criteria for each module being published within each specified module guide and assignment briefs.
Formative assessment occurs in various ways throughout the programme and may involve feedback from peers, tutors and individual reflection, seminars, coursework exercises and presentations.
Summative assessment may include coursework exercises, examinations (seen and unseen, open- and closed- book), presentations, and practical assignments.

Intellectual skills, particularly analytical and problem solving skills, are developed using a range of case-studies and problem / task based learning scenarios. Assessment of such activities includes practical simulation and design exercises and individual and group projects, in addition to the methods mentioned above.

The acquisition of appropriate **practical skills** is central to the learning strategy of the programme. All technical themes provide weekly timetabled practical laboratory or PC based sessions, supported by lecturing or other technically qualified staff. The content of these sessions evolves as the student progresses through the course from guided tasks to develop basic practical skills in the use of measurement and test equipment and software tools, through exercises to reinforce the understanding of fundamental principles and techniques, to open-ended mini-projects to give experience of practical modelling, simulation and design of complex systems. Assessment methods include laboratory and design reports, presentations and in-class demonstrations of working hardware and software or simulated designs.

Learners develop **research skills** in module activities and assessments by undertaking a small group project, and two major projects, one individual and one group-work, and completing a related dissertation.

Transferable/key skills are core to the learning and assessment strategy of the programme. They are pervasive, and are incorporated into modules and assessments as appropriate, e.g. team-working skills are fostered and assessed via group, task-based practical projects.

Learners are encouraged to plan their own work schedules and are required to meet deadlines. Reflection and self-awareness are fostered by keeping logbooks of laboratory and design activity and attending tutor interviews in support of personal performance

Programme structure and requirements, levels, modules, credits and awards.

The structure of the course, the modules, levels and credit values, and the awards which can be gained are shown in the diagrams below. The ECTS credit value will be 50% of the credit value under the university's assessment regulations.

MEng Electronic Engineering: Microelectronics Pathway			
Level 7			
GROUP PROJECT (30)		Technology Entrepreneurship (15)	GENERAL OPTION (15)
Applied DSP Pathway Module (15)	IC Architecture Pathway Module (15)	PATHWAY OPTION (15)	PATHWAY OPTION (15)
Level 6			
INDIVIDUAL PROJECT (45)			Project Management and Professional Practice (15)
Digital Signal Processing (15)	Digital Microelectronics Pathway Module (15)	Analogue Microelectronics Pathway Module (15)	Embedded Systems Design Pathway Module (15)
Level 5			
Signals and Systems (15)	Communication Systems (15)	Electronics Project (15)	Embedded Systems (15)
Engineering Mathematics (15)	Data Networks (15)	Analogue Circuit Design (15)	Digital Circuit Design (15)
Level 4			
Professional Development (15)	Engineering CAD (15)	Analogue Electronics Fundamentals (15)	Programming for Engineers (15)
Mathematics for Electronics and Telecommunications (15)	Measurement and Analysis (15)	Electrical Principles (15)	Digital Electronics Fundamentals (15)

MEng Electronic Engineering: Telecommunications Pathway			
Level 7			
GROUP PROJECT (30)		Technology Entrepreneurship (15)	GENERAL OPTION (15)
Advanced IP Networks Pathway Module (15)	Advanced Digital Telecommunications Pathway Module (15)	PATHWAY OPTION (15)	PATHWAY OPTION (15)
Level 6			
INDIVIDUAL PROJECT (45)			Project Management and Professional Practice (15)
Digital Signal Processing (15)	Telecommunications Pathway Module (15)	Network management Pathway Module (15)	Optical Communications Pathway Module (15)
Level 5			
Signals and Systems (15)	Communication Systems (15)	Electronics Project (15)	Embedded Systems (15)
Engineering Mathematics (15)	Data Networks (15)	Analogue Circuit Design (15)	Digital Circuit Design (15)
Level 4			
Professional Development (15)	Engineering CAD (15)	Analogue Electronics Fundamentals (15)	Programming for Engineers (15)
Mathematics for Electronics and Telecommunications (15)	Measurement and Analysis (15)	Electrical Principles (15)	Digital Electronics Fundamentals (15)

Programme Option Modules

There are two types of option modules: Pathway options and General Options. The course structure requires students to choose at least two Pathway options for their chosen route.

Students who have chosen the Microelectronics Pathway will be expected to choose 2 modules from the Microelectronics Pathway options list.

Students who have chosen the Telecommunications Pathway will be expected to choose 2 modules from the Telecommunications Pathway options list.

All students then have a choice of their third option from any of the remaining option modules in the General OR Pathway category. The General Options are designed to add breadth to the course in specific current technologies.

MEng Level 7 Option Modules			
Automotive Electronics and Control Systems (15) MP	Embedded Robotics (15) MP	Audio Electronics Design (15) MP	
Micro Systems Engineering (15) G	Hybrids and Sustainable Technology (15) G		
RF and Microwave Engineering (15) TP	Applied DSP (15) TP	Network Security (15) TP	

MP = Microelectronics Pathway Option
TP = Telecommunications Pathway Option
G = General Option

Examples:

A Telecommunications Pathway student must take a minimum of two TP options, but may choose a third option from the all categories dependent on an appropriate level of knowledge in the chosen option and by agreement with the course tutor for that module.

i.e. TP,TP,TP or TP,TP,G or TP,TP,MP

A Microelectronics student must take a minimum of two MP options, but may choose a third option from the MP, G or TP categories, dependent on an appropriate level of knowledge in the chosen option and by agreement with the course tutor for that module.

MP,MP,MP or MP,MP,G or MP,MP,TP

Support for Learning including Personal Development Planning (PDP)

Students are encouraged and given guidance to identify and reflect on their own learning needs, and are offered the following support as appropriate to meet those needs:

- an induction programme dealing with orientation and the dissemination of essential information, including an introduction to PDP;
- a dedicated Learning Centre with open access learning materials, resources and full-time staff specialising in a variety of support areas;
- a Student Handbook, containing information relating to the University, Faculty, course and modules;
- access to administrative staff and to academic staff, including the Tutors, Course Director and Programme Manager, at reasonable times;
- support staff to advise on pastoral and academic issues, and to offer support and assistance;
- access to Faculty resources, including a range of IT equipment and the services of, and guidance from, IT support staff;
- access to the University's Student Services, including those offered by the careers service, financial advisers, medical centre, disability service, crèche, counselling service and chaplaincy;
- resources for Professional Development Planning (PDP) to enable reflection on learning, performance and achievement and to plan personal, educational and career development. The university offers a range of on-line courses (www.moodle.bcu.ac.uk) to support PDP topics including: Reflection, Career and Employability, Action Planning, Self-awareness and Self-employment.

Criteria for admission

Candidates must satisfy the general admissions requirements of the programme, which are as follows:

A-Level; 280 points. Minimum of two 6-unit or one 12-unit A-Level (GCE or VCE) including AS Mathematics grade C.

National Diploma with Merit, Merit, Distinction. A Distinction in Mathematics for Technicians unit or a Merit in Further Mathematics for Technicians unit.

Advanced Diplomas with Mathematics.

GCSE Mathematics and English grade C or equivalent must be offered.

Irish: 280 points in ILC. Scottish: 280 points from 4 Highers. IB: 29points (Including 8 Highers including Mathematics). BCC Adv. Highers including Mathematics.

Methods for evaluation and enhancement of quality and standards including listening and responding to views of students

The following faculty committees are involved in evaluation and enhancement of quality, standards and student experience: Board of Studies, Faculty Board, Learning and Teaching Committee, Academic Standards and Quality Enhancement Committee.

Review and evaluation processes in which students are involved include annual course and module reviews, course review and re-approval events, professional body accreditation visits and external examiner visits. Mechanisms for student input include meetings with course tutors, feedback questionnaires, faculty and university student satisfaction surveys and representation on the faculty committees referred to above.

External examiners are members of examination boards and their remit includes meeting students and monitoring and reporting on academic standards.