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Programme Specification (UG)

Awarding body / institution:	QMUL and Beijing University of Posts and Telecoms (BUPT)
Teaching institution:	QMUL and BUPT
Name of final award and programme title:	BSc(Eng) Electronic Information Engineering
Name of interim award(s):	
Duration of study / period of registration:	4 years
QMUL programme code / UCAS code(s):	UBNF-BEELEC1/USEIN - H6N8
QAA Benchmark Group:	Engineering, but benchmarks subsumed by UK-SPEC
FHEQ Level of Award :	Level 6
Programme accredited by:	
Date Programme Specification approved:	
Responsible School / Institute:	School of Electronic Engineering & Computer Science

Schools / Institutes which will also be involved in teaching part of the programme:

School of Electronic Engineering & Computer Science

Collaborative institution(s) / organisation(s) involved in delivering the programme:

Beijing University of Post and Telecommunications (BUPT)

Programme outline

The Electronic Information Engineering (EIE) programme is a comprehensive Joint Educational Institute (JEI) programme covering all aspects of multimedia technology in its static, dynamic and connected forms. A particular emphasis is placed on creativity, a key discipline often missing in alternative programmes yet the most important when it comes to applying the technology in practice, e.g. producing 3D animation films and implementing intelligent traffic monitoring systems. This programme is also intended to focus on designing and building more efficient and affordable technology by blending multimedia and the connected world to offer a better world more sustainably.

This programme equips the students with solid engineering foundation and knowledge and skills required for carrying out scientific research and solve complex engineering problems in the field of information communication and multimedia ranging from the collection, processing and visualisation of data and digital signal, to apply machine learning and artificial intelligence on data and systems, to deep learning and computer vision, to 3D Graphics for augmented and virtual reality, and to the information theory and telecommunication systems connecting it to the internet and so on. It incorporates research informed teaching in which students will be involved with the latest and future technologies in electronic information technology and systems.

In addition to the technology, the programme will also include the key skills aspects already incorporated into the other JEI/JP

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programmes that were specifically commended by the QAA, and accredited by the IET.

Aims of the programme

The programme sets out to provide graduates with:
- a solid fundamental knowledge about multimedia, telecommunication, mathematics and computer sciences;
- an understanding of network design, signal processing and network planning principles;
- a knowledge of theory, methodology and techniques for communications network assessment and evaluation;
- a good overall understanding of multimedia theories and their applications as carried across telecommunications networks.

This programme will provide graduates with good employment opportunities covering the field of telecoms, multimedia with scope in the related business and management fields.

It is to bring out the best of both education systems (QMUL and BUPT): the rigour on science and mathematics associated with the Chinese degree and the engineering and transferrable skills emphasised by the UK degree. It also combines the strength of both universities: BUPT's strong tradition of underpinning an engineering education with science and mathematics, and an emphasis on laboratory work and QM's strength in teaching analytical, communication and entrepreneurial skills.

The programme equips the students with good organisational ability, teamwork spirit, excellent self-learning, innovation and entrepreneurship ability. Graduates can carry out scientific research and solve complex engineering problems in the field of information communication and multimedia, and adapt to the international competitive environment. The graduates are prepared for jobs in research and development, engineering design, equipment manufacturing, network operation or technical management in the fields and industries related to electronic information engineering in China and abroad. They can also continue their further study in various related master or PhD programmes.

What will you be expected to achieve?

At the end of his/her degree, each student should be able to demonstrate the following abilities:
• the ability to recall factual knowledge and the ability to apply it in familiar and unfamiliar situations;
• the ability to apply scientific, mathematical and software 'tools' to a familiar or unfamiliar situation;
• the ability to use Information Technology as a key tool pervading all aspects of Telecommunications, Management and Multimedia;
• the ability to understand practical issues concerning real systems (whether hardware or software);
• the ability to recognise insufficient existing knowledge and the ability to search for the necessary scientific, mathematical and software 'tools' relevant to that particular issue;
• the ability to work as part of a team;
• the ability to manage time effectively;
• the ability to appreciate the financial background against which decisions are made in industry;
• the ability to show a certain level of reflection on the role of engineering in society;

and the following skills:
• the perceptive skills needed to understand information presented in the form of technical circuit-diagrams, flow-charts and high-level languages;
• the practical skills needed to implement a piece of hardware or software and to use laboratory test equipment;
• the analytical skills needed to verify the correct behaviour of a hardware or software system or component and to be able to identify faults;
• the design skills needed to synthesise a design (in hardware and/or software) from a specification (including the choice of the best option from a range of alternatives), to implement the design and to evaluate the design against the original specification;
• the written and oral communication skills needed to present information, in particular written information, effectively;
• the critical reasoning skills needed to appraise a particular topic;

Context-based aims and objectives:
• to be able to explain the mathematical principles underpinning the multimedia engineering discipline, such as boolean and linear algebra, Fourier and digital cosine transforms;
• to be able to explain scientific principles such as bit-based image and video encoding;
• to be able to apply engineering knowledge such as network programming, process modelling and human factors to the

multimedia engineering discipline;
• to be able to identify and apply key engineering principles (e.g. from the information theory) to the analysis of important multimedia processes (multimedia content creation, compression, transmission, analysis, etc.);
• to be able to analyse the advantages and limitations of various media for the creation of multimedia content, including virtual and augmented reality, and the effects of image and video coding techniques on media perceived quality;
• to be able to apply quantitative methods and computer software to solve multimedia engineering problems (e.g. processing, compression, segmentation and understanding);
• to be able to demonstrate the use of creativity to design solutions for practical business technology problems, and for the creation of multimedia content in response to a set task;
• to be able to identify issues and legal requirements in the practice of multimedia engineering activities, such as ethical issues and safety (e.g. hearing damage prevention);
• to be able to discuss the need of ethical conduct in the practice of multimedia engineering activities, for example current standards for data and copyright protection;
• to be able to discuss and review codes of practice and multimedia industry standards such as JPEG and MPEG family of standards.
• to be able to discuss and apply latest technology and algorithms in machine learning for solving computer vision problems.

Please note that the following information is only applicable to students who commenced their Level 4 studies in 2017/18, or 2018/19

In each year of undergraduate study, students are required to study modules to the value of at least 10 credits, which align to one or more of the following themes:

- networking

- multi- and inter-disciplinarity

- international perspectives

- enterprising perspectives.

These modules will be identified through the Module Directory, and / or by your School or Institute as your studies progress.

Academic Content:	
A1	Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current and future developments and technologies. This LO is covered in several year 1 and 2 modules of study to provide a solid foundation. Furthermore, year 3 and 4 modules, including multimedia specific modules, cover this LO to reinforce understanding and to appreciate the application of scientific principles.
A2	Knowledge and understanding of mathematical principles necessary to underpin their education in engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems. This LO is covered in many modules across all years of study to understand the fundamentals such as mathematics and physics with particular emphasis being given in years 1 and 2 modules as well as the understanding of the advanced level topics covered in Year 3 and 4 multimedia specific modules.

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A3	Understanding of engineering principles and the ability to apply them to analyse key engineering processes. This LO is covered in several modules with particular emphasis being given in years 3 and 4 multimedia specific nodules enabling students to be able to identify and apply key engineering principles (e.g., from the information theory) to the analysis of important multimedia processes (multimedia content creation, compression, transmission, etc.).
A4	Ability to apply quantitative methods and computer software relevant to the engineering discipline, in order to solve engineering problems. This LO is covered in many modules across all years of study to provide knowledge on quantitative methods and computer software in telecommunications and multimedia through a number of software labs to solve multimedia engineering problems (e.g. processing, compression, segmentation, and classification).
A5	Understanding of a systems approach to engineering problems and to work with uncertainty. This LO is covered in several modules with particular emphasis being given in years 3 and 4 through multimedia-specific modules enabling students to recognise and be able to use a systems approach (e.g. series of encoding processes) to multimedia engineering problems (e.g. video representation and object recognition).
A6	Understand customer and user needs and the importance of considerations such as aesthetics. This LO is covered in several modules to provide marketing research and analysis in order for students to understand customer demands and address the importance of considerations such as aesthetics while enabling students to be able to identify and discuss user needs in the creation of multimedia content.
A7	Awareness of appropriate codes of practice and industry standards. This LO is covered in several modules enabling students to be able to understand Standards for Internet, multimedia Industry Standards such as JPEG and MPEG family of Standards as well as to discuss and review appropriate codes of practice.
A8	Discuss the role of quality management systems and continuous improvement in the context of complex problems. This LO is several modules that enable students to be aware of quality issues, principles of quality systems and their application to the manufacture of engineering products.

Disciplinary Skills - able to:	
B1	Ability to apply and integrate knowledge and understand of other engineering disciplines to support study of their own engineering discipline. This LO is covered by several modules distributed among all years of study offering students to be able to apply engineering knowledge such as network programming, process modelling and human factors to the multimedia engineering discipline.
B2	Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques. This LO is covered in many modules across all years of study to provide concepts of system and components performance, and reinforce understanding through the use of analytical methods and modelling techniques in electronic information systems.

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B3	Investigate and define a problem and identify constraints including environmental and sustainability limitation, health and safety and risk assessment issues. This LO is covered in many modules with particular emphasis being given in years 2 and 3 modules enabling students to be able to analyse and appraise the requirements and constraints of a range of problems related to multimedia content and systems creation and deployment.
B4	Identify and manage cost drivers. Cost drivers are addressed across year 2 to 4 in both business related modules and technical modules.
B5	Use creativity to establish innovative solutions. The creativity to establish innovative solutions is covered in many modules allowing students to be able to demonstrate the use of creativity to design solutions for practical business technology problems, and for the creation of multimedia content in response to a set task.
B6	Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal. This LO is covered by several modules in years 2, 3 and 4 enabling students to be able to demonstrate their ability to ensure fitness for purpose of their productions, during a design and build project, and during the design and production of an interactive multimedia application.
B7	Manage the design process and evaluate outcomes. This LO is covered in several modules across all years of study that cover from software, hardware to wireless networks in telecommunication systems facilitating students to be able to demonstrate their ability to manage the design process and to evaluate their productions during a design and build project and during the design and production of an interactive multimedia application.
B8	Knowledge of characteristics of particular materials, equipment, processes, or products. This LO is addressed by several modules.
B9	Ability to work with technical uncertainty. This LO is covered by several modules addressing more practical perspective of the construction of complex systems allowing students to consider how to mitigate uncertainty, and to develop skills for scenario analysis and ability to identify credible options in Engineering context and also enabling students to be able to demonstrate their ability to analyse various multimedia processing and delivery scenarios and identify the need for novel solutions.

Attributes:	
C1	Knowledge and understanding of commercial and economic context of engineering processes. This LO is covered by several modules across 3 years of study providing students an understanding of the commercial and economic context of electronic information engineering processes.
C2	Knowledge of management techniques that may be used to achieve engineering objectives within that context. This LO is covered by several modules that enable students to understand many management analytic tools which they can apply for decision making, project and operations management to achieve engineering objectives.
C3	Understanding of the requirement for engineering activities to promote sustainable development. This LO is covered by several modules that allow students to understand, e.g., the corporate social responsibilities for sustainable and ethical topics.

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C4	Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk). This LO is covered across several modules addressing, e.g., issues and legal requirements in the practice of multimedia engineering activities, such as ethical issues and safety (e.g. hearing damage prevention).
C5	Understanding of the need for a high level of professional and ethical conduct in engineering. This LO provides an excellent theme that is addressed in several skills development modules.
C6	Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology development, etc). This LO is covered in several modules specifically relating to engineering applications.
C7	Understanding use of technical literature and other information sources. For many modules, this LO is a core part of the learning. Student have access to a vast number of books and electronic journals from which they complement their lectures and reference material for their coursework.
C8	Awareness of nature of intellectual property and contractual issues. This LO is addressed in year 1 modules to make students aware of Intellectual property rights, the issues of patents and their interaction with multimedia standards as well as multimedia content protection issues and so on.

How will you learn?

All taught courses involve lectures, problem solving coursework, laboratory work, case study and independent study. Lectures are used to introduce principles and methods and also to illustrate how they can be applied in practice. Coursework allows students to develop their skills in problem solving and to gain practical experience. Laboratory work provide students with the guidance and help while solving a problem using a wide range of tools and techniques. This allows students to learn-by-doing in order to complement the lectures. QM Graduate Attributes are available for all JEI students to identify students' attributes and develop students' knowledge, skills and behaviour that employers' value.

How will you be assessed?

The assessment of the taught course units takes place through a written examination and practical coursework. Some courses also include in-class tests as a component in assessment.

The final year project is examined on the basis of a written report, a formal oral presentation, and a demonstration of the piece of software or hardware developed by the student. In addition to the final year project, other modules introduce project and group working skills.

How is the programme structured?

Please specify the structure of the programme diets for all variants of the programme (e.g. full-time, part-time - if applicable). The description should be sufficiently detailed to fully define the structure of the diet.

Most modules are shown with a value of 15 credits. This is to simplify the procedure to fit the QM system. EBx modules are actually 44 contact hours instead of 33 so should count for more than 15 credits; BBx modules use Chinese credits that do not map exactly to QM credits. CBx modules are co-delivered by QM and BUPT. Personal Development Plan & Entrepreneurial Skills is marked as a Core module with no credits as it forms part of Engineering Environment which is a mix of QM and BUPT modules. Engineering Environment is worth 15 credits and counts 5% towards the award of Honours.

In addition there are more modules than in a degree in London in order to satisfy Chinese requirements - the module load is not symmetrical across semesters as the technical modules are balanced with the Chinese compulsory modules not shown.
All modules are taught in English and every module must be passed for a degree to awarded (Chinese regulations) - so are all

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shown as core.

The programme has two parts: technical content and compulsory courses. The degree is awarded on the basis of the technical content, but the compulsory part must be passed to get a degree to comply with Chinese MoE requirements.

Only modules shown on the QM transcript counting towards the award of Honours are included; Chinese compulsory courses are not shown in detail, nor are short summer semester modules, but these must all be passed for the award of the degree so a pass/fail module is included to allow that to be handled at QM.

Academic Year of Study   FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
New Horizons English 1	BBC4031	15	4	Core	1	Semester 1
Linear Algebra	BBC4913	15	4	Core	1	Semester 1
Advanced Mathematics 1	BBC4911	15	4	Core	1	Semester 1
Computer Fundamentals and Programming	BBC3502	15	4	Core	1	Semester 1
Personal Development Plan & Entrepreneurial Skills 1	EBC3002	0	3	Core	1	Semesters 1 & 2
New Horizons English 2	BBC4032	15	4	Core	1	Semester 2
Advanced Mathematics 2	BBC4921	15	4	Core	1	Semester 2
Physics D	BBC4923	15	4	Core	1	Semester 2
Introduction to Electronic Systems	BBC4102	15	4	Core	1	Semester 2

Academic Year of Study   FT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Communication Skills 1	BBC4106	5	4	Core	2	Semester 1
Engineering Mathematics 2	BBC4111	15	4	Core	2	Semester 1

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Signals and Systems Theory	BBU4374	15	4	Core	2	Semester 1
Introduction to AI	EBU4203	15	4	Core	2	Semester 1
Data Design	EBU5601	15	5	Core	2	Semester 1
Personal Development Plan & Entrepreneurial Skills 2	EBC4002	0	4	Core	2	Semesters 1 & 2
Communication Skills 2	BBC4107	10	4	Core	2	Semester 2
Introductory Java Programming	EBU4201	15	4	Core	2	Semester 2
Probability Theory and Stochastic Processes	BBC4941	15	4	Core	2	Semester 2
Product Development and Management	EBU5608	15	5	Core	2	Semester 2
Digital Circuit Design	EBU4202	15	4	Core	2	Semester 2
Digital Signal Processing	EBU5376	15	5	Core	2	Semester 2

Academic Year of Study   FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Personal Development Plan & Entrepreneurial Skills 3	EBC5002	0	5	Core	3	Semesters 1 & 2
Machine learning	CBU5201	15	5	Core	3	Semester 1
Multimedia fundamentals	EBU5303	15	5	Core	3	Semester 1
Advanced Transform Methods	EBU6018	15	6	Core	3	Semester 1
Electric and Magnetic Fields	BBC5210	15	5	Core	3	Semester 1

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
Principles of Telecommunication Systems	BBU6302	15	6	Core	3	Semester 1
Software Engineering	EBU6304	15	6	Core	3	Semester 2
Digital Audio fundamentals	EBU5408	15	5	Core	3	Semester 2
Image and Video Processing	EBU6230	15	6	Core	3	Semester 2
Interactive Media Design and Production	EBU6305	15	6	Core	3	Semester 2

Academic Year of Study   FT - Year 4

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester
3D Graphics for Augmented and Virtual Reality	EBU6231	15	6	Core	4	Semester 1
Deep Learning and Computer Vision	EBU6506	15	6	Core	4	Semester 1
Information Theory	BBC6701	15	6	Core	4	Semester 1
Engineering environment (EIE)	EBC6013	15	6	Core	4	Semester 1
Chinese Compulsory Topics	BBF6000	0	6	Core	4	Semester 1
Project	BBC6521	30	6	Core	4	Semesters 1 & 2

What are the entry requirements?

Pass the minimum entry requirements for BUPT. As a national key university, all entrants to BUPT must score above the top line in the Chinese national entrance examinations. In addition, BUPT's requirement is much higher than that and the level is approximately equivalent to the top 2-3% of the population in China of that age group.

How will the quality of the programme be managed and enhanced? How do we listen to and act on your feedback?

The JEI operates an Academic Committee which is responsible under the contract and MoE licence for all matters relating to the delivery of taught programmes at school level including monitoring the application of relevant QM policies and reviewing all proposals for module and programme approval and amendment before submission to Taught Programmes Board. Student views are incorporated in this Committee's work in a number of ways, such as through student membership, or consideration of student surveys.

The JEI operates an Annual Programme Review of the taught undergraduate provision. The process is normally organised with the Director and co-Director of JEI who responsible for the completion of the school's Annual Programme Reviews. Schools/ institutes are required to produce a separate Annual Programme Review for undergraduate programmes using the relevant Undergraduate Annual Programme Review process. Students' views are considered in this process through analysis of the module evaluations and SSLC comments. In addition BUPT conducts a biannual review of all programmes.

The Staff-Student Liaison Committee (SSLC) provides a formal means of communication and discussion between QM and BUPT and JEI students. The committee consists of student representatives from each year in JEI together with appropriate representation from staff within the QM and BUPT. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. SSCLs meet twice a semester.

What academic support is available?

Induction and pastoral support is provided through BUPT. Students are organised into "classes" of 30 as in the usual Chinese model. Each class has a tutor who provides pastoral support. One male and one female tutor sleep on campus every night so there is 24/7 access to pastoral support.

Feedback mechanisms from students are: (i) directly to the lecturers (ii) to their tutor (as described above) and (iii) through an SSLC that meets twice a semester. Because of the large numbers of students, a separate SSLC is held for each cohort.
For every module, whether taught by QM or BUPT, formal office hour or tutorial slots are provided. In addition QM staff can give advice and supervision remotely using a variety of techniques including Skype, MSN and the cloud-based Nefsis conferencing system.

How inclusive is the programme for all students, including those with disabilities?

A specific disabled students support that complies with Chinese law is applied to this programme since the students are physically in China.

Programme-specific rules and facts

The Special Regulations for the JEI apply to this programme.

Links with employers, placement opportunities and transferable skills

There is an industrial advisory committee consisting of senior staff from the Chinese Telecommunications industry. A dedicated Industrial Liaison Manager is part of the JEI team to develop links with industry and industrial projects, to ensure that projects are appropriate and to monitor their progress. A good industrial project provides excellent experience for an engineering

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undergraduate. There is a compulsory internship for all year 3 summer students and frequent invited industry lectures to year 3 and 4 students.

To date the other JP between QMUL-BUPT has a record of 100% employment or PG education. In fact, most JP graduates (>80%) go on to PG education, including directly to PhD research. The JEI expectation would be the same.

Programme Specification Approval

Person completing Programme Specification:

Atm Shafiul Alam

Person responsible for management of programme:

Michael Chai

Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:

Date Programme Specification approved by Taught Programmes Board: