Programme Title: BSc(Eng) Telecommunications Engineering with Management (Telecoms)

Programme Specification

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) Telecommunications Engineering with Management (Telecoms)
Name of Interim Award(s)	
Duration of Study / Period of Registration	4 years
QM Programme Code / UCAS Code(s)	H6N2
QAA Benchmark Group	Engineering, but benchmarks subsumed by UKSPEC
FHEQ Level of Award	Level 6
Programme Accredited by	Institution of Engineering and Technology
Date Programme Specification Approved	
Responsible School / Institute	School of Electronic Engineering & Computer Science

Schools which will also be involved in teaching part of the programme
School of Electronic Engineering & Computer Science

Institution(s) other than Queen Mary that will provide some teaching for the programme
BUPT

Programme Outline

This is a comprehensive programme covering telecommunications underpinned by detailed mathematics and physics background. It includes all aspects from theory across all layers - physical to applications, with particular emphasis on digital and microprocessor systems design, modern wireless techniques, and communication systems electronics which is seen as an important component of the modern telecoms scene and envisaged to be the key enabler for anyone, anything, anytime, anywhere communications. Telecommunications is the strength and raison d'etre of BUPT.

Management is an important component of this programme as all engineers will need some knowledge of this. Essential business management knowledge and skills integrated into this programme prepare students for future careers in telecom and other technology-driven companies at the global level.

In addition to the technology, the programme will also include the key skills aspects already incorporated into the other JP programmes that were specifically recommended by the QAA, and accredited by the IET.

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Aims of the Programme

The programme sets out to provide graduates with:
- a solid fundamental knowledge about 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 telecoms theories and their applications as carried across telecommunications networks.

This programme will provide graduates with good employment opportunities covering the field of telecoms and related business and management. It combines the key skills in which QM excels together with the scientific rigour from BUPT.

What Will You Be Expected to Achieve?

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the following areas:
• 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 and Management;
• 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 telecommunication engineering discipline, such as digital circuit designs, electromagnetic theory, and communication systems;
• to be able to explain scientific principles such as modulation and de-modulation principles within communication systems;
• to be able to apply engineering knowledge such as network programming, process numerical calculations and human factors to the telecommunication engineering discipline;
• to be able to identify and apply key engineering principles (e.g. from the information theory) to the analysis of important telecommunication processes (digital designs, modulation, de-modulation, data transmission, etc.);
• to be able to analyse the advantages and limitations of various principles for analogue and digital system designs and radio propagation channel effects on the received signal quality;
• to be able to apply quantitative methods and computer software to solve telecoms engineering problems (e.g. processing of signals, etc);
• to be able to demonstrate the use of creativity to design solutions for practical business technology problems, and for the creation of telecom system design in response to a set task;
• to be able to identify issues and legal requirements in the practice of telecommunication engineering activities, such as safety issues;
• to be able to discuss the need for ethical conduct in the practice of telecommunication engineering activities, for example,

current standards for data and copyright protection; • to be able to discuss and review codes of practice and telecommunication industry standards.

Academic Content:	
A 1	Apply knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Some of the knowledge will be at the forefront of the particular subject of study. This LO is covered in several modules in years 1 & 2 to provide a solid foundation. Further year 3 and 4 modules, including telecommunications specific modules, also cover this LO to reinforce understanding and to appreciate the application of scientific principles.
A 2	Analyse complex problems to reach substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles. 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. This LO ensures that students are able to explain the mathematical principles underpinning the telecommunication engineering discipline, such as Maxwell's equations, linear algebra, Fourier and digital cosine transforms.
A 3	Select and apply appropriate computational and analytical techniques to model complex problems, recognising the limitations of the techniques employed. This LO is covered in several modules with particular emphasis being given in years 3 and 4, including many telecoms specific modules like Digital Systems Design, Microprocessor Systems Design and Wireless Technologies and Techniques. Students will be able to identify and apply key engineering principles (e. g. from the information theory) to the analysis of important telecoms design and application processes.
A 4	Select and evaluate technical literature and other sources of information to address complex problems. This LO is covered in modules like Introduction to AI, Machine Learning, Broadband Technologies and Fibre Optics.
A 5	Adopt a holistic and proportionate approach to the mitigation of security risks. This LO is covered in Personal Development Plan & Entrepreneurial Skills module.
A 6	Use practical laboratory and workshop skills to investigate complex problems. This LO is covered in modules like Physics, Digital Systems Design and Microprocessor Systems Design. Students will practice and apply their learning in the laboratory environment to solve telecommunications engineering problems.
A 7	Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations. This LO is covered in modules like Broadband Technologies and Fibre Optics, Introduction to AI, and Machine Learning.

Disciplinary Skills - able to:	
B 1	Design solutions for complex problems that meet a combination of societal, user, business and customer needs as appropriate. Students will be able to identify and discuss user needs in the creation of telecommunications engineering content. This will also involve considering some issues like health and safety, cultural environment, etc. This LO is covered in modules like Principles of Telecommunication Systems and Product Development and Management.
B 2	Apply an integrated or systems approach to the solution of complex problems. This LO is covered in many modules across all years of study to provide concepts of systems and components performance and reinforce understanding through the use of analytical methods and modelling techniques in telecommunication systems. Modules like Software Engineering, Microprocessor Systems Design, Advanced Network Programming cover this LO.
B 3	Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts. Students will be able to analyse and appraise the requirements and constraints of a range of problems related to telecoms content and systems creation, and deployment. This LO is covered in modules like Personal Development Plan & Entrepreneurial Skills, Wireless Technologies and Techniques, and Product Development and Marketing.
B 4	Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct. This LO is covered in modules like Personal Development Plan & Entrepreneurial Skills, and Introduction to AI.

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B 5	Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity. This LO is covered in modules like Introduction to AI, and Project.
B 6	Discuss the role of quality management systems and continuous improvement in the context of complex problems. This LO is covered in modules like Product Development and Management and Chinese Compulsory Topics.
B 7	Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights. This LO is covered in modules like Enterprise Management and Business Technology Strategy, where students come across many management analytic tools which they can apply for decision making, project and operations management to achieve engineering objectives.

Attributes:	
C 1	Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion. This LO is covered in Personal Development Plan & Entrepreneurial Skills.
C 2	Function effectively as an individual, and as a member or leader of a team. This learning outcome is covered in modules like Communication Skills, Introduction to AI, Machine Learning, and Enterprise Management.
C 3	Communicate effectively on complex engineering matters with technical and non-technical audiences. This LO is covered in modules like Introduction to Internet of Things, Machine Learning, and Project, where students are expected to demonstrate their design or project findings to technical and non-technical audiences.
C 4	Plan and record self-learning and development as the foundation for lifelong learning/CPD. This LO is covered in modules like Personal Development Plan & Entrepreneurial Skills, Communication Skills, and English Language and Study Skills.

QMUL Model Learning Outcomes - Level 4:	
D 1	

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 allow students to develop their skills in problem-solving and to gain practical experience. Laboratory works 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 JP 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.

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Examinations must contribute at least 70% of the overall marks to satisfy IET Accreditation.

How is the Programme Structured?

Please specify the full time and part time programme diets (if appropriate).

Most modules are shown with a value of 15 credits. This is to simplify the procedure to fit the QM system. EBx modules are normally 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 be awarded (Chinese regulations) - so are all shown as the 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.

QMUL Model

Students are required to undertake the equivalent of one module (15 credits in 2017/18) per year of study which has been identified as meeting the requirements of the QMUL Model. Each of these modules has been designed to combine the best of QMUL's academic excellence with your ability to identify and develop your skills, networks and experience. This will help to ensure you become a graduate who can undertake further study or secure graduate employment in areas that interest you, and will support your ability to position yourself to find the right job or opportunity for you. The relevant module for your first year of study in 2017/18 is indicated below.

Where more than one module is specified, this is because pertinent elements from these modules have been identified as being appropriate to the QMUL Model and when studied together, deliver the equivalent content of one 15-credit QMUL Model module.

The QMUL Model modules for future years and associated Learning Outcomes will be identified as your studies continue.

Should Professional, Statutory and Regulatory Body requirements apply to your programme of study, these will be taken into account in the specification of QMUL Model requirements.

Academic Year of Study FT - Year 1

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
New Horizons English 1	BBC4031	15	4	Core	1	Semester 1	No
Advanced Mathematics 1	BBC4911	15	4	Core	1	Semester 1	No
Linear Algebra	BBC4913	15	4	Core	1	Semester 1	No
Personal Development Plan & Entrepreneurial Skills 1	EBC3002	0	3	Core	1	Semesters 1 & 2	No
Computer Fundamentals and Programming	BBC3502	15	4	Core	1	Semester 1	No
New Horizons English 2	BBC4032	15	4	Core	1	Semester 2	No
Introduction to Electronic Systems	BBC4102	15	4	Core	1	Semester 2	No
Advanced Mathematics 2	BBC4921	15	4	Core	1	Semester 2	No
Physics D	BBC4923	15	4	Core	1	Semester 2	No

Academic Year of Study FT - Year 2

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Engineering Mathematics 2	BBC4111	15	4	Core	2	Semester 1	No
Introduction to AI	EBU4203	15	4	Core	2	Semester 1	No
Signals and Systems Theory	BBU4374	15	4	Core	2	Semester 1	No
Enterprise Management	EBU5402	15	5	Core	2	Semester 1	No
Communication Skills 1	BBC4106	5	4	Core	2	Semester 1	No
Personal Development Plan & Entrepreneurial Skills 2	EBC4002	0	4	Core	2	Semesters 1 & 2	No

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Digital Circuit Design	EBU4202	15	4	Core	2	Semester 2	No
Introductory Java Programming	EBU4201	15	4	Core	2	Semester 2	No
Probability Theory and Stochastic Processes	BBC4941	15	4	Core	2	Semester 2	No
Digital Signal Processing	EBU5376	15	5	Core	2	Semester 2	No
Internet Protocols and Networks	EBU5213	15	5	Core	2	Semester 2	No
Communication Skills 2	BBC4107	10	4	Core	2	Semester 2	No

Academic Year of Study FT - Year 3

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Advanced Network Programming	EBU5042	15	5	Core	3	Semester 1	No
Principles of Telecommunication Systems	BBU6302	15	6	Core	3	Semester 1	No
Digital Systems Design	EBU6335	15	6	Core	3	Semester 1	No
Machine Learning	CBU5201	15	5	Core	3	Semester 1	No
Electric and Magnetic Fields	BBC5210	15	5	Core	3	Semester 1	No
Personal Development Plan & Entrepreneurial Skills 3	EBU5002	0	5	Core	3	Semesters 1 & 2	No
Microwave, Millimeterwave and Optical Transmission	EBU6366	15	6	Core	3	Semester 2	No
Software Engineering	EBU6304	15	6	Core	3	Semester 2	No
Product Development and Marketing	EBU5606	15	6	Core	3	Semester 2	No

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Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Microprocessor Systems Design	EBU6475	15	6	Core	3	Semester 2	No

Academic Year of Study FT - Year 4

Module Title	Module Code	Credits	Level	Module Selection Status	Academic Year of Study	Semester	QMUL Model
Project	BBC6521	30	6	Core	4	Semesters 1 & 2	No
Engineering Environment (Telecom)	EBC6010	15	6	Core	4	Semester 1	No
Chinese Compulsory Topics	BBF6000	0	6	Core	4	Semester 1	No
Business Technology Strategy	BBU6031	15	6	Core	4	Semester 1	No
Wireless Technologies and Techniques	EBU6410	15	6	Core	4	Semester 1	No
Broadband Technologies and Fibre Optics	EBU6409	15	6	Core	4	Semester 1	No

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 Do We Listen and Act on Your Feedback?

The Staff-Student Liaison Committee (SSLC) provides a formal means of communication and discussion between QM and BUPT and JP students. The committee consists of student representatives from each year in JP 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.

The JP 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.

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The JP operates an Annual Programme Review of the taught undergraduate provision. The process is normally organised with the Director and co-Director of JP, who are 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.

Academic Support

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.

Programme-specific Rules and Facts

The Special Regulations for the JP apply to this programme.

Specific Support for Disabled Students

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

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 JP 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 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 JP has a record of 100% employment or PG education. In fact, most JP graduates (>80%) go on to PG education.

Programme Specification Approval

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Person completing Programme Specification	Md Hasanuzzaman Sagor
Person responsible for management of programme	Michael Chai
Date Programme Specification produced/amended by School Learning and Teaching Committee	
Date Programme Specification approved by Taught Programmes Board	

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