<table>
<thead>
<tr>
<th>Programme title:</th>
<th>MSc in Telecommunications with Business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final award (BSc, MA etc):</td>
<td>MSc</td>
</tr>
<tr>
<td>(where stopping off points exist they should be detailed here and defined later in the document)</td>
<td></td>
</tr>
<tr>
<td>UCAS code:</td>
<td>N/A</td>
</tr>
<tr>
<td>(where applicable)</td>
<td></td>
</tr>
<tr>
<td>Cohort(s) to which this programme specification is applicable:</td>
<td>From 2013 onwards</td>
</tr>
<tr>
<td>(e.g. from 2008 intake onwards)</td>
<td></td>
</tr>
<tr>
<td>Awarding institution/body:</td>
<td>University College London</td>
</tr>
<tr>
<td>Teaching institution:</td>
<td>University College London</td>
</tr>
<tr>
<td>Faculty:</td>
<td>Engineering Sciences</td>
</tr>
<tr>
<td>Parent Department:</td>
<td>Electronic and Electrical Engineering</td>
</tr>
<tr>
<td>(the department responsible for the administration of the programme)</td>
<td></td>
</tr>
<tr>
<td>Departmental web page address:</td>
<td><a href="http://www.ee.ucl.ac.uk/masters/msc-telecoms-with-business">http://www.ee.ucl.ac.uk/masters/msc-telecoms-with-business</a></td>
</tr>
<tr>
<td>(if applicable)</td>
<td></td>
</tr>
<tr>
<td>Method of study:</td>
<td>Full Time or Part Time</td>
</tr>
<tr>
<td>Criteria for admission to the programme:</td>
<td>The entry requirements will be equal or above the college requirements: normally a second class degree or equivalent in a relevant subject. In appropriate cases, students without a relevant degree qualification will be considered if they have sufficient proven experience at managerial level within the industry.</td>
</tr>
</tbody>
</table>
| **Length of the programme:**  
| (please note any periods spent away from UCL, such as study abroad or placements in industry) | **Full-time options :** (a) One calendar year  
|  
| **Part-time Flexible :** Up to five calendar years in total of part-time study.  
|  
| **Level on Framework for Higher Education Qualifications (FHEQ)**  
| (see Guidance notes) | 7  
|  
| **Relevant subject benchmark statement (SBS)**  
| (see Guidance notes) | [http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Engineering10.pdf](http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Engineering10.pdf)  
|  
| **Telecommunications Engineering** is concerned with developing, providing and maintaining infrastructure, products, processes and services for society. Telecommunications Engineering addresses the complete life-cycle of a digital or analogue telecommunications system, process or service, from conception, through design and manufacture, to decommissioning and disposal, within the constraints imposed by economic, legal, social, cultural and environmental considerations. Telecommunications Engineering relies on three core elements, namely scientific principles, mathematics and 'realisation'. Scientific principles clearly underpin all engineering, while mathematics is the language used to communicate parameters, model and optimise solutions. Realisation encapsulates the whole range of creative abilities, which distinguish the engineer from the scientist; to conceive, make and actually bring to fruition something which has never existed before. This creativity and innovation to develop economically viable and ethically sound sustainable solutions is an essential and distinguishing characteristic of engineering, shared by the many diverse, established and emerging disciplines within engineering. In addition to the engineering aspects above, the telecommunications industry needs managers who understand the principles of the strategic, financial and planning dimensions of the build and operations of networks and services. This set of skills covers the ability to construct and present credible justification for network expenditure to provide equipment upgrade, replacement or capacity increase in the form of business cases. Apart from the financial, regulatory, marketing and product specification for such upgrades, the managers need to be able to build and define capital programmes – often amounting to tens of millions of pounds. Finally the potential managers emerging from this TwB programme will have the full understanding of how to balance costs and service revenues in the context of a highly competitive, global business, in which the technology options – as well as commercial models – are rapidly changing.  
|  
|  
| The UK Standard for Professional Engineering Competence (2010) sets out five main areas of competence expected for Chartered Engineers, each covering a number of different aspects:  
| A. Use of general and specialist engineering knowledge and understanding  
| B. Application of appropriate theoretical and practical methods  
| C. Technical and commercial leadership and management  
| D. Effective interpersonal and communication skills  
| E. Commitment to professional standards and recognition of obligations to society, the profession and the environment.  
|
Brief outline of the structure of the programme and its assessment methods:

(see guidance notes)

All modules are taught in an intensive one week lectures (6 hours per day for 4 days) and presentations. A week of self-study is allowed after the module teaching finishes and this is followed by a 3-4 hour discussion and tutorial session. Modules are assessed within two to four weeks of the tutorial session.

All students will take eight taught modules, including one compulsory taught technical module (ITN). And four compulsory taught business modules (B1 to B4). The other three taught modules are optional technical modules chosen by the student according to their particular interest.

<table>
<thead>
<tr>
<th>Module</th>
<th>Credit Weighting</th>
<th>Assessment</th>
<th>Pre-requisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>15</td>
<td>Exam or assignment</td>
<td>none</td>
</tr>
<tr>
<td>T2</td>
<td>15</td>
<td>Exam or assignment</td>
<td>none</td>
</tr>
<tr>
<td>T3</td>
<td>15</td>
<td>Exam or assignment</td>
<td>none</td>
</tr>
<tr>
<td>T4</td>
<td>15</td>
<td>Exam or assignment</td>
<td>none</td>
</tr>
<tr>
<td>B1</td>
<td>15</td>
<td>Assignment</td>
<td>must be 1st B module</td>
</tr>
<tr>
<td>B2</td>
<td>15</td>
<td>Exam</td>
<td>must be 2nd B module</td>
</tr>
<tr>
<td>B3</td>
<td>15</td>
<td>Assignment after B1 &amp; B2</td>
<td>after B1 &amp; B2</td>
</tr>
<tr>
<td>B4</td>
<td>15</td>
<td>Assignment after B1 &amp; B2</td>
<td>after B1 &amp; B2</td>
</tr>
<tr>
<td>P</td>
<td>60</td>
<td>Written dissertation (80%) plus viva (20%)</td>
<td>must be last</td>
</tr>
</tbody>
</table>

Notes:
1) B1 to B4 are mandatory for the MSc Degree;
2) T1 to T4 are four technical modules selected from the Telecoms existing module portfolio.

Business Modules

Module B1: Strategy, Marketing and the Business Environment
5 days teaching followed by private study assessed by an assignment. (15 credits)

Module B2 Finance and Product Management
5 days teaching followed by an assessed an unseen written examination. (15 credits)

Module B3: Customer Service, Operations and Planning
5 days teaching followed by private study assessed by an assignment. (15 credits)

Module B4: Organisational Design, People and Innovation Management
5 days teaching followed by an assignment. (15 credits)

Technical Modules

Modules T1 to T4: All these modules are 4 days teaching (15 credits) and are taken from the existing MSc portfolio MSc Telecoms. The allowed selection is as follows:

Compulsory: ITN
Introduction to Telecommunications Network (15 Credits EXAM 2 ½ hours)

Optional:
Any three of:
1) Mobile Communications Systems (MCS) - 15 Credits EXAM 2 ½ hours
2) IP Networks (IPN) - 15 Credits EXAM 2 ½ hours
3) Next Generation Networks (NGN) - 15 Credits Assignment <5,000 words
4) Interactive Multimedia Systems (IMS) - 15 Credits EXAM 2 ½ hours
5) Network Planning and Performance (NPO) - 15 Credits Assignment <5,000 words
6) Network and Services Management (NSM) - 15 Credits EXAM 2 ½ hours

Module P: Research Project and Dissertation
18-20 weeks of supervised study assessed by viva and written report (max 15,000 words) (60 credits)
EDUCATIONAL AIMS OF THE PROGRAMME:

1. The Programme aims to provide students with a 360 degree view of how an ICT and telecommunications business is managed. This is achieved by starting with the concepts of strategy and business planning and macro-economics and regulation, then looking at financial and accounting management. Marketing and product management is then addressed with specific application to the ICT and Telecommunications business.

2. An important part of the education is the introduction of the basics of telecommunication technology and how networks are formed, together with the mapping of products and services to the networks. Emphasis is placed on the operational and planning aspects of dimensioning and running ICT systems and networks. Finally, the management of technology and innovation, skills training, organisational design and staff resource planning are addressed.

3. The student intake will be comprehensive from a variety of companies, based in the UK and abroad, with a range of disciplines (e.g. engineering, marketing, sales, finance, strategy, customer service, regulatory, legal, and HR). Hence, the education aims of the Programme are twofold: firstly, for each student to gain an understanding of the principles and current issues involved in areas outside their speciality or job area; and secondly, for students to understand how all the various threads (described above) need to inter-relate in order to run a successful ICT and Telecommunications business. In addition to the use of lecturers from UCL and other recognised academic institutions including Business Schools, extensive use will be made of guest speakers who are practicing managers from the industry.

4. The business models will also use a range of teaching formats including syndicate working, pre-reading and private investigation to allow students to associate the taught principles and techniques with their own experiences in the job. Students will also be given the opportunity to share their experiences in their syndicate groups and the full cohort, as appropriate.
INTENDED LEARNING OUTCOMES:
The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas.

Knowledge and understanding - Graduates will be able to
- Apply business and management techniques that are relevant to Telecommunications engineering.
- Explain the role of telecommunications in society and the constraints within which their engineering judgement will be exercised.
- Understand the professional and ethical responsibilities of Telecommunications engineers.
- Appreciate the national and international role of a Telecommunications systems engineer and the impact of related engineering solutions in a global context.
- Demonstrate a systematic understanding of knowledge, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of their academic discipline, field of study or area of professional practice.

Skills and other attributes – Graduates will be able to
- Deal with complex technical, financial and commercial issues both systematically and creatively, make sound judgments in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences.
- Demonstrate self-direction and originality in tackling and solving problems and act autonomously in planning and implementing tasks at a professional or equivalent level.
- Have the qualities and transferrable skills necessary for employment in circumstances requiring the independent learning ability required for continuing professional development, the exercise of initiative and personal responsibility, and decision-making and sound judgment in complex and unpredictable situations.
- Apply appropriate theoretical and practical methods to the analysis and solution of business problems
- Apply advanced knowledge in certain areas as appropriate to programme options chosen,
- Work effectively in communications business-based individual and group assignments.
- Explain in depth the managerial and economic factors facing a professional Telecommunications executive.
- Discuss, analyse and make sound decisions on the development of ICT systems, taking into consideration complex compromises between technology, regulatory constraints and financial aspects.
- Construct sound and well-justified arguments when making design decisions for ICT enterprises and being able to present such arguments to groups of technical and business experts.
Intellectual skills – Graduates will be able to

- Demonstrate a comprehensive understanding of techniques applicable to their own research or advanced scholarship.
- Demonstrate originality in the application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in the discipline.
- Show originality in tackling and solving problems.
- Understand how the boundaries of knowledge are advanced through research.
- Demonstrate a conceptual understanding that enables the student to evaluate critically current research and advanced scholarship in the discipline.
- Demonstrate a conceptual understanding that enables the student to evaluate methodologies and develop critiques of them and, where appropriate, to propose new hypotheses.
- Be creative in the solution of problems and in the development of designs.
- Formulate and test hypotheses modifying the hypotheses depending on the data obtained.

Characteristics – MSc in Telecommunications with Business Graduates will

- Be rational and pragmatic, interested in the practical steps necessary for a concept to become reality.
- Be able to construct a well formulated business case based on sound technical and commercial principles.
- Strive to achieve sustainable solutions to problems and have strategies for being creative, innovative and overcoming difficulties by employing their knowledge in a flexible manner.
- Be numerate and highly computer literate, and capable of attention to detail.
- Be cost and value-conscious, and aware of the social, cultural, environmental, health and safety, and wider professional responsibilities they should display.
- Appreciate the international dimension to engineering, commerce and communication.
- When faced with an ethical issue be able to formulate and operate within appropriate codes of conduct.
- Adopt a professional outlook, capable of team working, effective communicators, and able to exercise responsibility.

The detailed differences between the various specialised degree programs can be found in the Program Structure section at the end of this document.
**PROGRAMME OUTCOMES:**

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

### A: Knowledge and understanding

#### Knowledge and understanding of:

- Principles of Macro-economics, strategy formulation, and business planning.
- Principles of financing and accounting management.
- Principles of marketing, sales, product & portfolio management.
- Principles of networks, telephony, Internet and Telecommunications Systems, and communications technologies.
- Principles of technology management, R&D, innovation, patents policies.
- Principles of network planning & relation to business planning, support systems, service & network management, operational & network economics.
- Principles of HR management, skills planning, motivation, organisational design, change management.
- The global context, the inter-relation of political, customer, technology & regulatory drivers in the USA compared to rest of the World.

**Specific topics include:**

- Telecommunications Systems
- Mobile and wireless systems
- Communications technologies
- Network Design and Planning
- Data Networks and Architectures
- Next Generation Networks
- Strategic analysis
- Financial analysis
- Commercial analysis
- Research techniques

#### Teaching/learning methods and strategies:

- The main teaching and learning methods are based on the use of intensive, 4-5 day lecture based courses supported by tutorials, and private study.
- Each module is supported by a three-hour tutorial session where the module content is discussed and where discussions are based on the material taught and at least one full week of individual study and problem/exercise solving.
- Some modules include seminars and workshops to support the students.
- Most modules include an invited industrial lecture.
- Discussion forums and supplementary learning material provided through a virtual learning environment.
- Individual one-to-one regular tuition sessions during the project work. These include detailed technical discussions plus teaching of research methods.
### Assessment:
- Assessment is usually carried out three to four weeks after module teaching.
- Core modules are assessed by unseen written exam.
- Assessment methods of optional modules depend on the module taken where assessment is by exam, assignment or a mix of the two.

### B: Skills and other attributes

#### Intellectual (thinking) skills:
The course aim to develop in the students the following intellectual skills:

- Develop a holistic approach to the design of business processes associated with telecommunication and ICT services.
- Use knowledge of communications engineering fundamentals to design and specify components or subsystems within the network.
- Apply knowledge of communications principles to synthesise new concepts and generate research ideas.
- Apply knowledge of business strategy and ICT technologies to analysis of complex real world problems encompassing design, commercial and business limitations and industrial requirements. Critical assessment and analysis of current research and research methodologies in telecommunications business.

#### Teaching/learning methods and strategies:
- The primary teaching methods will be through Lectures, tutorials and seminars within the associated modules.
- Intellectual skills will be reinforced and strengthened significantly throughout the process of the course and especially project.
- Specific lectures on research methods are given.
- Critical assessment of research literature and methodologies is supported through workshops and seminars (several occasions during the year).

#### Assessment:
- Assignments and exams including design exercises within modules.
- Specific Assignments include aspects of critical assessments of the literature and of "others" designs and systems.
- The output of these skills will also be assessed in the research project, which is assessed by dissertation.
### C: Skills and other attributes

#### Practical skills (able to):

**Note:** In the technical modules a number of practical design skills will be developed. In the business modules a range of strategic, financial and business analysis skills will be developed.

- Use mathematical and computer based tools for engineering and financial modelling.
- Communicate effectively in writing and through presentations.
- Practice research techniques in a specialised research topic.
- Analyse the results of survey or other investigation.
- Present a well reasoned argument to senior management in effective manner.
- Analyse customer requirements and formulate appropriate responses.
- Discuss, analyse and make sound decisions on the development of ICT systems, taking into consideration complex compromises between technology, regulatory constraints and financial aspects.
- Construct sound and well-justified arguments when making design decisions of ICT systems and being able to present such arguments to groups of technical and business experts.

#### Teaching/learning methods and strategies:

- Team projects and group discussions (with syndicate working).
- The primary teaching method used in the research project is direct supervision by a member of academic staff with support of a second assessor.

#### Assessment:

- Exams and Assignments within the modules and the dissertation.
<table>
<thead>
<tr>
<th>Transferable skills (able to):</th>
<th>Teaching/learning methods and strategies:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The programme will enable students to:</td>
<td>These skills will be promoted through the dissertation</td>
</tr>
<tr>
<td>- Learn complex topics independently.</td>
<td>The main mode of teaching and learning for many of these skills will be the direct supervision of their research project by a member of academic staff. This interaction will focus on the development of skills (a-e).</td>
</tr>
<tr>
<td>- Work on new topics demonstrating initiative and creativity.</td>
<td></td>
</tr>
<tr>
<td>- Write well-structured complex reports.</td>
<td></td>
</tr>
<tr>
<td>- Write brief reports and executive summaries of complex arguments.</td>
<td></td>
</tr>
<tr>
<td>- Present work to an audience with mixed knowledge and skills.</td>
<td></td>
</tr>
<tr>
<td>- Use appropriate resources and citation methods.</td>
<td></td>
</tr>
<tr>
<td>- Provide a critical assessment of their own work and that of others.</td>
<td></td>
</tr>
<tr>
<td>- Make a contribution to the research topic by following through their ideas.</td>
<td></td>
</tr>
<tr>
<td>- Critical assessment of own work.</td>
<td></td>
</tr>
<tr>
<td>- Group work and team skills.</td>
<td></td>
</tr>
<tr>
<td>- Time management and organisational skills.</td>
<td></td>
</tr>
<tr>
<td>- write a well structured dissertation.</td>
<td></td>
</tr>
<tr>
<td>- use appropriate resources and citation methods.</td>
<td></td>
</tr>
<tr>
<td>- study and evaluate a variety of research material of a kind that they will not have used as undergraduates.</td>
<td></td>
</tr>
<tr>
<td>- provide a critical assessment of their own work and that of others.</td>
<td></td>
</tr>
<tr>
<td>- make a contribution to the research topic by following through their ideas.</td>
<td></td>
</tr>
</tbody>
</table>
## Assessment:

- The writing skills are assessed through assignments and the different elements of project assessment (executive summary and final dissertation).
- Presentation skills are assessed as part of the project work.

The following reference points were used in designing the programme:

- the relevant Subject Benchmark Statements ([http://www.qaa.ac.uk/AssuringStandardsAndQuality/subject-guidance/Pages/Subject-benchmark-statements.aspx](http://www.qaa.ac.uk/AssuringStandardsAndQuality/subject-guidance/Pages/Subject-benchmark-statements.aspx));
- the programme specifications for UCL degree programmes in relevant subjects (where applicable);
- UCL teaching and learning policies;
- staff research.

### Please note:
This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each course unit/module can be found in the departmental course handbook. The accuracy of the information contained in this document is reviewed annually by UCL and may be checked by the Quality Assurance Agency.

### Programme Organiser(s)

| Name(s): | Dr Clive Poole (Course Director)  
|          | Prof Andy Valdar (Deputy Course Director)  
|          | Professor Izzat Darwazeh (Postgraduate Tutor) |

### Date of Production:
12th November 2013

### Date of Review:
October 2018

### Date approved by Head of Department:
November 2013

### Date approved by Chair of Departmental Teaching Committee:
November 2013

### Date approved by Faculty Teaching Committee:
November 2013
MSc in Telecommunications with Business:

PROGRAMME STRUCTURE – 2014-15

General

The diagram below details the core, compulsory and the optional modules available for the MSc in Telecommunications with Business. Please see Section 3 below for module acronym definitions. Each module comprises 15 UCL Credits. The dissertation project comprises 60 UCL Credits and 180 UCL Credits are required for the award of the MSc in Telecommunications. The Scheme of Award description is given in Section 4 below.

1. Module Selection

<table>
<thead>
<tr>
<th>Core Modules</th>
<th>ITN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research Project / Dissertation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compulsory Modules</th>
<th>B1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B2</td>
</tr>
<tr>
<td></td>
<td>B3</td>
</tr>
<tr>
<td></td>
<td>B4</td>
</tr>
</tbody>
</table>

| Optional Modules (students can choose 3 out of 6) | MCS                 |
|                                                  | NGN                 |
|                                                  | IPN                 |
|                                                  | NPO                 |
|                                                  | IMS                 |
|                                                  | NSM                 |

2. Dissertation Project

The research project represents an important part of the MSc in Telecommunications with Business degree. Not only does the project dissertation represent one third of the final mark, but the project work offers a unique opportunity to focus on a problem with enough depth to write a professional document about it. Projects are allocated in March and students start working on their projects in April. Full time work is done on projects for 4 months (May to end of year in September).

Most student projects involve primary research by the student, where primary research data is collected and analysed to shed new light of a particular topic related to the contemporary telecommunications business environment. We have an active programme of industrial sponsorship of projects, whereby the industrial partner proposes and co-supervises the project, but does not take part in the assessment.
3. Module Definitions

Below are definitions of all of the modules along with the module leader (2013-2014 session).

**ITN - Introduction to Telecommunications Networks**
Module Leader – Professor Izzat Darwazeh

**Module B1 - Strategy, Marketing and the Business Environment**
Module Leader – Ian Morfett

**Module B2 - Finance and Product Management**
Module Leader – Keith Carrington

**Module B3 - Customer Service, Operations and Planning**
Module Leader – Prof. Andy Valdar

**Module B4 - Organisational Design, People and Innovation Management**
Module Leader – Dr Clive Poole

**IPN - Introduction to IP Networks**
Module Leader – Dr Miguel Rio

**MCS – Mobile Communications Systems**
Module Leader – Professor Izzat Darwazeh

**NPO – Network Planning and Operations**
Module Leader – Professor Andy Valdar

**NGN – Next Generation Networks**
Module Leader – Dr Clive Poole

**NSM – Network and Services Management**
Module Leader – Professor George Pavlou

**IMS – Internet Multimedia Systems**
Module Leader – Dr Ioannis Andreopoulos

3. Scheme of Award and Award Categories

The criterion for passing and obtaining a Distinction in this programme is the following.

For the award of the MSc degree students must have completed 180 UCL credits and passed at least 75% of taught modules with a pass mark of 50%. A maximum of 25% of a programme’s taught element, excluding the dissertation, may be condoned at 40 – 49%.

**Pass:** Students must obtain an average of at least 50% across all taught modules (with not more than 2 marks condoned (40% < 49%), and at least 50% in the Research Project.

**Merit:** An award of Merit will be made where: the overall mark, based on 180 credits, is 60% or greater and the mark for the dissertation is 65% or greater and there are no marks below 50%, no condoned marks, no re-sits, and all marks are based on first attempts.

**Distinction:** The criteria for the award of a distinction are that the mark for the dissertation is 70% or more, and the overall weighted mark (combining the taught elements and the dissertation) is 70% or greater and there are no marks below 50%, no condoned marks, no re-sits, and all marks are based on first attempts.