

**MSc Communications and Signal Processing**

This document provides a definitive record of the main features of the programme and the learning outcomes that a typical student may reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities provided. This programme specification is intended as a reference point for prospective students, current students, external examiners and academic and support staff involved in delivering the programme and enabling student development and achievement.

**Programme Information**

Award(s)	MSc			
Programme Title	Communications and Signal Processing			
Programme Code	H6U8			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Engineering			
Department	Department of Electrical and Electronic Engineering			
Associateship	City and Guilds of London Institute (ACGI)			
Mode and Period of Study	1 calendar year full-time (12 months)			
Cohort Entry Points	Annually in October			
Relevant <a href="#">QAA Benchmark Statement(s)</a> and/or other external reference points	<a href="#">Master's Degree in Engineering</a>			
Total Credits	ECTS:	90	CATS:	180
<a href="#">FHEQ Level</a>	Level 7			
<a href="#">EHEA Level</a>	2 <sup>nd</sup> cycle			
External Accrator(s)	<a href="#">Institution of Engineering and Technology</a>			

**Specification Details**

Student cohorts covered by specification	2016-17 entry
Person responsible for the specification	Dr Javier A. Barria
Date of introduction of programme	1975/1976
Date of programme specification/revision	June 2016

## Description of Programme Contents

This degree provides you with in-depth knowledge and critical awareness of theoretical and practical solutions to problems at the forefront of communications and the processing of signals.

Communications and signal processing are closely intertwined, and together provide the basis of modern information engineering. Areas of application include:

- mobile communications (3G/4G/LTE and future 5G), access networks and wireless communication
- communication networks including broadcast and computing communication networks
- image processing and robotic vision
- audio and video recording
- radar and sonar detection
- biomedical signal processing
- medical imaging
- remote sensing
- array signal processing and beamforming
- space-time communications and processing

## Learning Outcomes

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial College degree programme. The Graduate Attributes are available at: [www.imperial.ac.uk/students/academic-support/graduate-attributes](http://www.imperial.ac.uk/students/academic-support/graduate-attributes)

### Knowledge and Understanding of:

1. Fundamental and advanced principles of digital signal processing;
2. Fundamental and advanced principles of communications;
3. Contemporary analytical methods of digital signal processing and communications systems;
4. A wide variety of specialised topics as represented in optional course modules and variety of dissertation projects;
5. Effective use of computer-based simulations tools and hardware-based test equipment;
6. Research methods, including literature search, report writing, presentation skills;
7. Project management and communication skills including problem definition, project design, execution and reporting.

### Intellectual Skills – able to:

1. Develop model-based thinking for systems and specifications;
2. Perform hierarchical abstractions during analysis and synthesis;
3. Integrate and evaluate information from a variety of sources, and apply theoretical foundations and practical constraints to solve communications and/or signal processing problems;
4. Formulate and test hypotheses
5. Be creative in the solution of problems and in the development of hypotheses;
6. Plan, conduct and write-up a programme original research.

### Practical Skills – able to:

1. Analyse and design digital signal processing systems and communication systems;

2. Employ appropriate software tools and/or hardware test equipment in the design of the digital signal processing circuits and communication systems;
3. Use laboratory equipment to generate data;
4. Analyse experimental results and determine their strength and validity;
5. Prepare technical reports including the main individual project dissertation;
6. Produce posters and deliver technical presentations;
7. Use scientific literature effectively.

**Transferable skills – able to:**

1. Communicate effectively, as a result of clear and precise thinking, using presentations and written reports;
2. Apply know-how and skills previously obtained to new problems;
3. Formulate problem definitions and evaluate solutions using objective criteria;
4. Integrate and evaluate information from a variety of sources;
5. Figure out how techniques and solutions from one research discipline could be transferred to another research discipline;
6. Use ICT technologies effectively and appropriately;
7. Manage resources and time;
8. Learn independently with open-mindedness and critical enquiry;
9. Learn effectively for the purpose of continuing professional development.

**Entry Requirements**

Academic Requirement	A high first class (1st) Honours degree (75%+) in electrical engineering or a related subject.
Non-academic Requirements	Not applicable
UK/EU/International candidates are not required to attend an interview.	
English Language Requirement	IELTS 6.5 with a minimum of 6.0 in each element or equivalent
The programme's competency standards document can be found at: <a href="http://www.imperial.ac.uk/electrical-engineering/study/undergraduate/applicants-with-disabilities/">http://www.imperial.ac.uk/electrical-engineering/study/undergraduate/applicants-with-disabilities/</a>	

**Learning & Teaching Strategy**

Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"> <li>• Lectures and seminars</li> <li>• Problem solving classes</li> <li>• Tutorial sessions</li> </ul>
E-learning & Blended Learning Methods	<ul style="list-style-type: none"> <li>• Hardware laboratory</li> <li>• Software laboratory</li> </ul>
Project and Placement Learning Methods	<ul style="list-style-type: none"> <li>• Group projects</li> <li>• Individual projects</li> <li>• Industrial placement (optional)</li> </ul>

**Assessment Strategy**

Assessment Methods	<ul style="list-style-type: none"> <li>• Written examinations</li> <li>• Coursework software or hardware deliverable</li> <li>• Oral and poster presentations</li> <li>• Reports</li> <li>• Individual Research Project</li> </ul>
Academic Feedback Policy	
Feedback to all submitted coursework is expected within two weeks	
<p><b>Mechanisms for providing prompt feedback to students on their performance in course work and examinations and processes for monitoring that these named processes are effective:</b></p> <ul style="list-style-type: none"> <li>• All coursework is promptly marked</li> <li>• Meeting of individual students with course directors to discuss exams, research project and career aims</li> <li>• General remarks are communicated by broadcast emails to all Course students</li> <li>• More details given to representatives in the Staff – Student Committee</li> <li>• Course questionnaire evaluation of taught components</li> </ul>	
Re-sit Policy	
The College’s Policy on Re-sits is available at: <a href="http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/">http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/</a>	
Mitigating Circumstances Policy	
The College’s Policy on Mitigating Circumstances is available at: <a href="http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/">http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/</a>	
<b>Assessment Structure</b>	
Marking Scheme	
<p><b>Final Degree Classification</b> A student will be awarded the highest grade of MSc for which the following conditions are satisfied:</p> <p><b>MSc</b></p> <ol style="list-style-type: none"> <li>1. At least 40% for each of the 8 modules counted for the computation of the examinations average</li> <li>2. At least 50% for the laboratory average</li> <li>3. At least 50% for both the project and examinations average</li> </ol> <p><b>MSc with Merit</b></p> <ol style="list-style-type: none"> <li>1. At least 40% for each of the 8 modules counted for the computation of the examinations average</li> <li>2. At least 50% for the laboratory average</li> <li>3. At least 60% for both the project and examinations average</li> </ol> <p><b>MSc with Distinction</b></p> <ol style="list-style-type: none"> <li>1. At least 40% for each of the 8 modules counted for the computation of the examinations average</li> <li>2. At least 50% for the laboratory average</li> </ol>	

3. At least 70% for both the project and examinations average.

Module Weightings	
Module	% Module Weighting
Digital Signal Processing and Digital Filters	N/A
Advanced Communication Theory	N/A
Probability and Stochastic Processes	N/A
S1 Lab	N/A
Spectral Estimation and Adaptive Signal Processing	N/A
4 x modules from elective group (A)*	N/A
Individual Research Project	N/A

**\*Please note that if you opt to take five modules from elective group (A), only the best four modules will be included when calculating the final degree classification.**

Indicative Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course- work	% Practical	FHEQ Level	ECTS
EE9-SC1	Digital Signal Processing and Digital Filters	CORE	20	105	0	125	100%	0%	0%	7	5
EE9-SC2	Advanced Communication Theory	CORE	19	106	0	125	85%	15%	0%	7	5
EE9-SC3	Probability and Stochastic Processes	CORE	30	95	0	125	85%	15%	0%	7	5
EE9-SC4	Adaptive Signal Processing and Machine Intelligence	CORE	20	105	0	125	0%	100%	0%	7	5
EE9S.LAB	S1 Lab	CORE	90	160	0	250	0%	100%	0%	7	10
EE9-SPRJ	Individual Research Project	CORE	0	1000	0	1000	0%	100%	0%	7	40
EE9-SO7	Traffic Theory & Queuing Systems	ELECTIVE (A)	20	105	0	125	100%	0%	0%	7	5
EE9-SO9	Optical Communication	ELECTIVE (A)	20	105	0	125	100%	0%	0%	7	5
EE9-SO11	Coding Theory	ELECTIVE (A)	20	105	0	125	100%	0%	0%	7	5
EE9-SO14	Digital Image Processing	ELECTIVE (A)	20	105	0	125	100%	0%	0%	7	5
EE9-SO16	Speech Processing	ELECTIVE (A)	22	103	0	125	100%	0%	0%	7	5
EE9-SO20	Information Theory	ELECTIVE (A)	20	105	0	125	100%	0%	0%	7	5
EE9-SO22	Wavelets and Applications	ELECTIVE (A)	20	105	0	125	75%	25%	0%	7	5

Indicative Module List											
Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course- work	% Practical	FHEQ Level	ECTS
EE9-SO23	Distributed Computation and Networks: A Performance Perspective	ELECTIVE (A)	20	105	0	125	0%	100%	0%	7	5
EE9-SO24	Network and Web Security	ELECTIVE (A)	16	109	0	125	85%	15%	0%	7	5
EE9-SO25	Machine Learning for Computer Vision	ELECTIVE (A)	20	105	0	125	0%	100%	0%	7	5
EE9-SO28	Topics in Large Dimensional Data Processing	ELECTIVE (A)	20	105	0	125	100%	0%	0%	7	5
EE9-SO29	Pattern Recognition	ELECTIVE (A)	20	105	0	125	0%	100%	0%	7	5
EE9-SU30	Communication Systems	ELECTIVE (B)	16	109	0	125	0%	100%	0%	7	0

## Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/electrical-engineering/study/postgraduate/>

The Module Handbook is available at:

<http://www.imperial.ac.uk/electrical-engineering/study/postgraduate/>

The College's entry requirements for postgraduate programmes can be found at:

[www.imperial.ac.uk/study/pg/apply/requirements](http://www.imperial.ac.uk/study/pg/apply/requirements)

The College's Quality & Enhancement Framework is available at:

[www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance](http://www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance)

The College's Academic and Examination Regulations can be found at:

<https://www.imperial.ac.uk/about/governance/academic-governance/regulations>

Imperial College is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of the College's Centenary, 8th July 2007, established the College as a University with the name and style of "The Imperial College of Science, Technology and Medicine".

<http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/>

Imperial College London is regulated by the Higher Education Funding Council for England (HEFCE)

<http://www.hefce.ac.uk/reg/register/>