

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

Programme Title	Communications and Signal Processing			
Award(s)	MSc			
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)			
Main Location of Study	South Kensington Campus			
Mode and Period of Study	1 calendar year full-time (12 months)			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Master's Degree in Engineering			
Total Credits	ECTS:	90	CATS:	180
FHEQ Level	Level 7			
EHEA Level	2 nd cycle			
External Accrerator(s)	Institution of Engineering and Technology Accreditation received: 2019 Accreditation renewal: 2023			
Specification Details				
Student cohorts covered by specification	2019-2020 entry			
Person responsible for the specification	Dr Tania Stathaki			

Date of introduction of programme	1975/1976
Date of programme specification/revision	Oct 2019
Programme Overview	
<p>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.</p> <p>Communications and signal processing are closely intertwined, and together provide the basis of modern information engineering. Areas of application include:</p> <ul style="list-style-type: none"> • 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	
<p>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</p>	
<p>Knowledge and Understanding of:</p> <ol style="list-style-type: none"> 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. <p>Intellectual Skills – able to:</p> <ol style="list-style-type: none"> 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	Normally a high first class (1st) (75%+) UK Bachelor's Degree with Honours in Electrical Engineering or a related subject (or a comparable qualification recognised by the College).
Non-academic Requirements	Not applicable
UK/EU/International candidates are not required to attend an interview.	
English Language Requirement	<p>Meet the College's higher English-language requirement. You can do this in a number of ways:</p> <ul style="list-style-type: none"> • Pass the Imperial Pre-sessional English Programme (applicants for postgraduate taught or research admission only) • Take an English language proficiency test • Provide evidence of a previous qualification that you have taken that confirms your English level • Provide evidence that you meet one of our English language exemptions <p>Higher Requirement: IELTS 7.0 overall (minimum 6.5 in all elements)</p>

The programme's competency standards document can be found at:

<http://www.imperial.ac.uk/electrical-engineering/study/undergraduate/applicants-with-disabilities/>

Learning & Teaching Strategy

Scheduled Learning & Teaching Methods

- Lectures and seminars
- Problem solving classes
- Tutorial sessions

E-learning & Blended Learning Methods

- Hardware laboratory
- Software laboratory

Project Learning Methods

- Group projects
- Individual projects

Placement Learning Methods

- Industrial placement (optional)

Assessment Strategy

Assessment Methods

- Written examinations
- Coursework software or hardware deliverable
- Oral and poster presentations
- Reports
- Individual Research Project

Academic Feedback Policy

Feedback to all submitted coursework is expected within two weeks

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:

- All coursework is promptly marked
- Meeting of individual students with course directors to discuss exams, research project and career aims
- General remarks are communicated by broadcast emails to all Course students
- More details given to representatives in the Staff – Student Committee
- Course questionnaire evaluation of taught components

Re-sit Policy

The College's Policy on Re-sits is available at: <http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/>

Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: <http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/>

Programme Structure			
Full-time	Term One	Term Two	Term Three
Core Modules	4	1	0
Elective Modules	6	5	0
Projects	0	0	1
Assessment Dates & Deadlines			
Written Examinations	May		
Coursework Assessments	Continuous		
Project Deadlines	Initial Project Report: Mid-March Poster Submission: Late August Project Submission: Early September Poster Presentation: Early September		
Practical Assessments	Continuous		
Assessment Structure			
Marking Scheme			
<p>Final Degree Classification A student will be awarded the highest grade of MSc for which the following conditions are satisfied:</p> <p>MSc</p> <ol style="list-style-type: none"> At least 40% for each of the 8 modules counted for the computation of the examinations average At least 50% for the laboratory average At least 50% for both the project and examinations average <p>MSc with Merit</p> <ol style="list-style-type: none"> At least 40% for each of the 8 modules counted for the computation of the examinations average At least 50% for the laboratory average At least 60% for both the project and examinations average <p>MSc with Distinction</p> <ol style="list-style-type: none"> At least 40% for each of the 8 modules counted for the computation of the examinations average At least 50% for the laboratory average 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
Adaptive Signal Processing and Machine Intelligence	N/A
4 x elective modules*	N/A
Individual Research Project	N/A

***If a student registers for five elective modules, 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
ELEC97024 (EE9-SC1)	Digital Signal Processing and Digital Filters	CORE	20	105	0	125	100%	0%	0%	7	5
ELEC97005 (EE9-SC2)	Advanced Communication Theory	CORE	19	106	0	125	60%	40%	0%	7	5
ELEC97073 (EE9-SC3)	Probability and Stochastic Processes	CORE	30	95	0	125	85%	15%	0%	7	5
ELEC97003 (EE9-SC4)	Adaptive Signal Processing and Machine Intelligence	CORE	20	105	0	125	0%	100%	0%	7	5
ELEC97078 (EE9-SLAB)	S1 Lab	CORE	90	160	0	250	0%	100%	0%	7	10
ELEC97016 (EE9-SPRJ)	Individual Research Project	CORE	0	1000	0	1000	0%	100%	0%	7	40
ELEC97091 (EE9-SO7)	Traffic Theory & Queuing Systems	ELECTIVE	20	105	0	125	100%	0%	0%	7	5
ELEC97061 (EE9-SO9)	Optical Communication	ELECTIVE	20	105	0	125	100%	0%	0%	7	5
ELEC97014 (EE9-SO11)	Coding Theory	ELECTIVE	20	105	0	125	100%	0%	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
ELEC97022 (EE9-SO14)	Digital Image Processing	ELECTIVE	20	105	0	125	100%	0%	0%	7	5
ELEC97049 (EE9-SO20)	Information Theory	ELECTIVE	20	105	0	125	100%	0%	0%	7	5
ELEC97093 (EE9-SO22)	Wavelets, Representation Learning and their Applications	ELECTIVE	20	105	0	125	75%	25%	0%	7	5
ELEC97096 (EE9-SO24)	Network and Web Security	ELECTIVE	16	109	0	125	85%	15%	0%	7	5
ELEC97053 (EE9-SO25)	Selected Topics in Computer Vision	ELECTIVE	20	105	0	125	0%	100%	0%	7	5
ELEC97095 (EE9-SO27)	Wireless Communications	ELECTIVE	20	105	0	125	0%	100%	0%	7	5
ELEC97089 (EE9-SO28)	Topics in Large Dimensional Data Processing	ELECTIVE	20	105	0	125	70%	30%	0%	7	5
ELEC97065 (EE9-SO29)	Pattern Recognition	ELECTIVE	20	105	0	125	0%	100%	0%	7	5

Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/electrical-engineering/study/current-students-course-handbook/#m>

The Module Handbook is available at:

<http://www.imperial.ac.uk/electrical-engineering/study/current-students-course-handbook/#m>

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

www.imperial.ac.uk/study/pg/apply/requirements

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

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".

<https://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/>

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<https://www.officeforstudents.org.uk/>