Programme Information		
Programme Title	Programme Code	HECoS Code
Sensor Systems Engineering	H605	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MSc - H605	1 calendar year (12 months)	Full-Time	Annually in October	90	180
PG Diploma - H605D	N/A	N/A	N/A	60	120
PG Certificate - H605C	N/A	N/A	N/A	30	60
The PG Certificate/PG Diploma are exit awards and are not available for entry. You must apply to and join the MSc.					

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Engineering
Teaching Institution	Imperial College London	Department	Electrical and Electronic Engineering
Associateship	Diploma of Imperial College (DIC)	Main Location(s) of Study	South Kensington Campus
External Reference			
Relevant QAA Benchmark Statement(s) and/or other external reference points		Master's Award in Engineering	
FHEQ Level		Level 7	
EHEA Level		2nd Cycle	
External Accreditor(s) (if applicable)			
External Accreditor 1:	The Institution of Engineering and Technology (IET)		
Accreditation received:	Pending	Accreditation renewal:	Pending
Collaborative Provision			
Collaborative partner	Collaboration type	Agreement effective date	Agreement expiry date
N/A	N/A	N/A	N/A
Specification Details			

Programme Lead	Dr Oleksiy Sydoruk
Student cohorts covered by specification	2025-26 entry
Date of introduction of programme	October 25
Date of programme specification/revision	May 24

Programme Overview

From consumer electronics, to vehicles, industrial plants, and spacecraft, sensors are ubiquitous. Often, they are parts of large systems that need to collect, process, and analyse signals from different inputs. The demand for the quantity, quality, and immediate availability of sensor data is ever growing, and this challenge must be met at the stage of the physical sensor design. As a result, there is a need for engineers who understand sensor development both at the physical design and of the system levels. This MSc programme aims to deliver this combination of skills.

You will study the entire process of sensor system development, from design, fabrication, and characterisation of individual sensors to sensor instrumentation and signal and data processing to sensor networks and systems.

The programme consists of compulsory taught modules that provide background theory, practical knowledge, and skills (including software design) in designing and analysing sensors, sensor instrumentation, sensor signals, and sensor systems and networks. The aim is to provide you with experience both in the practical issues of device-level design and in system-level performance requirements. A key feature of this programme is a balanced approach to all levels of sensor systems design, and an in-depth treatment of electromagnetic, semiconductor, and MEMS sensors and imaging systems. You will gain both theoretical understanding and practical experience of sensor design and measurements through laboratory work.

This programme offered over 12 months full-time, is structured in three parts. The taught component of the programme is delivered during the Autumn and Spring terms. You will study topics of fundamental importance to Sensor Systems Engineering by attending four compulsory modules. You will supplement them with elective modules in both the Autumn and Spring terms. A core taught component is the Laboratory in Sensor Systems, during which you will apply the theoretical knowledge that you have acquired and supplement it with skills in the modelling and measurement of sensors, sensor signal processing, and design of sensor systems.

Building on the taught components, you will be allocated an individual research project at the end of the Autumn term. Multiple topics for an individual research project are proposed. You will review the proposals and submit a ranked list of your preferences. Project allocation is done based on preference and project popularity. After your project is allocated, you may start doing preliminary work. You will focus solely on your individual research project during the third part of the programme, in the Summer term and until the end of the programme when your project is submitted at the start of September. Projects in industry are also permitted under the co-supervision of an academic staff and need to be approved by the course director.

In addition to ongoing formative feedback throughout the programme, the taught modules will be assessed by written, oral, and computer-based examinations and by written coursework. Summative assessment typically takes place at the end of the autumn and spring terms. The individual research project will be assessed by a dissertation and a poster presentation delivered in September.

The Sensor Systems Engineering MSc programme is run by staff with backgrounds in sensors, optical, electromagnetic, and semiconductor devices, signal processing, machine learning and related fields. The staff are experts both in delivering advanced teaching and in research, development, and application of sensor systems.

Given the ubiquity and importance of sensors, graduates of our MSc programme will be able to work in public, private, and third-sector organizations around the world that are involved in sensor development, implementation, assessment, and regulation. The graduates will also be able to pursue PhD research at academic institutions in the UK and worldwide.

Learning Outcomes

On completion of the MSc in Sensor Systems Engineering programme, you will be expected to:

1. Apply fundamental and advanced principles to the design, fabrication, measurement, and evaluation sensors and sensor systems;
2. Appraise and apply analytical, numerical, experimental, and software tools appropriate for the design, implementation, and validation of sensors and sensor systems;
3. Select and execute standard methods to design, characterise, and implement sensors and sensor systems;
4. Document the process and report on the outcome of evaluation of sensors and sensor systems;
5. Develop and adapt project management and communication skills including problem definition, project design, execution, and reporting;
6. Formulate problem definitions and evaluate solutions using objective criteria;
7. Appraise, select, and implement advanced approaches to solve sensor problems;
8. Predict potential outcomes of applying various types of techniques to a given problem;
9. Compare, evaluate and critically review scientific and technical literature pertaining to sensors and sensor systems;
10. Evaluate the effectiveness of a particular implementation through appropriate design and execution of modelling, measurement, and software development;
11. Analyse evaluation results, draw appropriate conclusions and recommend actions to improve the performance.

On completion of the PG Diploma, you will be able to achieve items (1) to (6) from the above list.
On completion of the PG Certificate, you will be able to achieve items (1) to (4) from the above list.

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial degree programme. The Graduate Attributes are available at: https://www.imperial.ac.uk/about/education/our-graduates/

Entry Requirements	
Academic Requirement	Normally a high first class (1st) (75%+) UK Bachelor's Degree with Honours in Electrical Engineering, Physics, or a related subject (or a comparable qualification recognised by the university).
Non-academic Requirements	N/A
English Language Requirement	Higher English requirement
Admissions Test/Interview	Applications will be reviewed by a selection committee consisting of at least the Programme Director and a nominated staff member. The main criteria are academic performance to date and academic potential. Applicants are not normally interviewed.

The programme's competency standards documents are available from the department.

Learning & Teaching Approach

Learning and Teaching Delivery Methods

The learning and teaching approach consists of a combination of lectures, seminars, laboratory-based work, coursework and guided reading. It will include:

- *Lectures:* these are typically delivered to the entire cohort ranging from one to two hours in length. Lectures may be delivered as traditional-style lectures, flipped classroom, or online learning supported by pre-recorded lectures. Most lectures involve student engagement with questions posed to the class, or a lecturer may include small-group exercises or discussions to reinforce learning of the recently covered material.
- *Quizzes and short exercises:* these are used as a part of formative learning and practice, for you to test your understanding of concepts taught and your ability to build on and apply that knowledge.
- *Seminars:* some modules will offer a range of small practical exercises and projects, which you will complete either individually or as a part of a small group. Your work on these will be supported by module lecturers who often work together with graduate teaching assistants.
- *Online tools:* some modules may employ a range of online tools such as online quizzes and discussion boards to answer your questions and facilitate learning.
- *Laboratory:* in the laboratory you will be taught key skills which will then be applied towards characterising different sensors. These sensors will then need to be put into a sensor network. The aim of the lab is to put the theory behind sensor system design into practice. You will be collaborating with other students in small groups. Assessment will be via demonstration and group report.
- *Individual Research Project:* You will undertake a research project, supervised by one or more members of our academic staff, who are leaders of international renown in their field of research. This will allow you to undertake in-depth research in areas of interest to you, be exposed to state-of-the-art knowledge and develop the communication skills to effectively present your research findings and deliver a research output that contributes to knowledge.

As part of the learning and teaching you will be challenged to produce different types of output for assessment that rely on your communication skills. These include group/individual coursework reports, software models, lab reports, an individual research dissertation, and a research poster presentation.

Development of professional skills is supported by various aspects of the group and individual research project. You will be encouraged throughout the programme to undertake independent reading both to supplement and consolidate material relevant to the lectures and the individual research project and to broaden your individual knowledge and understanding of the sensors area.

Intellectual skills are developed through the teaching and learning methods, with some experience of team work. Practical skills (such as computational and experimental) are developed throughout our teaching and learning programme, in particular coursework, laboratory experiments, and individual research project. The latter will be supported by interaction with research supervisor(s) and (sometimes) research students and other research staff. Transferable skills are developed through laboratory projects, coursework, and individual project work.

Overall Workload

Your overall workload consists of face-to-face sessions and independent learning. While your actual contact hours may vary according to the elective modules you choose to study, the following gives an indication of how much time you will need to allocate to different activities at each level of the programme. At Imperial College London, each ECTS credit taken equates to an expected total study time of 25 hours. Therefore, the expected total study time is 2,250 hours per year for an average student.

The Department expects you to allocate approximately 4 hours in self-study for every hour spent in lectures and tutorials for a typical lecture-based module.

The pattern of work is varies depending on your selected elective modules, however, on average you can expect to spend about 200 hours in lectures over the Autumn and Spring terms, while devoting a further 800 hours to independent study. You will spend approximately 250 hours for your laboratory experiments and coursework. You will also be expected to spend 1,000 hours working for your Individual Research Project, starting part-time from the Spring term and full-time from May until early September.

Assessment Strategy

Assessment Methods

A range of summative and formative assessment methods are used throughout the programme to maximise your learning. Summative assessment refers to those that will test whether you have met the intended learning outcomes of each module and contribute towards the programme-level intended learning outcomes. Formative assessments are designed for you to identify your areas of strength and weakness to enhance your learning.

Written and computer-based examinations as well as written coursework and demonstrations are used as summative assessments for modules where theoretical knowledge and its applications are introduced. In addition to a final summative assessment, modules will typically offer opportunities for you and/or your instructors to assess your level of understanding and progress through formative assessments, such as problem-solving exercises (in class and for self-study), quizzes, and coursework exercises carried out individually or as part of a group with peer assessment in some cases. The individual research project is evaluated on the quality of the submitted report, its originality and technical contribution, and through a poster presentation.

The exact balance of the summative assessment across the programme depends upon your choice of elective modules, but an indicative breakdown is:

Coursework	50%
Exams	40%
Practical	10%

Academic Feedback Policy

The Department of Electrical and Electronic Engineering recognises that feedback is an essential part of learning and assigns high priority to the timeliness and quality of feedback offered to you on all modules. The primary purpose of feedback is to assist learning and the development of skills, by highlighting strengths and weaknesses on one hand, and by identifying actions for improvement on the other. It is important to recognize that: 1) feedback comes in various forms and 2) feedback requires your active engagement.

Feedback will be provided for all assessments carried out as part of your MSc programme. For examinations, the published model answers will be annotated to highlight common mistakes and alternative approaches to the solutions. For coursework and the laboratory-based exercises, written feedback will normally be provided within ten working days. For the individual research project, feedback will be provided by the supervisor(s) on a continuous basis during the regular project supervision meetings. Oral feedback on the research project will be provided immediately by assessors during/after the poster presentation.

Some of the modules will further aim to provide you with the opportunity to receive formative feedback ahead of any major summative assessment. Such feedback may be provided in the form of in-class quizzes, problem sheets, etc. You should keep in mind that not all feedback is structured, and important feedback may be obtained from self-reflection on your progress to date, from peers when studying or working together in a team, in dialogue with a lecturer in or outside of a class or laboratory, or by email and online discussion boards.

The Board of Examiners will meet to consider the results of the examinations and the research project in mid-late October and results will be released to you only via student e-service within ten working days. Students who have not managed a clear pass will be informed, setting out possible courses of action within 10 days of the examiner's board.

You will meet with your personal tutors to discuss ongoing progression through the programme, exams, research project and career aims.

Imperial's Policy on Academic Feedback and guidance on issuing provisional marks to students is available at: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Re-sit Policy
Imperial's Policy on Re-sits is available at: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/
Mitigating Circumstances Policy
Imperial's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Additional Programme Costs		
This section should outline any additional costs relevant to this programme which are not included in students' tuition fees.		
Description	Mandatory/Optional	Approximate cost
Lab equipment	Mandatory	Provided
Personal laptop or tablet computer (recommended configuration)	Mandatory	Varies

Programme Structure[1]					
Year 1 – FHEQ Level 7 **You will study all core and compulsory modules (groups A and B). You must also choose two electives from group C in each of the Autumn and the Spring terms.**					
Code	Module Title	Core/ Compulsory/ Elective	Group	Term	Credits
ELEC70101	Sensors	Compulsory	A	Autumn	5
ELEC70130	Advanced Instrumentation	Compulsory	A	Autumn	5
ELEC70131	Sensor Systems and Networks	Compulsory	A	Spring	5
ELEC70102	Microelectromechanical Systems (MEMS)	Compulsory	A	Spring	5
ELEC70132	Laboratory in Sensor Systems	Core	B	Autumn and Spring	10
ELEC70133	Individual Research Project in Sensor Systems	Core	B	Spring and Summer	40
ELEC70134	Communications: Physical Layer	Elective	C	Autumn	5
ELEC70135	Physical Imaging Systems	Elective	C	Autumn	5
ELEC70043	Analogue Integrated Circuits and Systems	Elective	C	Autumn	5
ELEC70057	Biomedical Electronics	Elective	C	Autumn	5
ELEC70098	Optimisation	Elective	C	Autumn	5
ELEC70085	Computational Sensing and Imaging	Elective	C	Autumn	5
ELEC70077	Digital Signal Processing and Digital Filters	Elective	C	Spring	5
ELEC70001	Adaptive Signal Processing and Machine Intelligence	Elective	C	Spring	5
ELEC70004	Analogue Signal Processing	Elective	C	Spring	5
ELEC70013	High Performance Analogue Electronics	Elective	C	Spring	5
ELEC70070	Information Theory	Elective	C	Spring	5
ELEC70082	Distributed Optimisation and Learning	Elective	C	Spring	5
ELEC70072	Real-time Digital Signal Processing	Elective	C	Spring	5
				Credit Total	90

[1] **Core** modules are those which serve a fundamental role within the curriculum, and for which achievement of the credits for that module is essential for the achievement of the target award. Core modules must therefore be taken and passed in order to achieve that named award. **Compulsory** modules are those which are designated as necessary to be taken as part of the programme syllabus. Compulsory modules can be compensated. **Elective** modules are those which are in the same subject area as the field of study and are offered to students in order to offer an element of choice in the curriculum and from which students are able to select. Elective modules can be compensated.

Progression and Classification

Award and Classification for Postgraduate Students

Award of a Postgraduate Certificate (PG Cert)
To qualify for the award of a postgraduate certificate you must have a minimum of 30 credits at Level 7.

Award of a Postgraduate Diploma (PG Dip)
To qualify for the award of a postgraduate diploma you must have passed modules to the value of no fewer than 60 credits at Level 7 and no more than 10 credits as a Compensated Pass;

Award of an MSc degree
To qualify for the award of a postgraduate degree you must have:

1. accumulated credit to the value of no fewer than 90 credits at Level 7
2. and no more than 10 credits as a Compensated Pass;
3. met any specific requirements for an award as outlined in the approved programme specification for that award.

Classification of Postgraduate Taught Awards

The university sets the class of Degree that may be awarded as follows:

1. Distinction: 70.00% or above
2. Merit: 60.00% or above but less than 70.00%.
3. Pass: 50.00% or above but less than 60.00%.

For a Master's, your classification will be determined through the weighted average mark in the designated 'taught' and 'research' aspects of the programme each meeting the threshold for the relevant classification band. The research aspect of the programme is the ELEC70133 Individual Research Project in Sensor Systems. All other modules constitute the taught aspect of the programme.

ELEC70132 Laboratory in Sensor Systems is a pass/fail module and does not count towards the programme average.

Your degree algorithm provides an appropriate and reliable summary of your performance against the programme learning outcomes. It reflects the design, delivery, and structure of your programme without unduly over-emphasising particular aspects.

Programme Specific Regulations

The accreditation body (IET) requires no more than 10 ECTS credits as compensated pass

Supporting Information
The Programme Handbook is available from the Department
The Module Handbook is available from the Department
Imperial's entry requirements for postgraduate programmes can be found at: www.imperial.ac.uk/study/pg/apply/requirements
Imperial's Quality & Enhancement Framework is available at: www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance
Imperial's Academic and Examination Regulations can be found at: www.imperial.ac.uk/about/governance/academic-governance/regulations
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Imperial College London is regulated by the Office for Students (OfS) www.officeforstudents.org.uk/advice-and-guidance/the-register/
This document provides a definitive record of the main features of the programme and the learning outcomes that you may reasonably be expected to achieve and demonstrate if you take full advantage of the learning opportunities provided. This programme specification is primarily intended as a reference point for prospective and current students, academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review.