

Programme Information		
Programme Title	Programme Code	HECoS Code
Medical Device Design and Entrepreneurship	H673U	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MRes	1 Calendar Year (12 months)	Full time	Annually in October	90	180
PG Diploma – H673UD	N/A	N/A	N/A	60	120
PG Certificate – H673UC	N/A	N/A	N/A	30	60
The PG Certificate and PG Diploma are an exit awards and are not available for entry. You must apply to and join the MRes. The PG Certificate and PG Diploma are not accredited by any professional body.					

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Engineering
Teaching Institution	Imperial College London	Department	Bioengineering
Associateship	Diploma of Imperial College (DIC)	Main Location(s) of Study	South Kensington and White City Campuses
External Reference			
Relevant QAA Benchmark Statement(s) and/or other external reference points		Master's Degree in Engineering Master's Degree in Biosciences	
FHEQ Level		Level 7 - Masters	
EHEA Level		2nd Cycle	
External Accreditor(s) (if applicable)			
External Accreditor 1:	The Institution of Engineering and Technology		
Accreditation received:	2013	Accreditation renewal:	2026
External Accreditor 2:	Institution of Mechanical Engineers		
Accreditation received:	2013	Accreditation renewal:	Pending
External Accreditor 3:	Institute of Materials, Minerals & Mining		
Accreditation received:	2013	Accreditation renewal:	2029
External Accreditor 4:	Institution of Engineering Designers		

Accreditation received:	2018	Accreditation renewal:	2029
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 Sam Au	
Student cohorts covered by specification		2025-26 entry	
Date of introduction of programme		October 13	
Date of programme specification/revision		January 25	

Programme Overview
<p>The MRes in Medical Device Design and Entrepreneurship (MDDE) will prepare you for an innovative research career in Bioengineering. The programme capitalises on the strength of the Department of Bioengineering at Imperial alongside the access to a number of local hospitals through the Imperial NHS trust, London's reputation as a financial hub and the growing medical device and broader health innovation sector.</p> <p>The MDDE is a one year full-time programme leading to the MRes award. As a student on this programme you will benefit from interaction with students on other programmes in the Department to help develop your interdisciplinary knowledge. The programme is taught on both the South Kensington and White City Campuses. Laboratories as part of taught modules will normally be at the South Kensington Campus.</p> <p>The programme involves lectures and practical work in the first term. In the first term you will also begin researching the medical device concept which will be the subject of your research/development project, and begin working on a market analysis and development plan. The research project would usually be supervised by an academic within the department and there may be additional input from industrial or clinical collaborators. Industry and end-user participation enhance the quality of the educational experience by providing additional input on the complex pathway encountered in pushing a medical device toward the marketplace. Industrial partners have a technical background and are currently working in medical device development or business funding. It may be possible for projects to be carried out partly or wholly at an external organisation and requests will be considered on a case by case basis.</p> <p>A variety of seminars and workshops are provided within the department to deepen and broaden your research skill-base. The MDDE programme will prepare you to analyse and solve problems in MDDE using an integrated, multidisciplinary approach. Graduates from this programme typically work in industries such as the medical device industry or undertake a PhD in the UK or worldwide. A measure of the success of the graduates of this programme is the impact they have delivered, which includes the creation of start-ups and follow-on funding worth up to \$2.5 million to date.</p>
Learning Outcomes
<p>The following Learning Outcomes are in line with FHEQ level 7 and the UK-SPEC outcomes required for accreditation by professional engineering bodies.</p> <p>The Learning Outcomes are categorised into the following groups:</p> <ul style="list-style-type: none"> ▪ Knowledge and Understanding [KU] ▪ Intellectual Abilities [IA] ▪ Practical and Transferable skills [PT] <p>Upon successful completion of the <i>MRes Medical Device Design and Entrepreneurship programme</i> you will be able to:</p>

[KU1] Assess the underlying scientific principles and models that govern the field of bioengineering entrepreneurship.

[KU2] Evaluate the core concepts, principles and theories relevant to Medical Device design and entrepreneurship and how these are relevant to historical, current and future developments and technologies in the area of Bioengineering.

[KU3] Evaluate a wide range of scientific studies and case studies relevant to Medical Device design and entrepreneurship and critically discuss these examples in terms of their commercial, economic, social and sustainability implications.

[IA1] Critically select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in the field of medical device design, including investigation of new and emerging technologies

[IA2] Apply diagnostic skills, technical knowledge and understanding of engineering design processes to analyse, evaluate and refine experimental processes

[IA3] Extract, analyse and critically evaluate information and data gathered from experimentation, academic and technical resources to determine their strength and validity, interpret conclusions and make recommendations for future experimental studies.

[IA4] Work with information that may be incomplete or uncertain, quantify the effect of this on the design or development of an engineering solution and, where appropriate, use theory or experimental research to mitigate deficiencies through the generation of new data

[IA5] Formulate an engineering-based development path for a medical device using your knowledge of core and specialised business and engineering concepts.

[PT1] Work effectively with all members of a research team including students and academics, demonstrating good interpersonal and communication skills that show an appreciation for the different roles within a team

[PT2] Exercise initiative and judgement in a range of situations, identifying areas for self-learning and development, and accepting accountability for decisions made and the quality of outcomes produced.

[PT3] Work individually to plan and conduct a business plan for a medical device, working in a safe and ethical manner.

[PT4] Professionally communicate results and technical details through a variety of means including the preparation and/or delivery of presentations, technical and business reports and scientific papers.

Upon successful completion of the *PG Diploma Medical Device Design and Entrepreneurship programme* you will be able to:

[KU1] Assess the underlying scientific principles and models that govern the field of bioengineering entrepreneurship.

[KU2] Evaluate the core concepts, principles and theories relevant to Medical Device design and entrepreneurship and how these are relevant to historical, current and future developments and technologies in the area of Bioengineering.

[KU3] Evaluate a range of scientific studies and case studies relevant to Medical Device design and entrepreneurship and critically discuss these examples in terms of their commercial, economic, social and sustainability implications.

[IA1] Critically select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in the field of medical device design, including investigation of new and emerging technologies

[IA2] Extract, analyse and critically evaluate information and data gathered from experimentation, academic and technical resources to determine their strength and validity, interpret conclusions and make recommendations for future experimental studies.

[IA3] Work with information that may be incomplete or uncertain, quantify the effect of this on the design or development of an engineering solution and, where appropriate, use theory or experimental research to mitigate deficiencies through the generation of new data

[IA4] Formulate an engineering-based development path for a medical device using your knowledge of core and specialised business and engineering concepts.

[PT1] Work effectively with all members of a research team including students and academics.

[PT2] Exercise initiative and judgement in a range of situations, identifying areas for self-learning and development.

[PT3] Work individually to plan and conduct a business plan for a medical device, working in a safe and ethical manner.

[PT4] Professionally communicate results and technical details through a variety of means including the preparation and/or delivery of presentations, technical and business reports.

Upon successful completion of the *PG Certificate Medical Device Design and Entrepreneurship programme* you will be able to:

[KU1] Assess the underlying scientific principles and models that govern the field of bioengineering entrepreneurship.

[KU2] Evaluate the core concepts, principles and theories relevant to Medical Device design and entrepreneurship and how these are relevant to historical, current and future developments and technologies in the area of Bioengineering.

[KU3] Evaluate a wide range of scientific studies and case studies relevant to Medical Device design and entrepreneurship and critically discuss these examples in terms of their commercial, economic, social and sustainability implications.

[IA1] Critically select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in the field of medical device design

[IA2] Extract, analyse and critically evaluate information and data gathered from academic and technical resources to determine their strength and validity

[IA3] Work with information that may be incomplete or uncertain, and where appropriate, use theory to mitigate deficiencies through the generation of new data

[IA4] Formulate an engineering-based development path for a medical device using your knowledge of core and specialised business and engineering concepts.

[PT1] Work effectively with all members of a research team including students and academics

[PT2] Exercise initiative and judgement in a range of situations, identifying areas for self-learning and development

[PT3] Work individually to develop a business plan for a medical device, working in a safe and ethical manner.

[PT4] Professionally communicate technical and business information through a variety of means including the preparation and/or delivery of presentations, technical and business reports.

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:

Entry Requirements

Academic Requirement	You are expected to have at minimum a 2.1 UK Honour's degree in an engineering discipline, physical science or mathematical subject or equivalent.
Non-academic Requirements	N/A
English Language Requirement	Standard requirement (PG)
Admissions Test/Interview	Applicants may be invited to attend an interview with one or more members of academic staff, in person or virtually.

The programme's competency standards documents can be found at: www.imperial.ac.uk/media/imperial-college/faculty-of-engineering/bioengineering/public/student/Competency-Standards---Bioengineering-UG-PG---June-2016-Final.pdf

Learning & Teaching Approach

Learning and Teaching Delivery Methods

You will be taught through a combination of lectures, study groups and tutorials, computing labs, guest lectures and presentations. Study groups and tutorials will enable you to discuss and develop your understanding of topics covered in lectures whilst in smaller groups of around 30 students. These are usually based around problem sheets, questions or computational tasks set by the module lecturers. You will be expected to solve these either individually or as part of a small group. Study groups and tutorials are supported by graduate teaching assistants. Timetabled sessions may be delivered online or in person, or in a hybrid format.

The Virtual learning environment Blackboard will be used as a repository for teaching materials including recordings of all lectures, lecture notes and problem sheets. Learning technologies will be used to support teaching activities including in-class polling with Mentimeter, online self-diagnostic quizzes and online class forums.

Independent Learning

You are expected to spend significant time on independent study outside of timetabled learning and teaching sessions. From our experience students that undertake independent learning have improved academic performance, increased motivation and confidence in themselves and their abilities. By undertaking independent learning, you are also preparing yourself for professional practice where it is expected that you will manage your own continued professional development. Independent learning activities that you will be expected to undertake will typically include accessing online resources, completing problem sheets, reading journal articles and books, undertaking research in the library, reviewing lecture notes and watching lecture recordings, working on individual and group projects, working on coursework assignments and revising for exams.

Bioengineering uses flipped teaching for some modules, meaning that you need to actively engage with on-line resources ahead of attending timetabled sessions. This independent learning is followed by sessions led by the teacher where all students work in small groups to apply that knowledge to more practical examples. This helps you to further consolidate and enhance your understanding of the topics you study and allows us the time to focus on more challenging concepts in the taught sessions. These taught sessions are normally in the place of study groups for a flipped module

Research & Development Project

A key part of our MRes programme is the Research & Development Project. Within this project you will have the opportunity to demonstrate advanced knowledge, write extensively on an emerging research theme and apply developing entrepreneurial skills. Your Research Project is an opportunity for you, either individually or within a team of two, to develop cutting edge research and entrepreneurial capabilities under the close supervision of an academic and potentially with an industrial supervisor. Industry participation enhances the quality of your educational experience by providing additional input on the complex pathway encountered in pushing a medical device toward the marketplace.

As part of the project selection process, you will be provided with a list of potential projects to choose from early in the Autumn term. You will then have an opportunity to rank order the projects that you wish to undertake. Supervisors and the programme director will allocate projects to students based on student preferences and project fit.

You will be expected to engage with your project supervisor(s) after allocation and to commence work in laboratories in the Spring term. From the Summer term you will work on your project full-time until the end of the programme.

Overall Workload

Your overall workload consists of face-to-face sessions and independent learning. While your actual contact hours may vary according to the optional 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, 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.

Taught modules on this programme will be held mainly during the Autumn and Spring term(s). Typically you will spend in the order of 15% of your time on lectures, seminars and similar (around 300 hours) and in the order of 85% of your time on independent study. Of the independent study time, your research & development project accounts for 1090 hours of individual study.

Assessment Strategy

Assessment Methods

A variety of assessment methods will be used to test your understanding. Assessments are grouped as formative and summative.

Formative assessments do not contribute to the module mark but provide information on your progress as an individual and in the context of the class. This allows you to learn by using your new skills to solve problems and receive feedback on your performance to guide your future learning. This supports you to achieve a better performance in the summative assessments which do count towards your module marks. Formative assessments also provide feedback to the teaching staff which allow us to adapt our teaching.

Summative assessments are used to assess your learning against the intended module learning outcomes and contribute towards your achievement of the programme learning outcomes, detailed above. There is summative assessment during and/or at the end of each module and these assessments will contribute towards your mark for the year.

The design of our programme will allow you to test your understanding of the subject using formative assessments such as problem sheets, on-line diagnostic tests, practice presentations and mock/past examinations before you complete the summative assessments that count towards your final mark.

The taught modules will be assessed using a combination of:

- Written examinations
- Oral presentations
- Written reports, including a dissertation
- Coursework including progression tests, problem sheets
- Practical training elements

The research modules will be assessed at regular intervals throughout the degree using a combination of:

- Written Reports & Final Thesis
- Oral presentations & Business pitches
- Poster Presentations

The typical breakdown of assessments for this programme is:

Practical	40%
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Coursework	50%
Exams	10%

Academic Feedback Policy
<p>Feedback may be provided in one of a number of formats, including (but not limited to):</p> <ul style="list-style-type: none"> • Oral (during or after lectures, personally or as a group feedback session) • Personal (discussion with academics during office hours, meetings with cohort and academic tutors) • Interactive (problem solving tutorials with GTAs & study groups, peer feedback) • Written (solutions/model answers to coursework, electronic feedback online) <p>Deadlines for submission of assessments and to receive feedback are indicated in the coursework calendars normally provided at the start of the teaching year. You will usually be provided with feedback within 10 working days although on occasions they may be informed of a different time scale (e.g. if the submitted work is particularly complex and will take a long time to mark).</p> <p>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/</p>
Re-sit Policy
<p>Imperial's Policy on Re-sits is available at: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/</p>
Mitigating Circumstances Policy
<p>Imperial's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/</p>

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
Textbooks	Mandatory	£150
Personal Protective Equipment	Mandatory	Provided

Important notice: The Programme Specifications are the result of a large curriculum and pedagogy reform implemented by the Department and supported by the Learning and Teaching Strategy of Imperial College London. The modules, structure and assessments presented in this Programme Specification are correct at time of publication but might change as a result of student and staff feedback and the introduction of new or innovative approaches to teaching and learning. You will be consulted and notified in a timely manner of any changes to this document.

Programme Structure ¹					
FHEQ Level 7 You will study all core and compulsory modules including the ‘Research Project’ (Total 45 ECTS) and the six compulsory modules (Total 35 ECTS). You then choose two elective modules (Total 10 ECTS)					
Code	Module Title	Core/ Compulsory	Group	Term	Credits
BIOE70014	Medical Device Entrepreneurship	Compulsory	N/A	Autumn	5 ECTS
BIOE70037	Data Analysis for Research	Compulsory	N/A	Autumn	5 ECTS
BIOE70069	Effective Communication Skills	Compulsory	N/A	Autumn	5 ECTS
BIOE70028	Medical Device Certification	Compulsory	N/A	Spring	5 ECTS
BIOE70068	Financial Forecasting, Deal Structuring and Negotiations	Compulsory	N/A	Spring	5 ECTS
BIOE70044	Market Analysis for Medical Device Entrepreneurship	Compulsory	N/A	Autumn-Spring	10 ECTS
BIOE70041	Medical Device Design and Entrepreneurship Research and Development Project	Core	N/A	Autumn-Summer	45 ECTS
BIOE70032	Tissue Engineering and Regenerative Medicine	Elective	N/A	Spring	5
BIOE70008	Advanced Physiological Monitoring and Data Analysis	Elective	N/A	Autumn	5
BIOE70033	Biomaterials for Bioengineers L7	Elective	N/A	Autumn	5
BIOE70049	Bioengineering Approaches for Cancer	Elective	N/A	Autumn	5
BIOE70011	Brain Machine Interfaces	Elective	N/A	Spring	5
BIOE70149	Nanotechnologies for Cancer Diagnosis and Cancer Therapy	Elective	N/A	Autumn	5
BIOE70013	Computational Neuroscience	Elective	N/A	Spring	5
BIOE70019	Orthopaedic Biomechanics	Elective	N/A	Spring	5
BIOE70020	Neuroscience	Elective	N/A	Autumn	5
BIOE70010	Principles of Biomedical Imaging L7	Elective	N/A	Autumn	5
BIOE70016	Human Neuromechanical Control and Learning	Elective	N/A	Spring	5

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.

BIOE70022	Industrial Applications of Cellular Engineering L7	Elective	N/A	Spring	5
BIOE70056	Advanced Biomaterials for Bioengineers	Elective	N/A	Autumn	5
Credit Total					90 ECTS

Progression and Classification

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 a minimum of 60 credits at Level 7 with no more than 10 credits as a compensated pass.

Award of a Masters Degree (including MRes)

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 Masters, your classification will be determined through the Programme Overall Weighted Average and the designated dissertation or final major project module meeting the threshold for the relevant classification band.

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

As an accredited degree, students on this MRes programme are subject to the standards set by the UK Engineering Council in relation to compensation. A maximum of 10 ECTS credits can be compensated across the programme.

Supporting Information

The Programme Handbook is available at: www.imperial.ac.uk/bioengineering/admin/research/mres/

The Module Handbook is available from the department.

Imperial's entry requirements for postgraduate programmes can be found at:
www.imperial.ac.uk/study/apply/postgraduate-taught/entry-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

Imperial College London 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 Imperial's Centenary, 8th July 2007, established university as a University with the name and style of "The Imperial College of Science, Technology and Medicine".
www.imperial.ac.uk/admin-services/secretariat/university-governance-structure/charters/

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.