Programme Information		
Programme Title	Programme Code	HECoS Code
Engineering for Biomedicine	HB90	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MSc	1 Calendar year (12 months)	Full-Time	Annually in October	90	180
PG Diploma – HB90D	N/A	N/A	N/A	60	120
PG Certificate – HB90C	N/A	N/A	N/A	30	60
The PG Certificate and 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	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 Awards in Engineering	
FHEQ Level		Level 7	
EHEA Level		2nd Cycle	
External Accreditor(s) (if applicable)			
External Accreditor 1:	N/A		
Accreditation received:	N/A	Accreditation renewal:	N/A
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 Victoria Salem	

Student cohorts covered by specification	2024-25 entry
Date of introduction of programme	October 21
Date of programme specification/revision	August 23

Programme Overview

Bioengineering is at the interface of engineering and medicine. Indeed, bioengineering is a discipline that advances knowledge in engineering, biology and medicine, and improves human health through cross-disciplinary activities that integrate the engineering sciences with the biomedical sciences and clinical practice.

The MSc Engineering for Biomedicine is a one-year full-time programme leading to the MSc award. This programme is designed to build on your background in clinical or life sciences and develop your technical skills and understanding of biomedical engineering. It will enable you to apply these skills and knowledge to the development of life-saving technologies.

In the core modules, you will learn the basics of engineering maths, biomedical imaging, programming skills, statistical and data analysis tools, regulatory and business principles within a medical device framework, and how to critically assess relevant scientific literature. Through elective modules, you will have the option to learn about a diverse range of topics relevant to regenerative medicine, diagnosis and treatment of disease, orthopaedics and synthetic biology.

In this programme you will benefit from interaction with students on other programmes in the Department to develop your interdisciplinary knowledge. Our programme combines lectures, study groups, and taught classes where you gain a theoretical understanding, with a substantial engineering project where you will work on a real-world problem in medicine and biology with life-changing potential. You may choose to develop your practical and laboratory skills either through the selection of taught modules with practical content, or during your project work. Taught modules typically run during the Autumn and Spring terms which allows you to focus full-time on your project in the latter half of the year. 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. 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.

In addition to the main programme content, the department hold regular seminars and workshops with guest speakers whose research spans the Bioengineering discipline. You are encouraged to attend the seminars to deepen and broaden your understanding of the Bioengineering field. Our programme will prepare you to analyse and solve problems in bioengineering using an integrated, multidisciplinary approach, and our graduates are well-placed to gain employment in a growing industry.

Learning Outcomes

The following Learning Outcomes are in line with FHEQ level 7.

The Learning Outcomes are categorised into the following groups:
- Knowledge and Understanding [KU]
- Intellectual Abilities [IA]
- Practical and Transferable skills [PT]

Upon successful completion of the *MSc Engineering for Biomedicine* programme you will be able to:

[KU1] Assess how core concepts and principles in engineering can be applied to the fields of life science and medicine and identify their limitations.

[KU2] Evaluate core and specialised concepts and principles of engineering and how these are relevant to historical, current and future developments and technologies in the fields of life science and medicine.

[KU3] Evaluate a range of innovative and creative engineering solutions applied to healthcare problems and quality-of-life issues and critically discuss these examples in terms of their commercial, economic, social and sustainability implications.

[KU4] Recognise and justify the need for a high level of professional and ethical conduct in engineering, based on a knowledge of professional codes of conduct, how ethical dilemmas can arise and the management of risk issues.

[KU5] Evaluate management and business practices that may be applied in the development of technologies in the fields of life science and medicine, with reference to regulatory requirements applicable to medical devices and healthcare solutions.

[IA1] Critically select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in bioengineering, life sciences and medicine.

[IA2] Apply diagnostic skills, technical knowledge and understanding of engineering principles to find creative solutions to problems in life sciences and medicine.

[IA3] Extract, analyse and critically evaluate information and data gathered from academic and technical resources.

[IA4] Work with information that may be incomplete or uncertain, and where appropriate, use theory or experimental research to mitigate deficiencies through the generation of new data.

[PT1] Work effectively within a multidisciplinary team, demonstrating leadership, project management and communication skills.

[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 and/or within a group to plan, conduct and professionally communicate the results of a programme of original research or advanced technical design activities, in a safe and ethical manner in laboratory or computational settings.

Upon successful completion of the *PG Diploma Engineering for Biomedicine* programme you will be able to:

[KU1] Assess how core concepts and principles in engineering can be applied to the fields of life science and medicine and identify their limitations.

[KU2] Evaluate core and specialised concepts and principles of engineering and how these are relevant to historical, current and future developments and technologies in the fields of life science and medicine.

[KU3] Evaluate a range of innovative and creative engineering solutions applied to healthcare problems and quality-of-life issues and critically discuss these examples in terms of their commercial, economic, social and sustainability implications.

[KU4] Recognise and justify the need for a high level of professional and ethical conduct in engineering, based on a knowledge of professional codes of conduct, how ethical dilemmas can arise and the management of risk issues.

[KU5] Describe and critically discuss management and business practices that may be applied in the development of technologies in the fields of life science and medicine, with reference to regulatory requirements applicable to medical devices and healthcare solutions.

[IA1] Critically select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in bioengineering, life sciences and medicine.

[IA2] Extract, analyse and critically evaluate information and data gathered from academic and technical resources.

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

[PT1] Work effectively within a multidisciplinary team, demonstrating leadership, project management and communication skills.

[PT2] Work individually and/or within a group to plan, conduct and professionally communicate the results of a programme of original research or advanced technical design activities, in a safe and ethical manner in laboratory or computational settings.

Upon successful completion of the *PG Certificate Engineering for Biomedicine* programme you will be able to:

[KU1] Assess how core concepts and principles in engineering can be applied to the fields of life science and medicine and identify their limitations.

[KU2] Evaluate core and specialised concepts and principles of engineering and how these are relevant to historical, current and future developments and technologies in the fields of life science and medicine.

[KU3] Evaluate a range of innovative and creative engineering solutions applied to healthcare problems and quality-of-life issues and critically discuss these examples in terms of their commercial, economic, social and sustainability implications.

[KU4] Recognise and justify the need for a high level of professional and ethical conduct in engineering, based on a knowledge of professional codes of conduct, how ethical dilemmas can arise and the management of risk issues.

[KU5] Describe and critically discuss management and business practices that may be applied in the development of technologies in the fields of life science and medicine, with reference to regulatory requirements applicable to medical devices and healthcare solutions.

[IA1] Critically select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in bioengineering, life sciences and medicine.

[IA2] Extract, analyse and critically evaluate information and data gathered from academic and technical resources.

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

[PT1] Work effectively within a multidisciplinary team, demonstrating leadership, project management and communication skills.

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: www.imperial.ac.uk/about/education/our-graduates/

Entry Requirements	
Academic Requirement	The minimum requirement is normally a 2.1 UK Bachelor's degree with Honours in a clinical or life science degree (or a comparable qualification recognised by the university) Applicants awarded an unclassified clinical degree (e.g. MBBS, MBChB and MChD/BChD) are expected to show good academic standing (typically within the top 50% of their medical school cohort). Where a graded intercalated degree has been undertaken at least a 2.1 should have been achieved. An 'A' grade in A-level maths desirable. For further information on entry requirements, please go to: www.imperial.ac.uk/study/apply/postgraduate-taught/entry-requirements/
Non-academic Requirements	None

English Language Requirement	Higher requirement (PG) Please check for other Accepted English Qualifications
Admissions Test/Interview	Applicants may be invited to attend an interview with one or more members of academic staff

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.

Depending on your project and elective choices you may also attend laboratories sessions in our wet or dry laboratories and develop your practical skills.

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.

Major Individual Project

A key part of our MSc programme is the Major Individual Project. This project gives you an opportunity to build on the knowledge and skills you will have developed in your taught modules and apply this to current engineering, design and research problems that interest you. The project also helps you to develop important project management, team working and communication skills that are highly valued by employers and international research groups.

The project is conducted throughout the year but the majority of work is normally undertaken in the summer term, when you will be expected to work on this full time. Whilst this project will be based in Bioengineering it may involve collaboration with groups in other Imperial departments or with Industry.

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 for the MSc Engineering for Biomedicine is 2,250 hours per year.

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. Around half of your independent study hours are spent on your Major Individual Project.

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 each year.

The choice of assessment method is largely determined by the learning objectives being assessed and includes:

Assessed Coursework

- Problem sheets
- Laboratory reports – individually or as part of a portfolio.
- Practical demonstrations
- Project reports
- Oral presentations
- Poster presentations
- Academic tutorials
- In class progress tests

Examinations

- Written examinations
- Oral examinations

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 and mock/past examinations before you complete the summative assessments that count towards your final mark.

The exact balance of the summative assessment through the programme depends upon which elective modules are taken, but an indicative breakdown is:

Coursework	35%
Exams	35%
Practicals	30%

Academic Feedback Policy

Feedback will be provided to you in one of many formats, including:

- Oral (during or after lectures, personally or as a group feedback session)
- Personal (discussion with academics during office hours, meetings with Personal Tutors)
- Interactive (problem solving with GTAs & study groups, peer feedback)

- Written (solutions/model answers to coursework, notes on submitted reports)
- Online (results of online tests with correct answers provided)
- Self-reflective (personal journals, reflective essays and class discussion)

It is department policy to provide feedback to students normally within 10 working days of assessment submission. This timeframe may be extended for significantly large assessments or for final examinations. In this case the date when feedback will be available by will be communicated to students when the assessment is the set.

Individual feedback will not be provided on written examinations. However, feedback on the general performance of the cohort on the exam questions will be given. Numerical results for each module will be published after the meeting of the final Board of Examiners

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
Eligibility for resits is determined by the Examination Board in line with Imperial's policy. The Department of Bioengineering does not normally offer resits in September. Students with marginal failure may be offered a supplementary qualifying test in place of a re-sit opportunity. 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
N/A	N/A	N/A

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]

Year 1 – FHEQ Level 7

You will study the core module, 'MSc Major Individual Project' (Total 40 ECTS) and the first 3 compulsory modules (Total 20 ECTS).

You then choose one module from Group A (5 ECTS).

You choose 5 electives, including up to 2 electives from Group B (Autumn term modules), and between 3 and 5 from Group C (Spring term modules).

Group B modules run in Autumn term, as do the compulsory modules, and therefore you would be overloaded if you took more than 2 electives from Group B (Autumn term).

Code	Module Title	Core/ Compulsory Elective/	Group	Term	Credits
BIOE70025	MSc Major Individual Project	Core	N/A	Autumn-Summer	40
BIOE70074	Journal Club	Compulsory	N/A	Autumn	5
BIOE70055	Fundamentals of Biomedical Engineering L7	Compulsory	N/A	Autumn	10
BIOE70037	Computational and Statistical Methods for Research	Compulsory	N/A	Autumn	5
BIOE70028	Medical Device Certification	Compulsory	A	Autumn	5
BIOE70014	Medical Device Entrepreneurship	Compulsory	A	Autumn	5
BIOE70008	Advanced Physiological Monitoring and Data Analysis	Elective	B	Autumn	5
BIOE70010	Principles of Biomedical Imaging	Elective	B	Autumn	5
BIOE70033	Biomaterials for Bioengineers L7	Elective	B	Autumn	5
BIOE70049	Bioengineering Approaches to Cancer	Elective	B	Autumn	5
BIOE70056	Biomaterials for Biomedicine and Sustainability	Elective	B	Autumn	5
BIOE70019	Orthopaedic Biomechanics	Elective	C	Spring	5
BIOE70032	Tissue Engineering and Regenerative Medicine L7	Elective	C	Spring	5
BIOE70012	Biomimetics	Elective	C	Spring	5
BIOE70022	Industrial Applications of Cellular Engineering L7 (not running in 2024-25)	Elective	C	Spring	5
BIOE70005	Cellular and Molecular Mechanotransduction	Elective	C	Spring	5
BIOE70075	Engineering In Cancer Therapy	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 a minimum of 60 credits at Level 7 and 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 15 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

None

Supporting Information
The Programme Handbook is available at: www.imperial.ac.uk/bioengineering/admin/current-pgt/msc-engineering-for-biomedicine/
The Module Handbook is available at: www.imperial.ac.uk/bioengineering/admin/current-pgt/options/
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
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 Imperial as a University with the name and style of "The Imperial College of Science, Technology and Medicine". www.imperial.ac.uk/admin-services/secretariat/college-governance/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.