

Programme Information		
Programme Title	Programme Code	HECoS Code
iBSc Medical Sciences with Biomedical Engineering	A144	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
BSc	1 Academic year	Full-Time	Annually in October	60	120

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Engineering
Teaching Institution	Imperial College London	Department	Bioengineering
Associateship	City and Guilds of London Institute	Main Location(s) of Study	South Kensington and White City Campuses

External Reference	
Relevant <a href="#">QAA Benchmark Statement(s)</a> and/or other external reference points	<a href="#">Bachelors Degrees in Engineering</a>
<a href="#">FHEQ Level</a>	Level 6
<a href="#">EHEA Level</a>	1st Cycle

External Accreditor(s) (if applicable)			
External Accreditor 1:	NA		
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 Firat Guder
Student cohorts covered by specification	2022-23 entry
Date of introduction of programme	October 17
Date of programme specification/revision	March 22

## Programme Overview

Biomedical engineers use their technological knowledge and understanding to help people live longer, healthier, happier lives. In our Medical Sciences with Biomedical Engineering programme you will develop the technical knowledge and understanding required of an engineer and learn how to apply this knowledge in the analysis and solution of Biomedical Engineering problems.

Our one-year intercalated BSc programme, is a full time programme leading to a BSc award. The programme is available to medical students both from Imperial College London and from other institutions. The programme aims to educate you, as a future clinician and medical leader in engineering practices as applied to healthcare challenges and position you well for interdisciplinary careers at the forefront of healthcare innovation.

Our programme combines lectures, study groups and taught classes where you gain a theoretical understanding with practical experiences where you will and work on real world projects in medicine and biology with life-changing potential. A large part of your practical experience will come from the Bioengineering Group Project where you will work within an interdisciplinary team to develop a solution to a proposed Biomedical Engineering problem. During all aspects of the programme you will benefit from interaction with students on other programmes in the Department to 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.

In the core modules, you will learn the basics of engineering maths, electronics and mechanics, programming skills, statistical and data analysis tools, 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, biomechanics and mechanobiology and development of medical devices.

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.

## Learning Outcomes

The following Learning Outcomes are in line with FHEQ level 6.

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 *iBSc Medical Sciences with Biomedical Engineering* programme you will be able to:

**[KU1]** Assess the application of core scientific principles, mathematics, computational models and tools used in Biomedical engineering.

**[KU2]** Evaluate core and specialised concepts and principles of engineering and how these are relevant to historical, current and future developments and technologies in a biological and medical context

**[KU3]** Evaluate examples of innovative and creative engineering solutions applied to healthcare problems and quality-of-life issues and 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 and how ethical dilemmas can arise.

**[IA1]** Select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in Biomedical engineering.

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

- [IA3]** Extract and evaluate information and data gathered from academic and technical resources.
- [PT1]** Work effectively within a multidisciplinary team, demonstrating leadership and communication skills.
- [PT2]** Exercise judgement in a range of situations and accept accountability for achieving personal and/or group outcomes.
- [PT3]** Plan, conduct and communicate the results of research investigations and/or design activities, in a safe and ethical manner in laboratory or computational settings

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)

**Entry Requirements**

Academic Requirement	<p>Registration on a General Medical Council (GMC) recognised MBBS degree (or equivalent), or a veterinary or dental degree programme. Students must have successfully completed the first two years of that programme. No break in studies is permitted between the programme at the other institution and the beginning of the programme for the BSc degree.</p> <p>Intercalating students need to demonstrate that they are likely to receive a 2.1 or 1st by supplying an academic transcript from their home institution.</p> <p>Applicants should be enthusiastic about engineering and are required to possess a strong mathematical ability, demonstrated through having achieved a minimum of Grade 'B' at A-Level in Mathematics, or equivalent.</p> <p>For further information on entry requirements, please go to UG: <a href="http://www.imperial.ac.uk/study/ug/apply/requirements/ugacademic">www.imperial.ac.uk/study/ug/apply/requirements/ugacademic</a></p>
Non-academic Requirements	None
English Language Requirement	<a href="#">Standard requirement (UG)</a> Please check for other <a href="#">Accepted English Qualifications</a>
Admissions Test/Interview	None

The programme's competency standards documents can be found at: <http://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 pre-sessional material, 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 elective choices you may also attend laboratory sessions to develop your practical skills. These may include computer, wet labs or electrical labs.

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.

### Pre-sessional course and laboratory preparatory workshops

As we know many of our students have not formally studied mathematics or programming for a number of years, we offer a pre-sessional course covering these topics. This material is delivered via an online learning platform and is largely delivered asynchronously, allowing you to schedule your own study time during the summer prior to starting with us in person. You will be supported on this course through a number of study sessions with Graduate Teaching Assistants.

Additionally, if you select lab-based electives you may also be required to attend laboratory preparatory workshops. Typically, this consists of 2 x 3 hour sessions to allow you to develop basic electronics labs skills. This should be discussed with the module leader when you make your elective selections.

These optional sessions are not for credit and the time spent on these is not counted in the total number of hours given as the overall workload below. There are formative assessments built into the pre-sessional course to help you understand your progress, but you are not required to pass the course to undertake the full programme.

### Bioengineering Group Project

A key part of our iBSc programme is the Bioengineering Group Project. For this module you will work in a small group to design, make and test a solution to a bioengineering problem. These projects will allow you to develop professional engineering skills and appreciate the subtleties of working in a team. You will also be given support in managing a team and giving effective feedback to others, which includes training and practice with the process of peer review which will form part of the assessment for these projects. For the process of peer review each member of a team is asked to provide relative effort marks for their team members via an

anonymous on-line form. We guide you through this process, including an early practice run to ensure that this is fair and informative

### 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 1,500 hours per year.

Typically, you will spend in the order of 15% of your time on lectures, seminars and similar (around 250 hours) and in the order of 85% of your time on independent study. Over a third of your independent study hours are spent on your group 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 outcomes 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

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	45%
Exams	40%
Practicals	15%

<b>Academic Feedback Policy</b>
<p>Feedback will be provided to you in one of many formats, including:</p> <ul style="list-style-type: none"> <li>• Oral (during or after lectures, personally or as a group feedback session)</li> <li>• Personal (discussion with academics during office hours, meetings with Personal Tutors)</li> <li>• Interactive (problem solving with GTAs &amp; study groups, peer feedback)</li> <li>• Written (solutions/model answers to coursework, notes on submitted reports)</li> <li>• Online (results of online tests with correct answers provided)</li> <li>• Self-reflective (personal journals, reflective essays and class discussion)</li> </ul> <p>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 set.</p> <p>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</p> <p>The College's Policy on Academic Feedback and guidance on issuing provisional marks to students is available at:  <a href="http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/">www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/</a></p>
<b>Re-sit Policy</b>
<p>Eligibility for resits is determined by the Examination Board in line with the College 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.</p> <p>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/">www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/</a></p>
<b>Mitigating Circumstances Policy</b>
<p>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/">www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/</a></p>

<b>Additional Programme Costs</b>		
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 <sup>1</sup>					
<b>Year 1 - FHEQ Level 6</b> <b>Students study all core and compulsory modules.</b>					
<b>Students then choose 4 electives from Groups A and B, where no more than 1 elective can be from Group B.</b>					
Code	Module Title	Core/ Elective/ Compulsory	Group	Term	Credits
BIOE60017	Fundamentals of Biomedical Engineering	Compulsory	N/A	1	10
BIOE60011	Probability and Statistics for Bioengineering	Compulsory	N/A	1	5
BIOE60028	iBSc Journal Club	Compulsory	N/A	1	5
BIOE60005	Bioengineering Group Project	Core	N/A	All	20
BIOE60013	Tissue Engineering and regenerative medicine	Elective	A	2	5
BIOE60029	Principles of Biomedical Imaging L6	Elective	A	1	5
BIOE60008	Image Processing	Elective	A	2	5
BIOE60026	Orthopaedic Biomechanics L6	Elective	A	2	5
BIOE60003	Biomedical Instrumentation	Elective	A	2	5
BIOE60030	Neuroscience L6	Elective	A	1	5
BIOE60031	Advanced Physiological Monitoring and Data Analysis L6	Elective	A	1	5
BIOE60032	Bioengineering Approaches to Cancer L6	Elective	A	1	5
BIOE60027	Cellular and Molecular Mechanotransduction L6	Elective	A	2	5
BIOE60033	Ionising Tissue and Flow Imaging L6	Elective	A	2	5
<b>Year 1 - FHEQ Level 7</b> <b>Students may choose 1 elective from Group B. Students should note that the pass mark for electives at Level 7 is 50%.</b>					
Code	Module Title	Core/ Elective/ Compulsory	Group	Term	Credits
BIOE70014	Medical Device Entrepreneurship	Elective	B	1	5
BIOE70028	Medical Device Certification	Elective	B	1	5
BIOE70012	Biomimetics	Elective	B	1	5
Credit Total					60

<sup>1</sup> **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

### Classification

In order to be considered for an award, you must have achieved the minimum number of credits at the required levels prescribed for that award and met any programme specific requirements as set out in the Programme Specification.

Your classification will be determined through:

- i) Aggregate Module marks for all modules

The College sets the class of undergraduate degree that may be awarded as follows:

- i) First 70.00% or above for the average weighted module results
- ii) Upper Second 60.00% or above for the average weighted module results
- iii) Lower Second 50.00% or above for the average weighted module results
- iv) Third 40.00% or above for the average weighted module results

## Programme Specific Regulations

N/A

Supporting Information
The Programme Handbook is available at: <a href="https://www.imperial.ac.uk/bioengineering/admin/current-ug/intercalated-bsc/">https://www.imperial.ac.uk/bioengineering/admin/current-ug/intercalated-bsc/</a>
The Module Handbook is available at: <a href="https://www.imperial.ac.uk/bioengineering/admin/current-ug/options/a144/">https://www.imperial.ac.uk/bioengineering/admin/current-ug/options/a144/</a>
The College's entry requirements for postgraduate programmes can be found at: <a href="http://www.imperial.ac.uk/study/pg/apply/requirements">www.imperial.ac.uk/study/pg/apply/requirements</a>
The College's Quality & Enhancement Framework is available at: <a href="http://www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance">www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance</a>
The College's Academic and Examination Regulations can be found at: <a href="http://www.imperial.ac.uk/about/governance/academic-governance/regulations">www.imperial.ac.uk/about/governance/academic-governance/regulations</a>
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". <a href="http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/">www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/</a>
Imperial College London is regulated by the Office for Students (OfS) <a href="http://www.officeforstudents.org.uk/advice-and-guidance/the-register/">www.officeforstudents.org.uk/advice-and-guidance/the-register/</a>
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 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.

Modifications			
Description	Approved	Date	Paper Reference
Curriculum Review	Programmes Committee	29/03/22	PC.2021.83

