

Programme Information		
Programme Title	Programme Code	HECoS Code
Biomedical Engineering with a Year Abroad	BH9C	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MEng ¹	4 Academic years	Full-time	Annually in October	240	480

¹The MEng Biomedical Engineering with a Year Abroad is a pathway within the MEng Biomedical Engineering degree where students undertake their fourth year at a host university outside of the UK. A placement is subject to performance at upper second-class level in the first two years of the programme, and acceptance by a suitable host University. The placements are competitive, and the final selection is made by the department following an interview.

CertHE, DipHE and BEng exit awards are available to students via the MEng Biomedical Engineering programme and are not accredited by any professional body. They may be offered to a student as an exit award in exceptional circumstances. All students must apply to and join the MEng Biomedical Engineering programme.

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Engineering
Teaching Institution	Imperial College London	Department	Bioengineering
Associateship	City and Guilds London Institute	Main Location(s) of Study	South Kensington Campus
External Reference			
Relevant QAA Benchmark Statement(s) and/or other external reference points		General Engineering and Masters in Engineering	
FHEQ Level		MEng Level 7 BEng Level 6	
EHEA Level		2nd Cycle	
External Accrator(s) (if applicable)			
External Accrator 1:	Institution of Mechanical Engineers		
Accreditation received:	N/A	Accreditation renewal:	2019
External Accrator 2:	Institute of Physics and Engineering in Medicine		
Accreditation received:	N/A	Accreditation renewal:	2019

External Accreditor 3:	The Institution of Engineering and Technology		
Accreditation received:	N/A	Accreditation renewal:	2019
External Accreditor 4:	The Institute of Materials, Minerals and Mining		
Accreditation received:	N/A	Accreditation renewal:	2019
External Accreditor 5:	The Institution of Engineering Designers		
Accreditation received:	N/A	Accreditation renewal:	2019
Collaborative Provision			
Collaborative partner	Collaboration type	Agreement effective date	Agreement expiry date
N/A	N/A	N/A	N/A
Specification Details			
Programme Lead	Professor Martyn Boutelle		
Student cohorts covered by specification	2019-20 entry		
Date of introduction of programme	October 02		
Date of programme specification/revision	March 19		

Programme Overview
<p>Biomedical engineers use their technological knowledge and understanding to help people live longer, healthier, happier lives. In our Biomedical 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 programme combines lectures, study groups and taught classes where you gain a theoretical understanding with many practical wet and dry labs and activities where you will and work on real world projects in medicine and biology with life-changing potential. You will also have many opportunities to take part in design, test and build activities starting in the first year and continuing through the degree programme.</p> <p>Our programme will also build your communication and inter-personal skills through a range of teaching activities including a substantial amount of group and team work as collaboration in interdisciplinary teams is a key feature of working as a professional Biomedical Engineer. This begins in the first week of year 1 where group working is introduced in fresher's week.</p> <p>We expect our graduates to have the ability to become leaders in their chosen areas and so our programme is also designed to develop your leadership skills, introduce you to professional standards and to develop your understanding of engineers' obligations to society, the profession and the environment.</p> <p>In your first two years all modules are compulsory and are delivered in the department. The first two years are designed to ensure that all students achieve a common breadth and depth of knowledge in the technical areas of Mathematics and Computing, Electrical Engineering, Mechanical Engineering and Bioengineering delivered in a <i>Biomedical Engineering context</i>. You will also follow a module developing your design skills and professional practice. At the end of the second year you will have a broad knowledge base which will provide a platform for specialisation.</p> <p>In the third year of the MEng programme there are a small number of compulsory modules including the group project that make up 25 ECTS. The remaining 35 ECTS is made up of elective modules that you can choose. 15 of these ECTS will form the basis of your specialisation from a choice of four: Bioengineering, Computational Bioengineering, Mechanical Bioengineering and Electrical Bioengineering.</p>

In the third year of the course you are also required to select an I-Explore module hosted outside of the department so that you will be taught alongside students from other degree programmes. These modules include business and management modules as well as other topics outside the Bioengineering discipline that will allow you to apply your knowledge in a new context.

You may choose to take some technical elective modules in other departments of the Faculty of Engineering. In this case you will attend the same lectures and take the same assessments as the senior year students in the hosting department. This confirms that the first two years have provided a solid platform for specialisation. The knowledge, understanding and skills that you acquire throughout the Faculty will be translated into a Bioengineering themed final year individual project.

Your final year will be spent at your host university. During this year you will be expected to conduct a substantial individual research project and study several technical modules. The exact content of this year will vary by partner institution.

Learning Outcomes

The following Learning Outcomes are in line with FHEQ levels 4-7 and the UK-SPEC outcomes required for accreditation by professional engineering bodies.

Upon successful completion of the MEng Biomedical Engineering with a Year Abroad programme you will be able to:

Knowledge and Understanding:

- Describe and explain the underlying scientific principles, engineering mathematics and computational models and tools that underpin Biomedical Engineering and identify their limitations
- Describe and explain the core concepts, principles and theories of related disciplines including Electrical Engineering, Mechanical Engineering and Materials Engineering and how these are relevant to historical, current and future developments and technologies in a Biological and Medical context.
- Give examples of a wide range 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 and social implications
- Recognise and explain 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

Intellectual abilities:

- Apply a wide range of engineering principles, tools and notations proficiently
- Critically select engineering principles and tools for the analysis and solution of familiar and unfamiliar bioengineering problems
- Apply diagnostic skills, technical knowledge and understanding of engineering design processes to establish rigorous and creative solutions to complex Bioengineering problems
- Extract pertinent data and critically evaluate information gathered from academic and technical resources

Practical and Transferable skills:

- Plan and safely execute experiments in diverse types of laboratories
- Demonstrate advanced leadership, teamwork and communication skills

The placements are competitive, and the final selection is made by the department following an interview.

The programme's competency standards documents can be found at: <https://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

Scheduled Learning & Teaching

Students are taught through a combination of lectures, study groups and tutorials, laboratories and 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. Dry laboratories in electrical, mechanical and bioengineering will allow you to develop practical skills and gain experience in the application of the theory discussed in lectures and study groups. Wet laboratories will allow you to develop an understanding of how to handle biological and chemical materials. Computing labs will support the maths and computational content of the course. In laboratories you will work in pairs or trios.

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.

The first two years of the programme will be made up of compulsory modules which all students on the programme will study. In years three and four, there will be a small number of compulsory modules and you will be able to choose the remainder of modules you study.

Independent Learning

Students are expected to spend significant time on independent study outside of face to face contact time. 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 eModules ahead of attending timetabled sessions. This independent learning is followed by sessions led by the lecturer 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

Design and Research Projects

A key part of this programme are the second and third year group projects and the fourth year individual research project. In second and third year 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. In fourth year you are required to undertake a substantial research project during your placement abroad.

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 1500 hours per year.

Typically, in the first two years (levels 4 and 5) you will spend around 25% of your time on lectures, seminars and other scheduled activity (around 400 hours) and around 75% of your time on independent study (around 1100 hours).

In the third year (level 6), you will spend less time in scheduled activity (around 250 hours) with the remainder in independent study, a significant proportion of which will be the 3rd year group project. As your 4th year is abroad the ratio of scheduled activity to independent study will vary by institution.

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

Examinations

- In class progress tests
- Mastery examinations (online/written)
- Written examinations
- Oral Exams -conducted by some host institutions for the Year Abroad

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 table below is indicative of the balance of assessment based on a typical pathway through the course.

	Year 1	Year 2	Year 3	Year 4
Coursework	30 %	30 %	47 %	Varies by institution
Examinations	70 %	70 %	53 %	

Academic Feedback Policy

Feedback will be provided 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 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.

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 will be published after the meeting of the final Board of Examiners.

The College'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 Departmental Board of Examiners in line with the College policy. The Department of Bioengineering does not normally offer resits in the same academic year. Students with marginal failure may be offered a re-assessment in place of a re-sit opportunity. The College's Policy on Re-sits is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Mitigating Circumstances Policy

The College's policy on mitigating circumstances makes provision for the Departmental Boards of Examiners to use their discretion where extenuating circumstances are independently corroborated and are judged by the Departmental Mitigating Circumstances Board to be of sufficient severity to have substantially affected a student's performance. The College's Policy on Mitigating Circumstances is available at:

www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

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
Course materials - Electronics textbook	Optional	£ 40
Personal Protective Equipment – Bioengineering Overalls	Mandatory	£ 26

Students will need to consider the costs involved with placements. For students studying or working abroad as part of their programme, costs will vary with destination. Information on the types of costs which may be incurred can be found in the Placements Abroad Handbook which is available at <https://www.imperial.ac.uk/placements/information-for-imperial-college-students/>

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 4 Students study core modules.					
Code	Module Title	Core/ Elective	Group*	Term	Credits
BIOE40001	Bioengineering Science 1	Compulsory	N/A	1,2,3	10
BIOE40004	Mathematics 1	Compulsory	N/A	1,2,3	10
BIOE40002	Computer Fundamentals and Programming 1	Compulsory	N/A	1,2,3	10
BIOE40006	Mechanics and Electronics 1	Compulsory	N/A	1,2,3	15
BIOE40010	Medical and Biological Science 1	Compulsory	N/A	1,2,3	10
BIOE40003	Design and Professional Practice 1	Compulsory	N/A	3	5
Credit Total					60
Year 2 - FHEQ Level 5 Students study all modules.					
Code	Module Title	Core/ Elective	Group	Term	Credits
	Mathematics 2	Compulsory	N/A	1,2,3	7.5
	Signals and Control 2	Compulsory	N/A	1,2,3	7.5
	Fluid and Solid Mechanics 2	Compulsory	N/A	1,2,3	10
	Electronics and Electromagnetics 2	Compulsory	N/A	1,2,3	10
	Design and Professional Practice 2	Compulsory	N/A	1,2,3	10
	Programming 2	Compulsory	N/A	1	5
	Bioengineering science 2	Compulsory	N/A	1	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.

	Medical Science 2	Compulsory	N/A	2	5
Credit Total					60

Year 3 - FHEQ Level 6 (except ^)

All students study the first four compulsory modules listed in this table, including the I-explore module (Total 35 or 37.5 ECTS)

Students must then choose one of the four pathways and study the associated compulsory modules: A) Bioengineering, B) Mechanical Bioengineering, C) Electrical Bioengineering and D) Computational Bioengineering (Total 15 ECTS)

Students can then choose two elective modules from Group E, across levels 6 and 7 (Total 10 ECTS)

^Level 7 modules

****Modules hosted by other departments. These are subject to availability.**

Code	Module Title	Core/ Elective	Group	Term	Credits
	Probability and Statistics for Bioengineering	Compulsory	N/A	1	5
	MEng Group Project	Core	N/A	1,2,3	20
	Modelling in Biology^	Compulsory	N/A	1	5
	I-Explore	Compulsory	N/A	1 and/or 2	5 or 7.5

Year 3 Bioengineering Pathway compulsory modules – FHEQ Level 6 (except where noted ^ as Level 7)

	Biomedical Instrumentation	Compulsory (for stream)	A	2	5
	Biomedical Advanced and Computational Stress Analysis	Compulsory (for stream)	A	2	5
	Principles of Biomedical Imaging^	Compulsory (for stream)	A	1	5

Year 3 Mechanical Bioengineering Pathway compulsory modules – FHEQ Level 6

	Biomechanics	Compulsory (for stream)	B	1	5
	Physiological Fluid Mechanics	Compulsory (for stream)	B	2	5

	Biomedical Advanced and Computational Stress Analysis	Compulsory (for stream)	B	2	5
Year 3 Electrical Bioengineering Pathway compulsory modules – FHEQ Level 6					
	Biomedical Instrumentation	Compulsory (for stream)	C	2	5
	Image Processing	Compulsory (for stream)	C	2	5
	Digital Biosignal processing	Compulsory (for stream)	C	1	5
Year 3 Computational Bioengineering Pathway compulsory modules – FHEQ Level 6					
	Image processing	Compulsory (for stream)	D	2	5
	Programming 3	Compulsory (for stream)	D	1	5
	Digital Biosignal Processing	Compulsory (for stream)	D	1	5
Year 3 Elective Modules – FHEQ Level 6 (except where noted as Level 7)					
	Digital Biosignal Processing	Elective	E	1	5
	Biomechanics	Elective	E	1	5
	Image Processing	Elective	E	2	5
	Physiological Fluid Mechanics	Elective	E	2	5
	Foundations of Synthetic Biology	Elective	E	2	5
	Human Centred Design of Assistive and Rehabilitation Devices	Elective	E	2	5
	Manufacturing Technology and Management**	Elective	E	1,2	5
	Machine Dynamics and Vibrations**	Elective	E	1,2	5
	Biomedical Instrumentation	Elective	E	2	5
	Biomedical Advanced and Computational Stress Analysis	Elective	E	2	5
	Advanced Signal Processing**	Elective	E	2	5
	Control Engineering**	Elective	E	1	5
	Advanced Electronic Devices^**	Elective	E	1	5
	Optoelectronics**	Elective	E	1	5

	Electromagnetics	Elective	E	2	5
	Design-led innovation and enterprise**	Elective	E	2	5
	Tissue Engineering and Regenerative Medicine	Elective	E	1	5
	Biomaterials**	Elective	E	1	5
	Communicating Biomedical Science and Engineering	Elective	E	1	5
	Hearing and Speech Processing^	Elective	E	1	5
	Biomimetics^	Elective	E	2	5
Credit Total					60

Year 4 - FHEQ Level 7					
Code	Module Title	Core/ Elective	Group	Term	Credits
	Completed at a university abroad				
Credit Total					60

Progression

Year One

A student must:

- Achieve a mark of at least 40.00% in each module. A student may be compensated in modules up to the value of 15 ECTS with a qualifying mark of at least 30.00%. Note the programme specific regulation that only 15 ECTS may be compensated over the whole degree.

Year Two

A student must:

- Achieve a mark of at least 40.00% in each module. A student may be compensated in modules up to the value of 15 ECTS with a qualifying mark of at least 30.00%.
- Achieve an overall aggregate mark of at least 60.00% to remain on the MEng pathway.
- A student achieving between 55.00% and 60.00% may at the discretion of the Director of Courses be allowed to remain on the MEng program subject to agreed module choices, provided a case is made by the student.
- A student achieving an overall aggregate mark of less than 55.00% but satisfying all other requirements will be transferred to the programme BH81 (BEng Biomedical Engineering). Students transferred to the BEng programme will undertake a BEng Individual Project in Year Three.

Year Three

A student must:

- Achieve a mark of at least 40.00% in each module. A student may be compensated in modules up to the value of 15 ECTS with a qualifying mark of at least 30.00%.

Year Four

Each partner institution uses a different marking scheme with different views regarding which mark or grade should correspond to the same level of performance. Based on previous experience of working with these partner institutions your year abroad mark will be converted into an equivalent Imperial College mark by the department. This mark will then be recommended to the Board of Examiners and used to determine classification decisions; the Board will take into account the small uncertainty inherent in any such mark conversion procedure and exercises its discretion in favour of the student when making its final decision.

The Year Abroad cannot be compensated.

Classification

The marks from modules in each year contribute towards the final degree 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
- ii) Year Weightings

For the MEng award, Year One is weighted at 7.50%, Year Two at 20.00% and Years Three and Four at 36.25%.

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 |

Please find the full Academic Regulations at <https://www.imperial.ac.uk/about/governance/academic-governance/regulations/>. Please follow the prompts to find the set of regulations relevant to your programme of study.

Programme Specific Regulations

You must complete a Business based elective at level 6 to meet the learning outcomes set by the professional engineering bodies for accreditation. If your choice of an iExplore module in year 3 is a BPES module, you are not required to choose such a module in year 4.

To ensure you complete 60 ECTS at level 7 across years 3 and 4 we have made the level 7 module 'Modelling in Biology' compulsory in year 3. To allow you the greatest range of flexibility in technical elective options we also allow you to take further level 7 modules in year 3 and some level 6 modules in year 4 as detailed in the programme structure section of this document.

To meet professional engineering accreditation requirements no more than 15 ECTS may be compensated on this degree programme.

Policies and regulations may vary for students on a year abroad. You are encouraged to familiarise yourself with the relevant policies and regulations which will underpin your studies while abroad before you go. If you have any questions please talk to your host institution or your home departmental contact.

Supporting Information

The Programme Handbook is available at: <https://www.imperial.ac.uk/bioengineering/admin/current-ug>

The Module Handbook is available at: <http://www.imperial.ac.uk/bioengineering/admin/current-ug/>

The College's entry requirements for postgraduate programmes can be found at:
www.imperial.ac.uk/study/pg/apply/requirements

The College's Quality & Enhancement Framework is available at:
www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance

The College's Academic and Examination Regulations can be found at:
www.imperial.ac.uk/about/governance/academic-governance/regulations

Imperial College is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of the College's Centenary, 8th July 2007, established the College as a University with the name and style of "The Imperial College of Science, Technology and Medicine".
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 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
N/A	N/A	N/A	N/A