

| Programme Information | | |
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| Programme Title | Programme Code | HECoS Code |
| Molecular Bioengineering with a Year Abroad | H163 | For Registry Use Only |

| Award | Length of Study | Mode of Study | Entry Point(s) | Total Credits | |
|------------------------|------------------|---------------|---------------------|---------------|------|
| | | | | ECTS | CATS |
| MEng ¹ H163 | 4 Academic years | Full-time | Annually in October | 240 | 480 |
| BEng H161 | 3 Academic years | Full-time | Annually in October | 180 | 360 |

¹The MEng Molecular Bioengineering with a Year Abroad is a pathway within the MEng Molecular Bioengineering 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.

*The DipHE and CertHE exit award is 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.

| 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 | | 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: | 2021 dependent on First Output Review | Accreditation renewal: | NA |

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|--|--|--------------------------|-----------------------|
| External Accreditor 2: | The Institution of Engineering Designers | | |
| Accreditation received: | 2018 | Accreditation renewal: | 2023 |
| External Accreditor 3: | Institute of Physics and Engineering in Medicine | | |
| Accreditation received: | 2021 dependent on First Output Review | Accreditation renewal: | NA |
| External Accreditor 4: | The Institution of Engineering and Technology | | |
| Accreditation received: | 2021 dependent on First Output Review | Accreditation renewal: | NA |
| External Accreditor 5: | The Institute of Materials, Minerals and Mining | | |
| Accreditation received: | 2017 | Accreditation renewal: | 2023 |
| 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 Sylvain Ladame | | |
| Student cohorts covered by specification | 2021-22 entry | | |
| Date of introduction of programme | October 18 | | |
| Date of programme specification/revision | October 21 | | |

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| Programme Overview |
| <p>Molecular Bioengineering considers how we might engineer biological systems to solve challenges in health and wellbeing. The programme will take a strong engineering approach to understanding and solving biological and biomedical problems and has been designed with a focus on engineering rather than a clinical perspective. By undertaking this degree programme you will develop the scientific understanding and laboratory expertise of a life-scientist with the technical knowledge and problem-solving skills of an engineer. With this unique combination of skills you will be extremely well placed to contribute to addressing the global challenges of today: health and well-being agenda, personalised medicine, new biomedical technology industries.</p> <p>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 Molecular Bioengineer. 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> |

In your first two years all modules are compulsory and are delivered in the department. These modules are designed so that you build a breadth of core engineering and biomedical engineering knowledge, as well as a specialist understanding of biochemical, physiological and biological processes. You will undergo extensive wet laboratory training so that you develop excellent advanced practical laboratory skills in chemical biology, molecular biology, synthetic biology, analytical sciences, microfluidics and device engineering.

In the third year of the MEng programme there are 5 compulsory modules including the group project that make up 45 ECTS. You can then choose 3 additional elective modules aligned with your own interests.

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.

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.

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 MEng Molecular Bioengineering with a Year Abroad programme you will be able to:

[KU1] Describe and explain the underlying scientific principles, engineering mathematics, computational tools and models, and laboratory and analysis techniques that underpin Molecular Bioengineering and identify their limitations.

[KU2] Describe and explain the core concepts, principles and theories of Molecular Bioengineering, Biomolecular Analysis, Biomimetic Design, Synthetic Biology and Materials Engineering and how these are relevant to historical, current and future developments and technologies in a biological, pharmaceutical and medical context.

[KU3] 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.

[KU4] 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.

[IA1] Apply a range of engineering principles, tools and notations proficiently.

[IA2] Critically select engineering principles and tools for the analysis and solution of familiar and unfamiliar bioengineering problems.

[IA3] Apply diagnostic skills, technical knowledge and understanding of engineering design processes to establish rigorous and creative solutions to complex Bioengineering problems.

[IA4] Extract pertinent data and critically evaluate information gathered from academic and technical resources.

[PT1] Plan and safely execute experiments in diverse types of laboratories.

[PT2] Demonstrate advanced practical skills in Chemistry, Molecular Biology, and Analytical Sciences using a range of current and cutting-edge laboratory and analysis techniques.

[PT3] Demonstrate advanced leadership, teamwork and communication skills.

[PT4] Exercise judgement in a range of situations and accept accountability for decisions made and the quality of outcomes produced.

[PT5] Employ advanced skills to plan and conduct research, advanced technical and professional activities.

[PT6] Work effectively in an international setting with people who have different biomedical engineering education backgrounds, approaches or perspectives.

CertHE, DipHE and BEng exit awards are available to students via the MEng Molecular Bioengineering programme. Please refer to the MEng Molecular Bioengineering programme specifications for learning outcomes by exit award.

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

Entry Requirements

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|------------------------------|--|
| Academic Requirement | The minimum requirement is normally A*AA overall at A-level |
| A- Level | This usually comprises of: A* in Mathematics A in Chemistry A in any further subject preferably biology, physics or further mathematics (or a comparable qualification recognised by the College). |
| IB | Minimum 38 points (or a comparable qualification recognised by the College) 6 in Mathematics at higher level 6 in Chemistry at higher level 6 in a third subject at higher level (or a comparable qualification recognised by the College). |
| Non-academic Requirements | N/A |
| English Language Requirement | Standard requirement IELTS score of 6.5 overall (minimum 6.0 in all elements) |
| Admissions Test/Interview | Applicants can move from the standard Molecular Bioengineering programme during year 3 subject to securing a placement. 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. |

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 electronics, mechanics 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 practical skills and develop an understanding of how to handle biological and chemical materials. You will undergo extensive amounts of wet laboratory work throughout this programme and so become familiar with routine methods and analysis techniques. 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 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 lead 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 reminder 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 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 | 34 % | 53 % | 47 % | Varies by institution |
| Examinations | 66 % | 47 % | 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.

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| 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 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 Board 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 |
| Year abroad costs – return flight, visa costs, health insurance | Mandatory | Varies dependent on partner institution |

| Programme Structure | | | | | |
|---|---|----------------------------------|--------|--------|---------|
| Year 1 – FHEQ Level 4 Students study all modules. | | | | | |
| Code | Module Title | Core/ Compulsory Elective | Group* | Term | Credits |
| BIOE40008 | Molecules and Energetics 1 | Compulsory | N/A | 1,2,3 | 15 |
| BIOE40007 | Medical and Biochemical science 1 | Compulsory | N/A | 1,2,3 | 15 |
| BIOE40005 | Maths and Engineering 1 | Compulsory | N/A | 1,2,3 | 15 |
| BIOE40002 | Programming 1 | Compulsory | N/A | 1,2,3 | 10 |
| BIOE40003 | Design & Professional Practice 1 | Compulsory | N/A | 1,2,3 | 5 |
| Credit Total | | | | | 60 |
| Year 2 - FHEQ Level 5 Students study all modules. | | | | | |
| Code | Module Title | Core/ Compulsory/ Elective | Group | Term | Credits |
| BIOE50009 | Molecules, Materials and Measurement 2 | Compulsory | N/A | 1,2,3 | 15 |
| BIOE50007 | Medical and Biochemical Science 2 | Compulsory | N/A | 1,2,3 | 15 |
| BIOE50005 | Maths and Engineering 2 | Compulsory | N/A | 1,2,3 | 15 |
| BIOE50010 | Programming 2 | Compulsory | N/A | 1,2,3 | 5 |
| BIOE50002 | Design and Professional Practice 2 | Compulsory | N/A | 1,2,3 | 10 |
| Credit Total | | | | | 60 |
| Year 3 - FHEQ Level 6 Students study all compulsory modules. <i>Students on the MEng Programme can then choose 3 elective modules from groups A & B, across FHEQ level 6 & 7 modules – subject to sitting at least 60 ECTS at level 7 modules (including the Individual project) in years 3 and 4. Students on the BEng programme choose 3 elective modules from group A</i> | | | | | |
| Code | Module Title | Core/ Compulsory/ Elective | Group | Term | Credits |
| BIOE60011 | Probability and Statistics for Bioengineering | Compulsory | N/A | 1 | 5 |
| BIOE60005 | Bioengineering Group Project | Compulsory | N/A | 1,2,3 | 20 |
| BIOE96 | Biomaterials for Bioengineers | Compulsory | N/A | 1 | 5 |
| BIOE60012 | Foundations of Synthetic Biology | compulsory | N/A | 2 | 5 |
| | I-Explore | Compulsory | N/A | 1 or 2 | 5 |
| BIOE60024 | Modelling in Biology | Compulsory | N/A | 1 | 5 |

| BIOE60008 | Image Processing | Elective | A | 2 | 5 |
|------------------------------|---|----------------------------------|-------|------|---------|
| BIOE60006 | Digital Biosignal Processing | Elective | A | 1 | 5 |
| BIOE60010 | Programming 3 | Elective | A | 1 | 5 |
| BIOE60007 | Human Centred Assistive and Rehabilitation Devices | Elective | A | 2 | 5 |
| BIOE60013 | Tissue Engineering and Regenerative Medicine | Elective | A | 1 | 5 |
| BIOE60015 | Advanced Imaging Technologies for Systems Biology and Biomedical Research | Elective | A | 2 | 5 |
| BIOE60016 | Communicating Biomedical Science and Engineering | Elective | A | 1 | 5 |
| BIOE60019 | Industrial applications of cellular engineering L6 | Elective | A | 2 | 5 |
| Year 3 - FHEQ Level 7 | | | | | |
| Code | Module Title | Core/ Compulsory/ Elective | Group | Term | Credits |
| BIOE70012 | Biomimetics | Elective | A | 2 | 5 |
| Credit Total | | | | | 60 |
| Year 4 - FHEQ Level 7 | | | | | |
| Code | Module Title | Core/ Compulsory/ Elective | Group | Term | Credits |
| | Completed at a university abroad | | | | |
| Credit Total | | | | | 60 |

* 'Group' refers to module grouping (e.g. a group of electives from which one/two module(s) must be chosen).

** Modules hosted in other departments are subject to availability.

Progression

Year One

A student must:

- Achieve a mark of at least 40% in each module. A student may be condoned in modules up to the value of 15 ECTS with a qualifying mark of at least 30%.

Year Two

A student must:

- Achieve a mark of at least 40% 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%.
- Achieve an overall aggregate mark of at least 60% to remain on the MEng pathway.
- A student achieving between 55% and 60% 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% but satisfying all other requirements will be transferred to the programme (BEng Molecular Bioengineering H161). Module choices in the third year of this course must be agreed with the Director of courses and will not normally include modules outside the department of Bioengineering

Year Three

A student must:

- Achieve a mark of at least 40% in each level 6 module and 50% in each level 7 module. A student may be compensated in modules up to the value of 15 ECTS with a qualifying mark of at least 30% for level 6 modules and 40% for level 7 modules.

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.

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 7.5%, Year Two at 20% and Years Three and Four at 36.5%. For the BEng award, Year One is weighted at 7.5%, Year Two at 35% and Year Three at 57.5%.

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

- i) First 70% or above for the average weighted module results
- ii) Upper Second 60% or above for the average weighted module results

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| iii) | Lower Second | 50% or above for the average weighted module results |
| iv) | Third | 40% or above for the average weighted module results |

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 allow you the greatest range of flexibility in technical elective options we also allow you to take some level 7 modules in year 3 and some level 6 modules in year 4 as detailed in the programme structure section of this document. You must complete 60 ECTS at level 7 across years 3 and 4 to achieve the MEng qualification.

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 |