

| Programme Information  |                |                       |
|------------------------|----------------|-----------------------|
| Programme Title        | Programme Code | HECoS Code            |
| Biomedical Engineering | BH9C           | For Registry Use Only |

| Award      | Length of Study  | Mode of Study | Entry Point(s)      | Total Credits |      |
|------------|------------------|---------------|---------------------|---------------|------|
|            |                  |               |                     | ECTS          | CATS |
| MEng BH9C  | 4 Academic years | Full-time     | Annually in October | 240           | 480  |
| BEng* BH81 | 3 Academic years | Full-time     | *                   | 180           | 360  |
| DipHE*     | 2 Academic years | Full-time     | *                   | 120           | 240  |
| CertHE*    | 1 Academic year  | Full-time     | *                   | 60            | 120  |

\*The DipHE and CertHE exit awards are not accredited by any professional body. The BEng exit award is an Honours degree. 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 <a href="#">QAA Benchmark Statement(s)</a> and/or other external reference points | <a href="#">Engineering</a>                                     |                           |                         |
| <a href="#">FHEQ Level</a>   | MEng Level 7<br>BEng Level 6<br>DipHE Level 5<br>CertHE Level 4 |                           |                         |
| <a href="#">EHEA Level</a>   | 2nd Cycle   |                           |                         |
| External Accrator(s) (if applicable)   |   |                           |                         |
| External Accrator 1:   | Institution of Mechanical Engineers                             |                           |                         |
| Accreditation received:  | 2005  | Accreditation renewal:    | 2023                    |
| External Accrator 2:   | Institute of Physics and Engineering in Medicine                |                           |                         |

|  |   |                          |                       |
|--|---|--------------------------|-----------------------|
| Accreditation received:                  | 2010  | Accreditation renewal:   | 2023                  |
| External Accreditor 3:                   | The Institution of Engineering and Technology   |                          |                       |
| Accreditation received:                  | 2002  | Accreditation renewal:   | 2023                  |
| External Accreditor 4:                   | The Institute of Materials, Minerals and Mining |                          |                       |
| Accreditation received:                  | 2010  | Accreditation renewal:   | 2023                  |
| External Accreditor 5:                   | The Institution of Engineering Designers        |                          |                       |
| Accreditation received:                  | 2018  | Accreditation renewal:   | 2023                  |
| <b>Collaborative Provision</b>           |   |                          |                       |
| Collaborative partner                    | Collaboration type                              | Agreement effective date | Agreement expiry date |
| N/A                                      | N/A   | N/A                      | N/A                   |
| <b>Specification Details</b>             |   |                          |                       |
| Programme Lead                           | Dr Maria Parkes                                 |                          |                       |
| Student cohorts covered by specification | 2022-23 entry                                   |                          |                       |
| Date of introduction of programme        | October 02                                      |                          |                       |
| Date of programme specification/revision | July 22   |                          |                       |

|   |
|---|
| <b>Programme Overview</b>   |
| <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</p> |

of these ECTS will form the basis of your specialisation from a choice of four: Bioengineering, Computational Bioengineering, Mechanical Bioengineering and Electrical Bioengineering.

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.

In your final year you must complete an individual project worth 30 ECTS. This individual project will be hosted within a research group and allows you to gain an understanding of the latest developments in the Bioengineering field as well as develop your ability to work independently. As much of the final year is spent on this individual project this is reflected in the ECTS weighting of the project. The remaining 30 ECTS is made up of advanced elective modules that you choose. You may choose to follow the topics that have caught your interest and build on your chosen specialisation or you may choose more broadly to keep your options open.

In the third and final years 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.

### 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 Biomedical Engineering programme you will be able to:**

**[KU1]** Describe and explain the underlying scientific principles, engineering mathematics and computational models and tools that underpin Biomedical Engineering and identify their limitations.

**[KU2]** 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.

**[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 wide 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 leadership, teamwork and communication skills.

**[PT3]** Exercise judgement in a range of situations and accept accountability for decisions made and the quality of outcomes produced.

**[PT4]** Employ advanced skills to conduct research, advanced technical and professional activities.

**Upon successful completion of the BEng Biomedical Engineering programme you will be able to:**

**[KU1]** Describe and explain the underlying scientific principles, engineering mathematics and computational models and tools that underpin Biomedical Engineering.

**[KU2]** 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.

**[KU3]** Give 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 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 bioengineering problems.

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

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

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

**[PT2]** Demonstrate leadership, teamwork and communication skills.

**[PT3]** Exercise judgement in a range of situations and accept accountability for achieving personal and/or group outcomes.

**Upon successful completion of the DipHE Biomedical Engineering programme you will be able to:**

**[KU1]** Describe and explain the underlying scientific principles, engineering mathematics and computational models and tools that underpin Biomedical Engineering.

**[KU2]** 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, and current developments and technologies in a Biological and Medical context.

**[KU3]** Give examples of innovative and creative engineering solutions applied to healthcare problems and quality-of-life issues.

**[KU4]** Recognise and explain the need for a high level of professional and ethical conduct in engineering.

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

**[IA2]** Select engineering principles and tools for the analysis and solution of familiar bioengineering problems.

**[IA3]** Apply diagnostic skills, technical knowledge and understanding of engineering design processes to establish solutions to well defined Bioengineering problems.

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

**[PT1]** Plan and safely execute experiments in a defined range of laboratories.

**[PT2]** Demonstrate leadership, teamwork and communication skills.

[PT3] Accept accountability for achieving personal and/or group outcomes.

**Upon successful completion of the Cert HE Biomedical Engineering programme you will be able to:**

[KU1] Describe and explain some of the underlying scientific principles, engineering mathematics and computational models and tools that underpin Biomedical Engineering.

[KU2] Describe and explain the basic concepts and principles of related disciplines including Electrical Engineering, Mechanical Engineering and Materials Engineering and how these are relevant to historical, and current developments and technologies in a Biological and Medical context.

[KU3] Give examples of engineering solutions applied to healthcare problems and quality-of-life issues.

[KU4] Recognise and explain the need for a high level of professional and ethical conduct in engineering.

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

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

[PT1] Safely execute experiments in a defined range of laboratories.

[PT2] Demonstrate teamwork and communication skills.

[PT3] Accept responsibility for outputs.

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         | The minimum requirement is normally A*AA overall at A-level   |
| A- Level                     | This usually comprises of:<br>A* in Mathematics<br>A in Physics<br>A in any further subject preferably Biology, Chemistry or Further Maths (or a comparable qualification recognised by the College).   |
| IB                           | Minimum <b>38</b> points (or a comparable qualification recognised by the College)<br><br><b>6</b> in Mathematics at higher level<br><b>6</b> in Physics at higher level<br><b>6</b> in a third subject at higher level (or a comparable qualification recognised by the College).  |
| Non-academic Requirements    | N/A   |
| English Language Requirement | <u>Standard requirement</u><br>IELTS score of 6.5 overall (minimum 6.0 in all elements)   |
| Admissions Test/Interview    | Selected applicants are invited to an interview day. This usually involves an introduction talk about the department and degree options, followed by group activities and individual interviews with two members of staff including an academic. The day finishes with a tour of the department.<br><br>For students who cannot attend an interview day in person an admissions test may be offered. This is a bespoke written test supplied to the candidate comprising of a short series of maths and |

bioengineering questions. Based on the results of this test a Skype interview may be arranged.

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 4th 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 embedded in a research team within the Bioengineering department. 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 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 and fourth years (level 6 and 7), 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 3<sup>rd</sup> year group project and 4<sup>th</sup> year individual research 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

#### Examinations

- In class progress tests
- Mastery examinations (online/written)
- 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 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 %   | 59 %   |
| Examinations | 70 %   | 70 %   | 53 %   | 41 %   |

### 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/](http://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 supplementary qualifying test 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/](http://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/](http://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              |



| <b>Programme Structure</b>         |   |                                  |        |       |         |
|------------------------------------|---|----------------------------------|--------|-------|---------|
| <b>Year 1 – FHEQ Level 4</b>       |   |                                  |        |       |         |
| <b>Students study core modules</b> |   |                                  |        |       |         |
| Code                               | Module Title                            | Core/<br>Compulsory/<br>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 & Professional Practice 1        | Compulsory                       | N/A    | 1,2,3 | 5       |
| Credit Total                       |   |                                  |        |       | 60      |
| <b>Year 2 - FHEQ Level 5</b>       |   |                                  |        |       |         |
| <b>Students study all modules</b>  |   |                                  |        |       |         |
| Code                               | Module Title                            | Core/<br>Compulsory/<br>Elective | Group  | Term  | Credits |
| BIOE50006                          | Mathematics 2                           | Compulsory                       | N/A    | 1,2,3 | 7.5     |
| BIOE50011                          | Signals and Control 2                   | Compulsory                       | N/A    | 1,2,3 | 7.5     |
| BIOE50004                          | Fluid and Solid Mechanics 2             | Compulsory                       | N/A    | 1,2,3 | 10      |
| BIOE50003                          | Electronics and Electromagnetics 2      | Compulsory                       | N/A    | 1,2,3 | 10      |
| BIOE50002                          | Design & Professional Practice 2        | Compulsory                       | N/A    | 1,2,3 | 10      |
| BIOE50010                          | Programming 2                           | Compulsory                       | N/A    | 1,2,3 | 5       |
| BIOE50001                          | Bioengineering science 2                | Compulsory                       | N/A    | 1,2,3 | 5       |
| BIOE50008                          | Medical Science 2                       | Compulsory                       | N/A    | 1,2,3 | 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 ECTS)

Students on the MEng programme 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)  
Please note: You must accumulate 60 ECTS of level 7 modules by the end of Year 4.

Students transferred to the BEng programme do not need to choose a pathway, but must choose 5 elective modules from Group E. These modules must be hosted in the department of Bioengineering.

^Level 7 modules

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

| Code   | Module Title  | Core/<br>Compulsory/<br>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      |
| BIOE60024  | Modelling in Biology                                  | Compulsory                       | N/A   | 1      | 5       |
|  | I-Explore   | Compulsory                       | N/A   | 1 or 2 | 5       |
| <b>Year 3 Bioengineering Pathway compulsory modules – FHEQ Level 6 (except where noted ^ as Level 7)</b> |   |                                  |       |        |         |
| BIOE60003  | Biomedical Instrumentation                            | Compulsory<br>(for stream)       | A     | 2      | 5       |
| BIOE60014  | Biomechanics  | Compulsory<br>(for stream)       | A     | 1      | 5       |
| BIOE60034  | Biomaterials for Bioengineers                         | Compulsory<br>(for stream)       | A     | 1      | 5       |
| <b>Year 3 Mechanical Bioengineering Pathway compulsory modules – FHEQ Level 6</b>                        |   |                                  |       |        |         |
| BIOE60014  | Biomechanics  | Compulsory<br>(for stream)       | B     | 1      | 5       |
| BIOE60009  | Physiological Fluid Mechanics                         | Compulsory<br>(for stream)       | B     | 2      | 5       |
| BIOE60002  | Biomedical Advanced and Computational Stress Analysis | Compulsory<br>(for stream)       | B     | 2      | 5       |
| <b>Year 3 Electrical Bioengineering Pathway compulsory modules – FHEQ Level 6</b>                        |   |                                  |       |        |         |
| BIOE60003  | Biomedical Instrumentation                            | Compulsory<br>(for stream)       | C     | 2      | 5       |
| BIOE60008  | Image Processing                                      | Compulsory<br>(for stream)       | C     | 2      | 5       |
| BIOE60006  | Digital Biosignal processing                          | Compulsory<br>(for stream)       | C     | 1      | 5       |
| <b>Year 3 Computational Bioengineering Pathway compulsory modules – FHEQ Level 6</b>                     |   |                                  |       |        |         |
| BIOE60008  | Image processing                                      | Compulsory<br>(for stream)       | D     | 2      | 5       |
| BIOE60010  | Programming 3   | Compulsory<br>(for stream)       | D     | 1      | 5       |

|   |   |                            |   |     |    |
|---|---|----------------------------|---|-----|----|
| BIOE60006   | Digital Biosignal Processing                          | Compulsory<br>(for stream) | D | 1   | 5  |
| <b>Year 3 Elective Modules – FHEQ Level 6 (except where noted ^ as Level 7)</b> |   |                            |   |     |    |
| BIOE60006   | Digital Biosignal Processing                          | Elective                   | E | 1   | 5  |
| BIOE60014   | Biomechanics  | Elective                   | E | 1   | 5  |
| BIOE60008   | Image Processing                                      | Elective                   | E | 2   | 5  |
| BIOE60009   | Physiological Fluid Mechanics                         | Elective                   | E | 2   | 5  |
| BIOE60012   | Foundations of Synthetic Biology                      | Elective                   | E | 1   | 5  |
| BIOE60007   | Human Centred Assistive and Rehabilitation Devices    | Elective                   | E | 2   | 5  |
| MECH60005   | Manufacturing Technology and Management**             | Elective                   | E | 1,2 | 5  |
| MECH60001   | Machine Dynamics and Vibrations**                     | Elective                   | E | 1,2 | 5  |
| BIOE60003   | Biomedical Instrumentation                            | Elective                   | E | 2   | 5  |
| BIOE60002   | Biomedical Advanced and Computational Stress Analysis | Elective                   | E | 2   | 5  |
| ELEC60002   | Advanced Signal Processing**                          | Elective                   | E |     | 5  |
| ELEC60008   | Control Engineering**                                 | Elective                   | E |     | 5  |
| ELEC70003   | Advanced Electronic Devices^**                        | Elective                   | E |     | 5  |
| ELEC60023   | Optoelectronics**                                     | Elective                   | E |     | 5  |
| DESE61004   | Design-led innovation and enterprise**                | Elective                   | E | 1,2 | 5  |
| BIOE60013   | Tissue Engineering and Regenerative Medicine          | Elective                   | E | 1   | 5  |
| BIOE60034   | Biomaterials for Bioengineers                         | Elective                   | E | 1   | 5  |
| BIOE60016   | Communicating Biomedical Science and Engineering      | Elective                   | E | 1   | 5  |
| BIOE70012   | Biomimetics^  | Elective                   | E | 2   | 5  |
| Credit Total  |   |                            |   |     | 60 |

#### Year 4 - FHEQ Level 7 (except †)

**Students must complete the compulsory Individual Project module (30 ECTS)**

**Students can then choose 5 elective modules from Group G, and 1 from Group H, across levels 6 and 7 (30 ECTS)**

**Please note: You must accumulate 60 ECTS of level 7 modules by the end of Year 4.**

† Level 6 modules

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

| Code | Module Title | Core/<br>Compulsory/<br>Elective | Group | Term | Credits |
|------|--------------|----------------------------------|-------|------|---------|
|------|--------------|----------------------------------|-------|------|---------|

|           |   |            |     |       |    |
|-----------|---|------------|-----|-------|----|
| BIOE70004 | Individual Project  | Compulsory | N/A | 1,2,3 | 30 |
| BIOE70013 | Computational Neuroscience  | Elective   | G   | 2     | 5  |
| BIOE70011 | Brain Machine Interfaces  | Elective   | G   | 2     | 5  |
| BIOE70008 | Advanced Physiological Monitoring and Data Analysis                 | Elective   | G   | 1     | 5  |
| BIOE70017 | Molecular, Cell and Tissue Biomechanics                             | Elective   | G   | 2     | 5  |
| BIOE70005 | Cellular and Molecular Mechanotransduction                          | Elective   | G   | 2     | 5  |
| BIOE70016 | Human Neuromechanical Control and Learning                          | Elective   | G   | 2     | 5  |
| BIOE70019 | Orthopaedic Biomechanics  | Elective   | G   | 2     | 5  |
| BIOE70018 | Molecular and Tissue Imaging  | Elective   | G   | 2     | 5  |
| BIOE70012 | Biomimetics   | Elective   | G   | 2     | 5  |
| BIOE70003 | Animal Locomotion and Bioinspired Robotics                          | Elective   | G   | 2     | 5  |
| MATE70018 | Advanced Biomaterials**   | Elective   | G   | 1     | 5  |
| MATE70016 | Advanced Tissue Engineering**                                       | Elective   | G   | 2     | 5  |
| MECH70015 | Computational Fluid Dynamics**                                      | Elective   | G   | 1,2   | 5  |
| ELEC70022 | Modelling of Multi-Body Mechanical Systems**                        | Elective   | G   |       | 5  |
| MECH70019 | Advanced Stress Analysis**  | Elective   | G   | 1,2   | 5  |
| MECH70012 | Finite Element Analysis and Applications**                          | Elective   | G   | 1,2   | 5  |
| TBC       | Data Analysis and Probabilistic Inference**                         | Elective   | G   |       | 5  |
| ELEC70001 | Adaptive Signal Processing and Machine Intelligence**               | Elective   | G   |       | 5  |
| ELEC70004 | Analogue Signal Processing**  | Elective   | G   |       | 5  |
| ELEC70013 | High-performance Analogue Electronics**                             | Elective   | G   |       | 5  |
| ELEC70031 | Radio-frequency Electronics**                                       | Elective   | G   |       | 5  |
| BIOE70001 | Application Specific Integrated Circuits (ASICs) for Bioengineering | Elective   | G   | 1     | 5  |
| ELEC70024 | Optimisation**  | Elective   | G   |       | 5  |
| ELEC70018 | Information Theory**  | Elective   | G   |       | 5  |
| MECH60001 | Machine Dynamics and Vibrations <sup>‡</sup> **                     | Elective   | G   | 1,2   | 5  |
| MECH60019 | Tribology <sup>‡</sup> **   | Elective   | G   | 1,2   | 5  |
| MATE60006 | Biomaterials <sup>‡</sup> **  | Elective   | G   | 1     | 5  |
| MECH60005 | Manufacturing Technology and Management <sup>‡</sup> **             | Elective   | G   | 1,2   | 5  |
| MECH60021 | Computational Continuum Mechanics <sup>‡</sup> **                   | Elective   | G   | 1,2   | 5  |

|              |  |          |     |     |    |
|--------------|--|----------|-----|-----|----|
| COMP60005    | Graphics † **  | Elective | G   |     | 5  |
| BIOE60013    | Tissue Engineering and Regenerative Medicine †           | Elective | G   | 1   | 5  |
| BIOE60014    | Biomechanics †   | Elective | G   | 1   | 5  |
| BIOE70014    | Medical Device Entrepreneurship                          | Elective | G/H | 1   | 5  |
| BIOE70056    | Advanced Biomaterials and Tissue Engineering             | Elective | G   | 1   | 5  |
| BIOE70022    | Industrial Applications of Cellular Engineering          | Elective | G   | 1   | 5  |
| TBC          | Nanotechnologies for Cancer Diagnosis and Cancer Therapy | Elective | G   | 1   | 5  |
| BIOE70020    | Neuroscience   | Elective | G   | 1   | 5  |
|              | Business for Professional Engineers and Scientists †     | Elective | H   | 1,2 | 5  |
| COMP70028    | Reinforcement Learning**                                 | Elective | G   | 1   | 5  |
| BIOE70076    | Communicating Biomedical Science and Engineering L7      | Elective | G   | 1   | 5  |
| BIOE70028    | Medical Device Certification                             | Elective | H   | 1   | 5  |
| COMP70006    | Computational Finance**                                  | Elective | H   | 1   | 5  |
| 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 compensated in modules up to the value of 15 ECTS across the entire programme, 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 across the entire programme, 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 BH81 (BEng Biomedical Engineering). 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 across the entire programme, with a qualifying mark of at least 30% for level 6 modules and 40% for level 7 modules.
- A student previously transferred to the programme BH81 (BEng Biomedical Engineering) will be eligible to transfer to the BH9C (MEng Biomedical Engineering) if they meet the following criteria:

Have a 2nd year aggregate mark at 55% or above

*AND*

Have achieved marks equivalent to a 2:1 at BEng level based on weightings of year 1, year 2 and year 3 at 7.5 : 35 : 57.5

*AND*

Have a 3rd year aggregate mark of 60 % or above

*Or*

Have accepted mitigating circumstances that impacted a significant proportion of year 2 (>20 ECTSs)

*AND*

Normally have a 2nd year aggregate mark of 50% or above

*AND*

Have a 3rd year aggregate mark of 60% or above

In the case where a student previously transferred to the BEng programme has accepted mitigating circumstances that impact a significant proportion of year 3 modules (>20 ECTSs), it is expected that:

The examination board will confirm that the weighted average of the non-mitigated modules is at 60% or above

*AND*

Following recommendation by the mitigating panel, the year 3 mark will be given consideration at the borderline by the examination board, in line with the mitigating circumstances policy.

When these conditions are satisfied, then the examination board is expected to recommend that the student is eligible to re-join the MEng programme

#### **Year Four**

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 across the entire programme, with a qualifying mark of at least 30% for level 6 modules and 40% for level 7 modules.

#### **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
- 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 or above to meet the learning outcomes set by the professional engineering bodies for accreditation. This can be achieved by selecting in year 4 a group H Module (BPES module, Medical Device Design and Entrepreneurship, Medical Device Certification or Computational Finance). If your choice of an iExplore module in year 3 was a BPES module, you are exempt from this requirement and can select another technical elective module from group G 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.

As an accredited degree, students on this programme are subject to the standards set by the UK Engineering Council in relation to compensation: a maximum of 15 ECTS credits can be compensated across the entire programme.

## 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](http://www.imperial.ac.uk/study/pg/apply/requirements)

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