# Imperial College London

| Programme Information | | | |
|---|---|---|---|
| Programme Title | | Programme Code | HECoS Code |
| Neurotechnology | | H6NU | For Registry Use Only |

| Award | Length of Study | Mode of Study | Entry Point(s) | Total Credits | |
|---|---|---|---|---|---|
| | | | | ECTS | CATS |
| MRes | 1 Calendar Year (12 months) | Full time | Annually in October | 90 | 180 |
| PG Diploma | N/A | N/A | N/A | 60 | 120 |
| PG Certificate | N/A | N/A | N/A | 30 | 60 |
| The PG Certificate and PG Diploma are exit awards and are not available for entry. You must apply to and join the MRes. The PG Certificate and PG Diploma are not accredited by any professional body. | | | | | |

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

| External Reference | |
|---|---|
| Relevant QAA Benchmark Statement(s) and/or other external reference points | Master's Award in Engineering |
| FHEQ Level | Level 7 - Masters |
| EHEA Level | 2nd Cycle |

| External Accreditor(s) (if applicable) | | | |
|---|---|---|---|
| External Accreditor 1: | The Institution of Engineering and Technology | | |
| Accreditation received: | 2016 | Accreditation renewal: | 2024 |
| External Accreditor 2: | Institution of Mechanical Engineers | | |
| Accreditation received: | 2014 | Accreditation renewal: | 2024 |
| External Accreditor 3: | Institute of Materials, Minerals & Mining | | |
| Accreditation received: | 2016 | Accreditation renewal: | 2024 |

| External Accreditor 4: | Institution of Engineering Designers | | |
|---|---|---|---|
| Accreditation received: | 2018 | Accreditation renewal: | 2024 |

**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 Andriy Kozlov |
| Student cohorts covered by specification | 2023-24 entry |
| Date of introduction of programme | October 12 |
| Date of programme specification/revision | August 23 |

**Programme Overview**

Neurotechnology is the use of insights and tools from mathematics, physics, chemistry, biology and engineering to investigate neural function and treat dysfunction. Brain-related illnesses affect more than two billion people worldwide, and the numbers are growing. Reducing this burden is a major challenge for society.

The MRes Neurotechnology is a one year full-time programme leading to the MRes award. As a student on this programme you will benefit from interaction with students on other programmes in the Department to help develop your interdisciplinary knowledge. You will also gain useful skills in engineering, research and statistical analyses before embarking on a comprehensive, 9-month research project. Both the taught and research elements of this degree programme are multi-disciplinary, drawing on both engineering/technological and biological/clinical expertise.

The programme is delivered by the Department of Bioengineering and is based at the South Kensington and White City Campuses. However, the research project can be conducted in any laboratory based in the Faculty of Engineering, Faculty of Natural Sciences, Faculty of Medicine. The programme involves lectures and practical work in the first term, followed by full-time work on a research project. A variety of seminars and workshops by experts from across the College and external to Imperial College London are provided to deepen and broaden your research skill-base. The programme will prepare you to analyse and solve problems in neurotechnology using an integrated, multidisciplinary approach.

Your MRes research project will be supervised by an academic at Imperial with expertise in an area of research within Neurotechnology that is of interest to you. Before applying to this programme, you should identify a potential project and supervisor from the list available on the department webpages and include this choice as part of your personal statement when you apply. Additionally, you may have a second supervisor with a clinical background, from a different department across the College or a co-supervisor from industry.

The programme equips you for on-demand research careers in academia and industry within the growing field of neurotechnology. You will be particularly well equipped for bioengineering PhD programmes run within Imperial College involving interactions between engineers, medics and clinicians.

**Learning Outcomes**

The following Learning Outcomes are in line with FHEQ level 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 MRes Neurotechnology programme you will be able to:

**[KU1]** Assess the underlying scientific principles and models that govern research in the field of Neurotechnology.

[**KU2**] Evaluate the core concepts, principles and theories relevant to Neurotechnology and how these are relevant to historical, current and future developments and technologies in the area of Neurotechnology.

**[KU3}** Evaluate a wide range of scientific studies in Neurotechnology and critically discuss these examples in terms of their commercial, economic, social and sustainability implications.

**[IA1]** Critically select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in the field of Neurotechnology research, including investigation of new and emerging technologies

**[IA2]** Apply diagnostic skills, technical knowledge and understanding of engineering design processes to analyse, evaluate and refine experimental processes

**[IA3]** Extract, analyse and critically evaluate information and data gathered from experimentation, academic and technical resources to determine their strength and validity, interpret conclusions and make recommendations for future experimental studies.

**[IA4]** Work with information that may be incomplete or uncertain, quantify the effect of this on the design or development of an engineering solution and, where appropriate, use theory or experimental research to mitigate deficiencies through the generation of new data

**[IA5]** Design and execute research experiments in the field of Neurotechnology research using your knowledge of core and specialised engineering concepts (e.g., machine learning, microfluidics, signal processing, imaging, blood sampling).

**[PT1]** Work effectively with all members of a research team including students and academics, demonstrating good interpersonal and communication skills that show an appreciation for the different roles within a team

**[PT2]** Exercise initiative and judgement in a range of situations, identifying areas for self-learning and development, and accepting accountability for decisions made and the quality of outcomes produced.

**[PT3]** Work individually to plan and conduct a lengthy programme of original research, in a safe and ethical manner in laboratory or computational settings.

**[PT4]** Professionally communicate the results of a programme of original research through a variety of means including the preparation and/or delivery of presentations, written reports and scientific papers.

Upon successful completion of the *PG Diploma Neurotechnology* programme you will be able to:

**[KU1]** Assess the underlying scientific principles and models that govern research in the field of Neurotechnology.

[**KU2**] Evaluate the core concepts, principles and theories relevant to Neurotechnology and how these are relevant to historical, current and future developments and technologies in the area of Neurotechnology.

**[KU3}** Evaluate a range of scientific studies in Neurotechnology and critically discuss these examples in terms of their commercial, economic, social and sustainability implications.

**[IA1]** Critically select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in the field of Neurotechnology research, including investigation of new and emerging technologies

**[IA2]** Extract, analyse and critically evaluate information and data gathered from experimentation, academic and technical resources to determine their strength and validity, interpret conclusions and make recommendations for future experimental studies.

**[IA3]** Work with information that may be incomplete or uncertain, quantify the effect of this on the design or development of an engineering solution and, where appropriate, use theory or experimental research to mitigate deficiencies through the generation of new data

**[IA4]** Design and execute research experiments in the field of Neurotechnology research using your knowledge of core and specialised engineering concepts (e.g., machine learning, microfluidics, signal processing, imaging, blood sampling).

**[PT1]** Work effectively with all members of a research team including students and academics.

**[PT2]** Exercise initiative and judgement in a range of situations, identifying areas for self-learning and development.

**[PT3]** Work individually to plan and conduct a lengthy programme of original research, in a safe and ethical manner in laboratory or computational settings.

**[PT4]** Professionally communicate the results of a programme of original research through a variety of means including the preparation and/or delivery of presentations and written reports.

Upon successful completion of the *PG Certificate Neurotechnology* programme you will be able to:

**[KU1]** Assess the underlying scientific principles and models that govern research in the field of Neurotechnology.

[**KU2**] Evaluate the core concepts, principles and theories relevant to Neurotechnology and how these are relevant to historical, current and future developments and technologies in the area of Neurotechnology.

**[KU3}** Evaluate a wide range of scientific studies in Neurotechnology and critically discuss these examples in terms of their commercial, economic, social and sustainability implications.

**[IA1]** Critically select and apply engineering principles and tools for the analysis and solution of familiar and unfamiliar problems in the field of Neurotechnology research

**[IA2]** Extract, analyse and critically evaluate information and data gathered from academic and technical resources to determine their strength and validity

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

**[IA4]** Design research experiments in the field of Neurotechnology research using your knowledge of core and specialised engineering concepts

**[PT1]** Work effectively with all members of a research team including students and academics

**[PT2]** Exercise initiative and judgement in a range of situations, identifying areas for self-learning and development

**[PT3]** Work individually to plan a lengthy programme of original research, in a safe and ethical manner in laboratory or computational settings.

**[PT4]** Professionally communicate technical ideas through a variety of means including the preparation and/or delivery of presentations and written reports.

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 | You are expected to have at minimum a 2.1 UK Honour's degree in an engineering discipline, physical science or mathematical subject or equivalent. |

| | Applicants with a biological or medical sciences background may be considered if they can demonstrate substantial quantitative skills. |
|---|---|
| Non-academic Requirements | N/A |
| English Language Requirement | [Standard requirement (PG)](#) |
| Admissions Test/Interview | Applicants may be invited to attend an interview with one or more members of academic staff, in person or virtually. |

The programme's competency standards documents can be found at: [www.imperial.ac.uk/media/imperial-college/faculty-of-engineering/bioengineering/public/student/Competency-Standards---Bioengineering-UG-PG---June-2016-Final.pdf](#)

## Learning & Teaching Approach

**Learning and Teaching Delivery Methods**

You will be taught through a combination of lectures, study groups and tutorials, computing labs, guest lectures and presentations. Study groups and tutorials will enable you to discuss and develop your understanding of topics covered in lectures whilst in smaller groups of around 30 students. These are usually based around problem sheets, questions or computational tasks set by the module lecturers. You will be expected to solve these either individually or as part of a small group. Study groups and tutorials are supported by graduate teaching assistants. Timetabled sessions may be delivered online or in person, or in a hybrid format.

The Virtual learning environment Blackboard will be used as a repository for teaching materials including recordings of all lectures, lecture notes and problem sheets. Learning technologies will be used to support teaching activities including in-class polling with Mentimeter, online self-diagnostic quizzes and online class forums.

**Independent Learning**
You are expected to spend significant time on independent study outside of timetabled learning and teaching sessions. From our experience students that undertake independent learning have improved academic performance, increased motivation and confidence in themselves and their abilities. By undertaking independent learning, you are also preparing yourself for professional practice where it is expected that you will manage your own continued professional development. Independent learning activities that you will be expected to undertake will typically include accessing online resources, completing problem sheets, reading journal articles and books, undertaking research in the library, reviewing lecture notes and watching lecture recordings, working on individual and group projects, working on coursework assignments and revising for exams.

Bioengineering uses flipped teaching for some modules, meaning that you need to actively engage with on-line resources ahead of attending timetabled sessions. This independent learning is followed by sessions led by the teacher where all students work in small groups to apply that knowledge to more practical examples. This helps you to further consolidate and enhance your understanding of the topics you study and allows us the time to focus on more challenging concepts in the taught sessions. These taught sessions are normally in the place of study groups for a flipped module.

**Research Project**
A key part of our MRes programme is the Research Project.  Mastery of Neurotechnology research is a complex and specialised field. Your Research Project is an opportunity for you to develop cutting edge research capabilities under the close supervision of academics and their research teams. This may include lecturers and clinicians from across a range of departments in Imperial.

You will be expected to engage with your project supervisor during your first week of term and begin the background research and planning for your project soon after. You begin full-time project work in the spring term, working on the project for 9 months.

**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 2,250 hours per year.

Taught modules on this programme will be held mainly during the Autumn term. You will typically spend 90 hours in lectures and tutorials, with around 410 hours of individual study. Your research project accounts for 1750 hours of additional individual study.

## 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 the year.

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

**The taught modules will be assessed using a combination of:**
- Written examinations
- Oral presentations
- Written reports, including a dissertation
- Coursework including progression tests, problem sheets
- Practical training elements

**The research modules will be assessed at regular intervals throughout the degree using a combination of:**
- Written Reports & Final Thesis
- Oral presentations
- Poster Presentations

The typical breakdown of assessments for this programme is:

| Practical | 50% |
|-----------|------|
| Coursework | 44 % |
| Exams | 6 % |

### Academic Feedback Policy

Feedback may be provided in one of a number of formats, including (but not limited to):
- Oral (during or after lectures, personally or as a group feedback session)
- Personal (discussion with academics during office hours, meetings with cohort and academic tutors)
- Interactive (problem solving tutorials with GTAs & study groups, peer feedback)
- Written (solutions/model answers to coursework, electronic feedback online)

Deadlines for submission of assessments and to receive feedback are indicated in the coursework calendars normally provided at the start of the teaching year. You will usually be provided with feedback within 10 working days although on occasions they may be informed of a different time scale (e.g. if the submitted work is particularly complex and will take a long time to mark).

| 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/ |
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| Re-sit Policy |
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| 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 |
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| 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 |
| Textbooks | Mandatory | £150 |
| Personal Protective Equipment | Mandatory | Provided |

**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]**

**FHEQ Level 7**
**You will study all core and compulsory modules.**

***This module is considered as pass/fail and will not contribute to the overall weighted average used for classification of the programme**

| Code | Module Title | Core/ Compulsory | Group | Term | Credits |
|------|-------------|------------------|-------|------|---------|
| BIOE70020 | Neuroscience | Compulsory | N/A | Autumn | 5 ECTS |
| BIOE70037 | Computational and Statistical Methods for Research | Compulsory | N/A | Autumn | 5 ECTS |
| BIOE70038 | Frontiers in Neurotechnology Research | Compulsory | N/A | Autumn-Summer | 5 ECTS |
| BIOE70039 | Topics in Neural Engineering* | Compulsory | N/A | Autumn-Spring | 5 ECTS |
| BIOE70040 | Planning for Research | Core | N/A | Autumn | 10 ECTS |
| BIOE70073 | Neurotechnology Research Project | Core | N/A | Spring-Summer | 60 ECTS |
| | | | | Credit Total | 90 ECTS |

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[1] **Core** modules are those which serve a fundamental role within the curriculum, and for which achievement of the credits for that module is essential for the achievement of the target award. Core modules must therefore be taken and passed in order to achieve that named award. **Compulsory** modules are those which are designated as necessary to be taken as part of the programme syllabus. Compulsory modules can be compensated. **Elective** modules are those which are in the same subject area as the field of study and are offered to students in order to offer an element of choice in the curriculum and from which students are able to select. Elective modules can be compensated.

| Progression and Classification |
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**Award of a Postgraduate Certificate (PG Cert)**
To qualify for the award of a postgraduate certificate you must have a minimum of 30 credits at Level 7.

**Award of a Postgraduate Diploma (PG Dip)**
To qualify for the award of a postgraduate diploma you must have a minimum of 60 credits at Level 7 with no more than 10 credits as a compensated pass.

**Award of a Masters Degree (including MRes)**
To qualify for the award of a postgraduate degree you must have:
1. accumulated credit to the value of no fewer than 90 credits at level 7
2. and no more than 10 credits as a Compensated Pass;
3. met any specific requirements for an award as outlined in the approved programme specification for that award.

**Classification of Postgraduate Taught Awards**
The College sets the class of Degree that may be awarded as follows:
1. Distinction: 70.00% or above.
2. Merit: 60.00% or above but less than 70.00%.
3. Pass: 50.00% or above but less than 60.00%.

For a Masters, your classification is determined through the Programme Overall Weighted Average and the designated dissertation or final major project module meeting the threshold for the relevant classification band.

Your degree algorithm provides an appropriate and reliable summary of your performance against the programme learning outcomes. It reflects the design, delivery and structure of your programme without unduly over-emphasising particular aspects.

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| Programme Specific Regulations |
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As an accredited degree, students on this MRes programme are subject to the standards set by the UK Engineering Council in relation to compensation. A maximum of 10 ECTS credits can be compensated across the programme.

| Supporting Information |
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| The Programme Handbook is available at: www.imperial.ac.uk/bioengineering/admin/research/mres/ |
| The Module Handbook is available from the department. |
| The College's entry requirements for postgraduate programmes can be found at: www.imperial.ac.uk/study/apply/postgraduate-taught/entry-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 they take full advantage of the learning opportunities provided. This programme specification is primarily intended as a reference point for prospective and current students, academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review. |