

**MRes Neurotechnology**

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 intended as a reference point for prospective students, current students, external examiners and academic and support staff involved in delivering the programme and enabling student development and achievement.

**Programme Information**

Programme Title	Neurotechnology			
Award(s)	MRes			
Programme Code	H6NU (1 year stand-alone programme) H6NT (1 +3 CDT programme)			
Associateship	City and Guilds of London Institute			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Engineering			
Department	Department of Bioengineering			
Mode and Period of Study	1 calendar year, full-time			
Cohort Entry Points	Annually in October			
Relevant <a href="#">QAA Benchmark Statement(s)</a> and/or other external reference points	No QAA Subject Benchmarking Groups are relevant to the first (MRes) year of a Centre for Doctoral Training (CDT) programme at the interface between engineering and neuroscience, as described in this document.			
Total Credits	ECTS:	90	CATS:	180
<a href="#">FHEQ Level</a>	Level 7			
<a href="#">EHEA Level</a>	2 <sup>nd</sup> cycle			
External Accrator(s)	None			
<b>Specification Details</b>				
Student cohorts covered by specification	2016/17 entry			
Person responsible for the specification	Professor Martyn Boutelle, Director of Courses			
Date of introduction of programme	October 2014			

Date of programme specification/revision	September 2016
<b>Description of Programme Contents</b>	
<p>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.</p> <p>The MRes Neurotechnology is a one year full-time programme leading to the MRes award. The MRes forms the first year of the 4 year CDT Neurotechnology programme, but may also be taken as a stand-alone MRes. Students on the stand-alone programme will therefore benefit from interaction with the main CDT cohort.</p> <p>Candidates make their choice of research project prior to beginning the course. Students take 3 months of taught modules and then carry out a 9-month research project which will involve laboratory rotations (as part of a single project), with a single thesis submission at the end of the MRes year. The research project would normally be supervised by at least two supervisors with different expertise. Supervisors may be drawn from any department across the College. Some students may also have a co-supervisor from industry.</p> <p>Students have the opportunity to take additional courses and short workshops in the 2nd and 3rd terms and will attend seminars and journal clubs throughout the year, as well as Centre for Neurotechnology Symposia.</p>	
<b>Learning Outcomes</b>	
<p>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: <a href="http://www.imperial.ac.uk/students/academic-support/graduate-attributes">www.imperial.ac.uk/students/academic-support/graduate-attributes</a></p>	
<p><b>Knowledge and Understanding of:</b></p> <ol style="list-style-type: none"> <li>1. Core and specialised concepts in Neurotechnology research</li> <li>2. Research techniques, including information retrieval, experimental design and statistics, computer modelling, sampling, experimental techniques, engineering design, problem solving, and laboratory safety;</li> <li>3. Detailed knowledge and understanding of the essential facts, concepts, principles and theories relevant to the student's project;</li> <li>4. Management and communication skills, including problem definition, project design, decision processes, teamwork, written and oral reports, scientific proposals and publications.</li> </ol> <p><b>Intellectual Skills</b></p> <ol style="list-style-type: none"> <li>1. Analyse and solve problems in Neurotechnology using an integrated multidisciplinary approach;</li> <li>2. Integrate and evaluate information;</li> <li>3. Formulate and test hypotheses using appropriate design of models or experiments, as well as statistical analysis of data;</li> <li>4. Plan, conduct and write-up a programme of original research.</li> </ol>	

### Practical Skills

1. Plan and execute safely a series of experiments or computations;
2. Use laboratory methods or computer-based tools to generate data;
3. Analyse results, determine their strength and validity, and make recommendations;
4. Prepare technical reports;
5. Give technical presentations;
6. Use the scientific literature effectively.

### Transferable Skills

1. Communicate effectively across different scientific disciplines through oral presentations, computer processing and presentations, and written reports;
2. Apply knowledge, experimental, and modelling skills;
3. Management skills: decision processes, objective criteria, problem definition, project design and evaluation needs;
4. Integrate and evaluate information from a variety of sources;
5. Transfer techniques and solutions from one discipline to another;
6. Use Information and Communications Technology;
7. Manage resources and time;
8. Learn independently with open-mindedness and critical enquiry;
9. Learn effectively for the purpose of continuing professional development.

### Entry Requirements

Academic Requirement	Minimum 2.1 UK Honours degree (or equivalent) in a physical science or engineering subject. Students with a biological or medical sciences background may be considered if they can demonstrate substantial quantitative skills.
Non-academic Requirements	None
Applicants may be invited to attend an interview with one or more members of academic staff.	
English Language Requirement	IELTS 6.5 with a minimum of 6.0 in each element or equivalent.

The programme's competency standards document can be found at:  
<http://www.imperial.ac.uk/bioengineering/admin/msc/essential-information/>

### Learning & Teaching Strategy

Scheduled Learning & Teaching Methods	<ul style="list-style-type: none"><li>• Lectures</li><li>• Guided practical classes / laboratory work, and demonstrations</li><li>• Seminars</li><li>• Workshops</li><li>• Group exercises</li><li>• Presentations</li><li>• Individual research project</li></ul>
---------------------------------------	--

E-learning & Blended Learning Methods	<ul style="list-style-type: none"> <li>• Virtual Learning Environment: Blackboard</li> <li>• Lecture material and recordings via Panopto</li> <li>• Online groups/discussions</li> <li>• Online quizzes and interactive content</li> </ul>
Project and Placement Learning Methods	<ul style="list-style-type: none"> <li>• Group and individual project work</li> </ul>
<b>Assessment Strategy</b>	
Assessment Methods	<ul style="list-style-type: none"> <li>• Written examinations</li> <li>• Oral presentations</li> <li>• Coursework including multiple choice progression test, problem sheets and quizzes</li> <li>• Written reports, including a research thesis</li> </ul> <p><b>Note: assessment for elective MSc modules will be via a brief written report and not via examination or any other method described in the module descriptors. The report on elective modules is pass/fail only and does not contribute to the degree score.</b></p>
<b>Academic Feedback Policy</b>	
<p>Feedback will be provided on coursework within two weeks of submission. Feedback may be provided in one of a number of formats, including:</p> <ul style="list-style-type: none"> <li>• Oral (during or after lectures)</li> <li>• Personal (discussion with academics during office hours)</li> <li>• Interactive (problem solving tutorials with GTAs &amp; study groups)</li> <li>• Written (solutions/model answers to coursework)</li> </ul> <p>In line with College policy, feedback will not be provided on written examinations.</p> <p>Preliminary results will be provided to students as alpha-grades. Numerical results will be published after the meeting of the final Board of Examiners.</p>	
<b>Re-sit Policy</b>	
The College's Policy on Re-sits is available at: <a href="http://www.imperial.ac.uk/registry/exams/resit">www.imperial.ac.uk/registry/exams/resit</a>	
<b>Mitigating Circumstances Policy</b>	
The College's Policy on Mitigating Circumstances is available at: <a href="http://www.imperial.ac.uk/registry/exams">www.imperial.ac.uk/registry/exams</a>	

## Assessment Structure

### Marking Scheme

#### Assessment Rules and Degree Classification:

1. Minimum standards (i.e. 50%) in each of the two assessed elements (taught and research) will be required with an overall pass mark of 50%. To achieve *pass with distinction* a minimum of 69.9% is required in each of the two elements. To achieve *pass with merit* a minimum of 60%, i.e. no fail, is required in each of the two elements.
2. To qualify for the award of MRes, students must complete all the course requirements, including the participation in mandatory extra curriculum events, and must achieve an overall pass mark in the combined examinations.
3. Students will be given two marks, one for each marked element. There will also be an overall mark used to decide whether a student obtains a Merit or Distinction. For this overall mark, the weighting of the individual marks is 25% for the taught element, and 75% for the research element. The marking criteria for the MRes project is as follows: 30% for research conduct, marked by the supervisors only (supervisors will agree on a final mark) and 70% for the written thesis, marked by two examiners (examiners will agree on a final mark). The two examiners will also provide internal marks for the oral exam (about 45min). The external examiners will moderate the final mark if necessary.

The Pass Mark for all **postgraduate** Master's level modules is 50%. Students must pass all elements in order to be awarded a degree.

<b>Module Weightings</b>		
<b>Element</b>	<b>Module</b>	<b>% Module Weighting</b>
<b>Taught Element</b> (25%)	Introduction to Neuroscience	20%
	Statistics & Data Analysis	20%
	Neurotechnology Journal Club	10%
	Ethical and Social Implications of Neurotechnology	10%
	Medical Device Entrepreneurship	20%
	Machine Learning & Neural Computation	20%
	Computational Methods Training	0% (P/F)
	1 - 4 x elective modules to the value of at least 4 ECTS	0% (P/F)
<b>Research Element</b> (75%)	Research Project	100%

**Indicative Module List**

Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course- work	% Practical	FHEQ Level	ECTS
BE9-MINS	Introduction to Neuroscience	CORE	30	32.5	0	62.5	100%	0%	0%	7	2.5
BE9-MSTDA	Statistics and Data Analysis	CORE	28	34.5	0	62.5	100%	0%	0%	7	2.5
BE9-MRNJCLUB	Journal Club	CORE	20	30	0	50	0%	0%	100%	7	2
BE9-MESIN	Ethical & Social Implications of Neurotechnology	CORE	7	18	0	25	0%	100%	0%	7	1
BE9-MDEVEN	Medical Device Entrepreneurship	CORE	30	32.5	0	62.5	0%	100%	0%	7	2.5
BE9-MMLNC	Machine Learning and Neural Computation	CORE	30	32.5	0	62.5	80%	20%	0%	7	2.5
BE9-MRNCM	Computational Methods Training	CORE	15	10	0	25	0%	0%	100%	7	1
BE9-MROIT	Optical Imaging Techniques	ELECTIVE	6	19	0	25	0%	0%	100%	7	1
BE9-MRTMB	Techniques in Molecular Bioengineering	ELECTIVE	13	22	0	25	0%	0%	100%	7	1
BE9-MRELEC	Electrophysiology	ELECTIVE	8	17	0	25	0%	0%	100%	7	1
BE9-MBIMG	Biomedical Imaging	ELECTIVE	28	22	0	50	100%	0%	0%	7	2
BE9-MSPHYS	Systems Physiology	ELECTIVE	30	20	0	50	100%	0%	0%	7	2
BE4-MBMX	Biomechanics	ELECTIVE	28	22	0	50	95%	5%	0%	7	2
MSE315	Biomaterials	ELECTIVE	24	26	0	50	100%	0%	0%	7	2

**Indicative Module List**

Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course- work	% Practical	FHEQ Level	ECTS
BE9-MHASP	Hearing and Speech Processing	ELECTIVE	27	23	0	50	100%	0%	0%	7	2
BE3-HPFM	Physiological Fluid Mechanics	ELECTIVE	26	24	0	50	70%	30%	0%	7	2
BE9-MCBMX	Cellular Biomechanics	ELECTIVE	28	22	0	50	80%	20%	0%	7	2
BE9-MHNCL	Human Neuromechanical Control and Learning	ELECTIVE	28	22	0	50	80%	20%	0%	7	2
BE9-MOBMX	Orthopaedic Biomechanics	ELECTIVE	28	22	0	50	60%	40%	0%	7	2
BE9-MBMIME	Biomimetics	ELECTIVE	26	24	0	50	100%	0%	0%	7	2
BE9-MHEDM	Health Economics and Decision Making	ELECTIVE	27	23	0	50	100%	0%	0%	7	2
BE9-MAPMDA	Advanced Physiological Monitoring and Data Analysis	ELECTIVE	30	20	0	50	100%	0%	0%	7	2
MSE417	Advanced Biomaterials	ELECTIVE	24	36	0	50	100%	0%	0%	7	2
MSE418	Advanced Tissue Engineering	ELECTIVE	24	36	0	50	100%	0%	0%	7	2
BE9-MAMI	Advanced Medical Imaging	ELECTIVE	30	20	0	50	100%	0%	0%	7	2
BE9-MBMI	Brain Machine Interfaces	ELECTIVE	27	23	0	50	80%	20%	0%	7	2
BE9-MCNS	Computational Neuroscience	ELECTIVE	28	22	0	50	100%	0%	0%	7	2



**Indicative Module List**

Code	Title	Core/ Elective	L&T Hours	Ind. Study Hours	Place- ment Hours	Total Hours	% Written Exam	% Course- work	% Practical	FHEQ Level	ECTS
BE3-HIPR	Image Processing	ELECTIVE	38	12	0	50	100%	0%	0%	6	2
E4.55	MEMS and Nanotechnology	ELECTIVE	25	25	0	50	100%	0%	0%	7	2
BE3-MNMED	Nuclear medicine	ELECTIVE	30	20	0	50	100%	0%	0%	6	2
BE3-MRADP	Radiotherapy physics and radiobiology	ELECTIVE	30	20	0	50	100%	0%	0%	6	2
BE9-MITR	Introduction to Robotics	ELECTIVE	30	20	0	50	80%	20%	0%	7	2
	Research Project	CORE	42	1758	0	1800	0%	55%	45%	7	72

## Supporting Information

The Programme Handbook is available at:

<http://www.imperial.ac.uk/neurotechnology/cdt/training/mres/>

The Module Handbook is available at:

<http://www.imperial.ac.uk/neurotechnology/cdt/training/mres/>

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:

<http://www3.imperial.ac.uk/registry/proceduresandregulations/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".

<http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/>

Imperial College London is regulated by the Higher Education Funding Council for England (HEFCE)

<http://www.hefce.ac.uk/reg/of/>