Imperial College London

Programme Specification (Master's Level)

# MSc Translational Neuroscience

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 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.

| **Programme Information** | | | | |
|---|---|---|---|---|
| Award(s) | MSc | | | |
| Programme Title | Translational Neuroscience | | | |
| Programme code | A3TN | | | |
| Awarding Institution | Imperial College London | | | |
| Teaching Institution | Imperial College London | | | |
| Faculty | Faculty of Medicine | | | |
| Department | Department of Medicine | | | |
| Associateship | None | | | |
| Mode and Period of Study | 1 calendar year full-time (12 months) | | | |
| Cohort Entry Points | Annually in October | | | |
| Relevant QAA Benchmark Statement(s) and/or other external reference points | There are no specific published benchmarks in the field of Neuroscience | | | |
| Total Credits | ECTS: | 90 | UK Credits: | 180 |
| FHEQ Level | Level 7 | | | |
| EHEA Level | 2nd cycle | | | |
| External Accreditor(s) | None | | | |
| **Specification Details** | | | | |
| Student cohorts covered by specification | 2016-17 entry | | | |
| Person Responsible for the specification | Professor David T Dexter | | | |
| Date of introduction of programme | October 2016 | | | |
| Date of programme specification/revision | February 2017 | | | |

**Description of Programme Contents**

The WHO recently listed Neurological disorders as a global emergency with the numbers of people affected by such disorders predicted to marked increase over the next 25 years as life expectancy globally increases. For the vast majority of neurological disorders there are no effective treatments. This course will be delivered by world leading expert clinicians and neuroscientists working across the spectrum in Neuroscience. Uniquely, this programme will provide theoretical and practical training to students in the various methodologies utilised in translational research for the development of novel therapeutic approaches to treat neurological conditions. Hence, this programme will provide excellent training for students, whether they wish to pursue an academic or industrial research career, in which they can play a vital role in developing better treatments or curing Neurological disorders.

**Learning Outcomes**

**Core Module 1 Functional Neuroanatomy:**
At the end of this module students will be in a better position to:-

TN1.1 Describe the functional anatomy of the central, peripheral, autonomic and somatic nervous system.
TN1.1 Discuss how this anatomy relates to function and interaction between these systems.
TN1.3 Critically analyse how structure and function relate to key pathophysiology and disease.

**Core Module 2 Cellular & Molecular Neuroscience:**
Building on the knowledge gained in Module 1, Functional Neuroanatomy, students will at the end of this module will be better able to:-

TN2.1 Describe the principle cell types within the brain and spinal cord, their function and how they interact in the nervous system.
TN2.2 Discuss how such cells contribute to the development of the brain and spinal cord and how this can be affected in developmental disorders.
TN2.3 Critical analyse how key neuronal pathways in the developed brain and spinal cord control physiological function.
TN2.4 Synthesise an evidence-based argument showing how plasticity in such neuronal pathways can be affected by neurodegenerative mechanisms and the brains potential to repair itself.
TN2.5 Critically evaluate methodologies used and understand how they can be applied in neurobiology research to investigate cellular physiological function and dysfunction in disease.

**Core Module 3 Neurodegenerative disorders:**
Building on the Functional Neuroanatomy knowledge gained in Module 1, and the Cellular & Molecular knowledge gained in Module 2, students will at the end of this module will be better able to:-

TN3.1 Describe the basic clinical features of the main CNS Neurodegenerative Disorders and how they are medically treated.
TN3.2 Discuss which neuronal pathways are involved in development of such Neurodegenerative Disorders.
TN3.3 Discuss how brain imaging techniques can confirm neuronal pathway dysfunction and assist in the diagnosis of Neurodegenerative Disorders.

TN3.4 Critically analyse the neurodegenerative mechanisms which can result in neuronal pathway dysfunction and how this can be influenced by physiological factors e.g. genetics etc. and the environment.

TN3.5 Critically evaluate the in vitro and in vivo models used to investigate mechanisms of neurodegeneration and their use in the development of novel therapeutic approaches.

TN3.6 Critically evaluate which physiological and pharmacological factors influence the design of novel therapies and understand how their effectiveness is tested in clinical trials.

**Core Module 4 Neuroinflammation, Stroke & CNS trauma:**

Building on the Functional Neuroanatomy knowledge gained in Module 1, and the Cellular & Molecular knowledge gained in Module 2, students will at the end of this module will be better able to:-

TN4.1 Describe the basic clinical features of multiple sclerosis (MS), stroke and CNS traumatic injury.

TN4.2 Discuss their key pathological features and evaluate how brain imaging can assist in the diagnosis and treatment of such Neurological disorders.

TN4.3 Critically analyse the cellular mechanisms that trigger the pathological features of MS, Stroke and CNS trauma and how this can be influenced by physiological factors e.g. genetics etc. and the environment.

TN4.4 Critically analyse how our understanding of the cellular mechanisms of MS, Stroke and CNS trauma has influence their treatment.

TN4.5 Critically evaluate the in vitro and in vivo models used to investigate the cellular mechanisms of MS, Stroke and CNS trauma and their use in the development of novel therapeutic approaches.

TN4.6 Critically evaluate how the "Good Clinical Practice" (GCP) framework influences translational research into MS, Stroke and CNS trauma.

**Elective Module 5 Brain Imaging:**

Building on the Functional Neuroanatomy knowledge gained in Module 1, the Cellular & Molecular knowledge gained in Module 2, and the introduction to brain imaging in Neurological Disorders gained in Modules 3 & 4 students will at the end of this module will be better able to:-

TN5.1 Describe the basic physics/mechanics of Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET) and Single Photon Emission Computed Tomography (SPECT) imaging.

TN5.2 Discuss how Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET) and Single Photon Emission Computed Tomography (SPECT) images relate to functional anatomy of the brain.

TN5.3 Critically analyse how Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET) and Single Photon Emission Computed Tomography (SPECT) brain imaging can detect changes in brain function associated with common neurological and psychiatric conditions.

TN5.4 Critically evaluate how imaging techniques can assist in the diagnosis and understanding of the common neurodegenerative disorders.

TN5.5 Critically evaluate how neuroimaging can play a major role in translational research, particularly in the field of the drug development.

**Elective Module 6 Computational Neuroscience:**

Building on the Functional Neuroanatomy knowledge gained in Module 1, the Cellular & Molecular knowledge gained in Module 2, the foundation in Neurological Disorders gained in Modules 3 & 4,

plus knowledge of image analysis data generated in Module 5, students will at the end of this module will be better able to:-

TN6.1 Describe the range of computational techniques used in cognitive neuroscience research.
TN6.2 Discuss how computational techniques can be used to analyse data from a variety of cognitive and neuroimaging sources and understand its limitations.
TN6.3 Critically evaluate how data sets from a variety of cognitive neuroscience and neuroimaging sources are practically analysed.
TN6.4 Create "data pipelines" by optimally combining several analytical computational techniques for the analysis of complex data sets.

**Elective Module 7 Brain plasticity & Neuroregeneration:**
Building on the Functional Neuroanatomy knowledge gained in Module 1, and the Cellular & Molecular knowledge gained in Module 2, students will at the end of this module will be better able to:-

TN7.1 Describe the clinical features of the main neurological conditions relevant to neuroregeneration.
TN7.2 Discuss the key pathological features of relevant neurological disorders.
TN7.3 Critically analyse the basic molecular and cellular principles governing neuronal plasticity and neuroregeneration potential in neurological disorders.
TN7.4 Critically evaluate what in vitro & in vivo models are available for the translational development of novel drug therapies for neuroregeneration.
TN7.5 Critically evaluate bioengineering and biomaterials that may assist to enhance nervous system regeneration.
TN7.6 Synthesise an evidence based argument supporting the use of cellular/stem cell therapies in neurological conditions and its neuroanatomical and behavioural outcomes.

**Elective Module 8 Addiction and Neuropsychopharmacology in Psychiatry:**
Building on the Functional Neuroanatomy knowledge gained in Module 1, and the Cellular & Molecular knowledge gained in Module 2, students will at the end of this module will be better able to:-

TN8.1 Describe the key clinical feature of the main psychiatric disorders.
TN8.2 Discuss which neurotransmitters systems and cellular processes are involved in the key psychiatric disorders; and how treatment may affect these.
TN8.3 Discuss the principle "substances of abuse", the clinical features they induce and treatments available for such patients - psychosocial and pharmacological.
TN8.3 Critical evaluate the range of neuroimaging techniques used to characterize brain function in health and in addiction/psychiatric disorders.
TN8.5 Critical evaluate experimental medicine approaches from first-into-man to early clinical trials.

**Core Module 9 Laboratory based research project:**
The core (modules 1-4) and elective modules (modules 5 & 6 or 7 & 8) within the first part of this course reflects the research strengths of the Division of Brain Sciences, from which the laboratory based research projects will be offered. Hence, the knowledge gained in the taught modules will provide the students with an excellent foundation for them to develop key skills within this practical based module. At the end of this module students will be better able to:-

TN9.1 Understand the background to their research project.

| | |
|---|---|
| TN9.2 | Apply evidence-based arguments to generate a hypothesis upon which the project is based. |
| TN9.3 | Evaluate the current methodologies available and subsequently design an appropriate set of experiments to test the hypothesis. |
| TN9.4 | Apply experimental protocols to generate robust scientific data. |
| TN9.5 | Critically evaluate and interpret the scientific data generated; identify potential experimental issues and perform efficient troubleshooting. |
| TN9.6 | Critically evaluate scientific publications. |
| TN9.7 | Create a written report demonstrating originality; giving the reader the background to the project, a clear hypothesis and the appropriate experimental design to test the hypothesis, a critical evaluation of the experimental data generated and a discussion of its implications in light of current knowledge. |
| TN9.8 | Create and perform a clear and concise oral presentation on the project and answer questions relating to the project. |

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** | |
|---|---|
| Academic Requirement | Normally a minimum of a 2:1 UK Honours degree in an appropriate biological science subject (e.g. biology, biochemistry, biomedical sciences, neuroscience, medicine, dentistry or veterinary science) or equivalent which should ideally have some Neuroscience component. |
| Additional Requirements | None |

Applicants who do not meet the academic requirements above but who have substantial relevant clinical or relevant professional experience may be admitted following completion of a 'Special Qualifying Exam' (SQE)

Home/EU/international students will be invited to attend a post-application interview

| | |
|---|---|
| English Language Requirement | Higher requirement |

The programme's competency standards documents can be found at: http://www.imperial.ac.uk/medicine/study/postgraduate/masters-programmes/msc-translational-neuroscience/

| **Learning & Teaching Strategy** | |
|---|---|
| Scheduled Learning & Teaching Methods | • Lectures & keynote lectures,<br>• Class tutorials,<br>• Small group tutorials,<br>• Group work sessions,<br>• Peer based teaching<br>• Journal Club,<br>• Seminar series, |

| | |
|---|---|
| | • Discussion sessions with patients & Carers affected by Neurological disorders,<br>• Supportive web-based material,<br>• Laboratory teaching,<br>• Computer-based practical workshops, |
| E-learning & Blended Learning Methods | • formative assessment via Blackboard<br>• Web-based material e.g. research/review articles, case studies etc. |
| Project and Placement Learning Methods | • Laboratory based research project |
| **Assessment Strategy** | |
| Assessment Methods | • Written exams (short and long answers)<br>• Essays<br>• Poster presentations<br>• Practical reports/write-ups<br>• Written design of research projects<br>• Dissertation<br>• Oral presentations |
| Academic Feedback Policy | |
| Students can expect to receive feedback within two weeks. There are a number of case studies, group workshops, journal clubs throughout the course, which are not directly assessed, but will allow students to receive feedback from group leaders and their peers. | |
| Re-sit Policy | |
| Students will be permitted to re-enter a failed examination or resubmit a piece of failed coursework on a single occasion. Examination re-sits will only be available at the next available sitting (i.e. the following academic year). Re-sits will be capped at the pass mark. | |
| Mitigating Circumstances Policy | |
| The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/registry/exams | |

**Programme Structure**

| Full-time | Pre-session | Term One | Term Two | Term Three | Summer |
|---|---|---|---|---|---|
| Core Modules | | 4 | | | |
| Elective Modules | | | 2 | | |
| Projects | | | 1 | | |

| Assessment Dates & Deadlines | |
|---|---|
| Written Examinations | January and February |
| Coursework Assessments | Continuous |
| Project Deadlines | September |
| Practical Assessments | September |

**Assessment Structure**

| Programme Component | | ECTS | % Weighting |
|---|---|---|---|
| Functional Neuroanatomy | | 7.5 | 8.3r% |
| Cellular and Molecular Neuroscience | | 7.5 | 8.3r% |
| Neurodegenerative Disorders | | 7.5 | 8.3r% |
| Neuroinflammation, Stroke & CNS trauma | | 7.5 | 8.3r% |
| EITHER: | Brain Imaging | 7.5 | 8.3r% |
| AND: | Computational Neuroscience | 7.5 | 8.3r% |
| OR: | Brain Plasticity and Neuroregeneration | 7.5 | 8.3r% |
| AND: | Addiction and Neuropharmacology in psychiatry | 7.5 | 8.3r% |
| Laboratory based research project | | 45 | 50% |
| Total | | 90 | 100% |

Marking Scheme

**Distinction**

A student must:

- Achieve a mark of at least 50% in each module
- Achieve an aggregate mark of at least 70% in the three programme components as follows:
  a) The four core modules
  b) the two elective modules
  c) the module 'Laboratory-based Research Project'
- A student who achieves an aggregate mark of 70% in two of the programme components above and achieves an aggregate mark of 60% in the remaining component may be awarded a distinction at the discretion of the exam board.

**Merit**

A student must:

- Achieve a mark of at least 50% in each module
- Achieve an aggregate mark of at least 60% in the three programme components as follows:
  a) The four core modules
  b) the two elective modules
  c) the module 'Laboratory-based Research Project'
- A student who achieves an aggregate mark of 60% in two of the programme components above and achieves an aggregate mark of 50% in the remaining component may be awarded a distinction at the discretion of the exam board.

**Pass**

A student must:

- Achieve a mark of at least 50% in each module
- Achieve an aggregate mark of at least 50% in the three programme components as follows:
  a) The four core modules
  b) the two elective modules
  c) the module 'Laboratory-based Research Project'

| Indicative Module List | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | Title | Core/ Elective | Year | L&T Hours | Ind. Study Hours | Place-ment Hours | Total Hours | % Written Exam | % Course-work | % Practical | FHEQ Level | ECTS |
| TN1 | Functional Neuroanatomy | Core | 1 | 45.5 | 142 | 0 | 187.5 | 70% | 30% | 0% | 7 | 7.5 |
| TN2 | Cellular and Molecular Neuroscience | Core | 1 | 49 | 138.5 | 0 | 187.5 | 70% | 30% | 0% | 7 | 7.5 |
| TN3 | Neurodegenerative Disorders | Core | 1 | 51 | 136.5 | 0 | 187.5 | 70% | 30% | 0% | 7 | 7.5 |
| TN4 | Neuroinflammation, Stroke & CNS trauma | Core | 1 | 46 | 141.5 | 0 | 187.5 | 70% | 30% | 0% | 7 | 7.5 |
| TN5 | Brain Imaging | Elective | 1 | 54.5 | 133 | 0 | 187.5 | 70% | 30% | 0% | 7 | 7.5 |
| TN6 | Computational Neuroscience | Elective | 1 | 53.5 | 134 | 0 | 187.5 | 50% | 50% | 0% | 7 | 7.5 |
| TN7 | Brain Plasticity and Neuroregeneration | Elective | 1 | 48 | 139.5 | 0 | 187.5 | 70% | 30% | 0% | 7 | 7.5 |
| TN8 | Addiction and Neuropharmacology in psychiatry | Elective | 1 | 53 | 134.5 | 0 | 187.5 | 70% | 30% | 0% | 7 | 7.5 |
| TN9 | Laboratory based research project | Core | 1 | 1125 | 0 | 0 | 1125 | 85% | 0% | 15% | 7 | 45 |

| Supporting Information | | | |
|---|---|---|---|
| The Programme Handbook is available at: www.imperial.ac.uk/medicine/study/postgraduate/masters-programmes/msc-translational-neuroscience/ | | | |
| 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: 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/ | | | |
| **Modifications** | | | |
| Correction of error: English Language Requirement updated to state the higher requirement. | N/A | February 2017 | N/A |