MSc In Translational Neuroscience.

www.sheffield.ac.uk/transneuro
MSc in Translational Neuroscience.

**Why translational neuroscience?**
Translational neuroscience implies the process by which fundamental laboratory research relating to brain structure and function informs the development of new therapies for diseases of the nervous system. Neurodegenerative, psychiatric and neurodevelopmental diseases are a huge economic burden to society and a cause of much suffering to patients and carers alike. Translational neuroscience is a new and rapidly advancing area of biomedical research with massive therapeutic and commercial potential.

Our MSc programme offers theoretical and practical training about fundamental aspects of contemporary neuroscience at molecular, cellular, anatomical and behavioural levels, and draws on examples from model organisms and patient-based studies. The MSc course combines research strengths across the Faculty of Medicine, Dentistry & Health and the Faculty of Science to provide an innovative and progressive programme of basic neurobiology and molecular biology through to neuroimaging and applied clinical practice. Experience from leading international research groups will provide a solid basis on which to develop your future career.

**Course structure**
The taught component of the MSc is delivered through lectures, tutorials and student-led group work during the first two terms. In the first term, there is the opportunity to select either option 1 (biomedical neuroscience based research skills) or option 2 (computational and mathematical modelling research skills). In the summer term, the 20-week research project will allow you to get practical experience of performing hypothesis-led scientific research. This is a full time course, with all taught modules worth 15 credits, whilst the extensive research project is worth 75 credits.

<table>
<thead>
<tr>
<th>Option 1</th>
<th>Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular &amp; Developmental Neuroscience</td>
<td>Computational Neuroscience: Neurons &amp; Neuronal Codes¹</td>
</tr>
<tr>
<td>Fundamentals in Neuroscience¹</td>
<td>Mathematical Modelling &amp; Research Skills¹</td>
</tr>
<tr>
<td>Literature Review &amp; Critical Analysis of Science</td>
<td>Genetics &amp; Modelling of Neurodegenerative Disease³</td>
</tr>
<tr>
<td>Ethics &amp; Public Awareness of Science²</td>
<td>Mechanisms of Neurodegenerative Disease³</td>
</tr>
<tr>
<td></td>
<td>Applied Neuroimaging, Neurophysiology &amp; Psychiatry</td>
</tr>
</tbody>
</table>

Research Project

Modules run in conjunction with ¹MSc Cognitive and Computational Neuroscience, ²MSc Molecular and Cellular Basis of Disease and ³MSc Molecular Medicine (Neuroscience Pathway)
**Molecular & Developmental Neuroscience**
You will learn about state-of-the-art informatics and molecular techniques for studying patterns of heredity, how to analyse gene and protein expression in neurological and psychiatric diseases, and how the nervous system develops.

**Fundamentals in Neuroscience**
You will be introduced to core aspects of contemporary neuroscience including neural signalling, sensation and sensory processing, how we move and how it’s controlled, brain development and plasticity and complex brain functions.

**Literature Review & Critical Analysis of Science**
You will be required to undertake an in-depth survey of the current literature in order to prepare a written essay on a research topic. A series of tutorials and seminars will run alongside to develop your ability to read and understand scientific literature.

**Ethics and Public Awareness of Science**
You will be introduced to the legislative limitations and ethical influences on biomedical science, how these are influenced by public attitudes and the scientific community. You will explore your personal views and how they influence your perception of research.

**Computational Neuroscience 1: Neurons & Neuronal Codes**
You will learn about commonly used methods in computational neuroscience, including how neurons encode and decode sensory information. The emphasis is on the use of mathematical and computational models of single neuron function and dysfunction.

**Mathematical Modelling & Research Skills**
You will develop the basic skills required to understand and participate in research in computational and cognitive neuroscience. You will learn programming skills which include the MatLab modelling language.

**Genetics & Modelling of Neurodegenerative Diseases**
You will be taught how pathological findings relate to neurodegenerative diseases and learn about the genetic basis of disease. You will be introduced to the use of cellular and animal models of monogenic disorders.

**Mechanisms of Neurodegenerative Disease**
You will explore the cellular and molecular causes of neurodegeneration in the major neurological diseases. You will discover how hypotheses can be tested in model systems and utilised to develop new therapeutic strategies.

**Applied Neuroimaging, Neurophysiology & Psychiatry**
You will obtain an overview of clinical neuroimaging techniques, neurophysiology and psychiatry. You will learn about neuropsychological testing, the neural and molecular basis of psychiatric disorders, psychiatric genetics and animal models of psychiatric disorders.

**Research Project**
The aim of your project is to apply appropriate laboratory based techniques to test a specific scientific hypothesis and to write up the research in a scientific manner. You should learn to record, interpret and discuss your results and the implications of their findings. You will also be expected to participate in journal clubs, seminars and lab meetings, within the host Department, to complement your laboratory experience.

---

1. Cultured motor neuron; 2. Zebrafish, primary culture & neuronal cell line, all used to model disease; 3. Functional MRI showing brain activation during an empathy task.
Why Sheffield?

Sheffield is a vibrant city situated in the heart of the UK, adjacent to the Peak District National Park. It offers a variety of culture and entertainment, with theatres, museums and concert venues. The affordable city-centre living is within walking distance to the University, making Sheffield a top destination for you to study.

Facts and figures.

University rated 9th in UK, 25th in Europe and 81st in World Ranking of Universities (Shanghai Jiao Tong Academic Rankings 2009)

93% of research is internationally recognised (RAE, 2008)

Best Students’ Union in Britain (Virgin Alternative Guide)

The University of Sheffield.

The University of Sheffield is a world-renowned research intensive university. Founded in 1905, it provides students with an environment where high quality teaching is informed by the latest research developments. The University attracts students from all over the world, as well the UK and Europe.
Neuroscience in Sheffield.

Neuroscience spans several faculties and departments, with research groups dedicated to the understanding and treatment of neurological and psychiatric disorders, providing an exciting and world-class research environment for your MSc. Students will be taught and supervised by highly interactive, multidisciplinary research teams of basic and clinical scientists applying state of the art approaches in a variety of disease models and patient cohorts. The course will be based at the Sheffield Institute for Translational Neuroscience (SITraN), which was opened by Her Majesty the Queen in November 2010.

Department of Neuroscience.
The major areas of research interest are in neurodegenerative diseases (diseases of the motor system and dementia); psychiatric disorders (psychoses, including schizophrenia) and clinical neurology (epilepsy, stroke, ataxia, multiple sclerosis). We use disease models, patient material and neuroimaging to understand the molecular, cellular and genetic aspects of disease. The primary research strategy is to develop novel therapeutic approaches which can be translated into clinical applications.

Biomedical Science.
The department’s research embraces the development of the nervous system, from specification and patterning of the embryo to formation and maintenance of neural networks; the physiology and pharmacology of neuronal microcircuits; diseases affecting the sensory, motor and cognitive aspects of the nervous system (pain syndromes, hearing disorders, Parkinson’s); and development of novel nanoparticles for the treatment of neurological and psychiatric diseases.

Department of Psychology.
The research strategy addresses key problems in sensorimotor control and cognition: action selection; basis of active visual and tactile perception, and the role of adaptive filtering therein; brain disorders (Parkinson’s disease, autistic spectrum disorders); cognition (e.g. the neural basis of deductive reasoning). Techniques used in the department include: electrophysiology, anatomy, computational neuroscience, functional imaging (fMRI and EEG) and experimental psychology.
The student experience

The MSc in Translational Neuroscience will provide you with a springboard for your future career. You will learn about recent advances in neuroscience and the application of novel approaches, gain laboratory experience with internationally renowned research groups, develop transferable skills and improve your employability, whether following a career in academia, the commercial sector or elsewhere.

**Neuroscience Skills:**
- Molecular biology
- Cell biology
- Single cell & whole brain imaging
- Structural & functional MRI
- Electrophysiology
- Novel therapeutics
- Computational modelling
- Whole organism behaviour
- Pharmacology

**Transferable Skills:**
- Critical analysis
- Time management
- Team working
- Independent researcher
- Problem solver
- Good communicator
- IT literate
- Professional and adaptable
- Reflective
- Self-motivated

**Student feedback**

“The modules were very interactive”

“It was an enriching and exciting experience”

“Studying at Sheffield has been one of the most wonderful experiences”

“The atmosphere in the labs is lively, friendly and extremely motivating”

“This department has shown me what a research career has to offer and I am excited!”
Information for applicants

**Entry requirements**
- 1st or 2:1 BSc in relevant science degree
- IELTS of 7 (including 7 in listening) or equivalent

**Further information**
For further details on the course please go to [www.sheffield.ac.uk/transneuro](http://www.sheffield.ac.uk/transneuro)

If you have any queries, please contact transneuro@sheffield.ac.uk

For further details on the departments please go to [www.shef.ac.uk/medicine/neuroscience](http://www.shef.ac.uk/medicine/neuroscience)
[www.shef.ac.uk/bms/](http://www.shef.ac.uk/bms/)
[www.shef.ac.uk/psychology/](http://www.shef.ac.uk/psychology/)

**Information on fees**
For further details on fees, please go to [www.sheffield.ac.uk/transneuro](http://www.sheffield.ac.uk/transneuro) and click “Fees”

**Applications**
To apply, please go to [www.shef.ac.uk/postgraduate/taught/apply](http://www.shef.ac.uk/postgraduate/taught/apply)

---

1 Information Commons; 2 Peace gardens; 3 Student’s Union; 4 Mappin Court postgraduate accommodation
Other Related Courses Available:

MSc Cognitive & Computational Neuroscience
(www.shef.ac.uk/psychology/prospectivepg/masters/ccn_masters)

MSc Molecular Medicine
(www.sheffield.ac.uk/molmed)