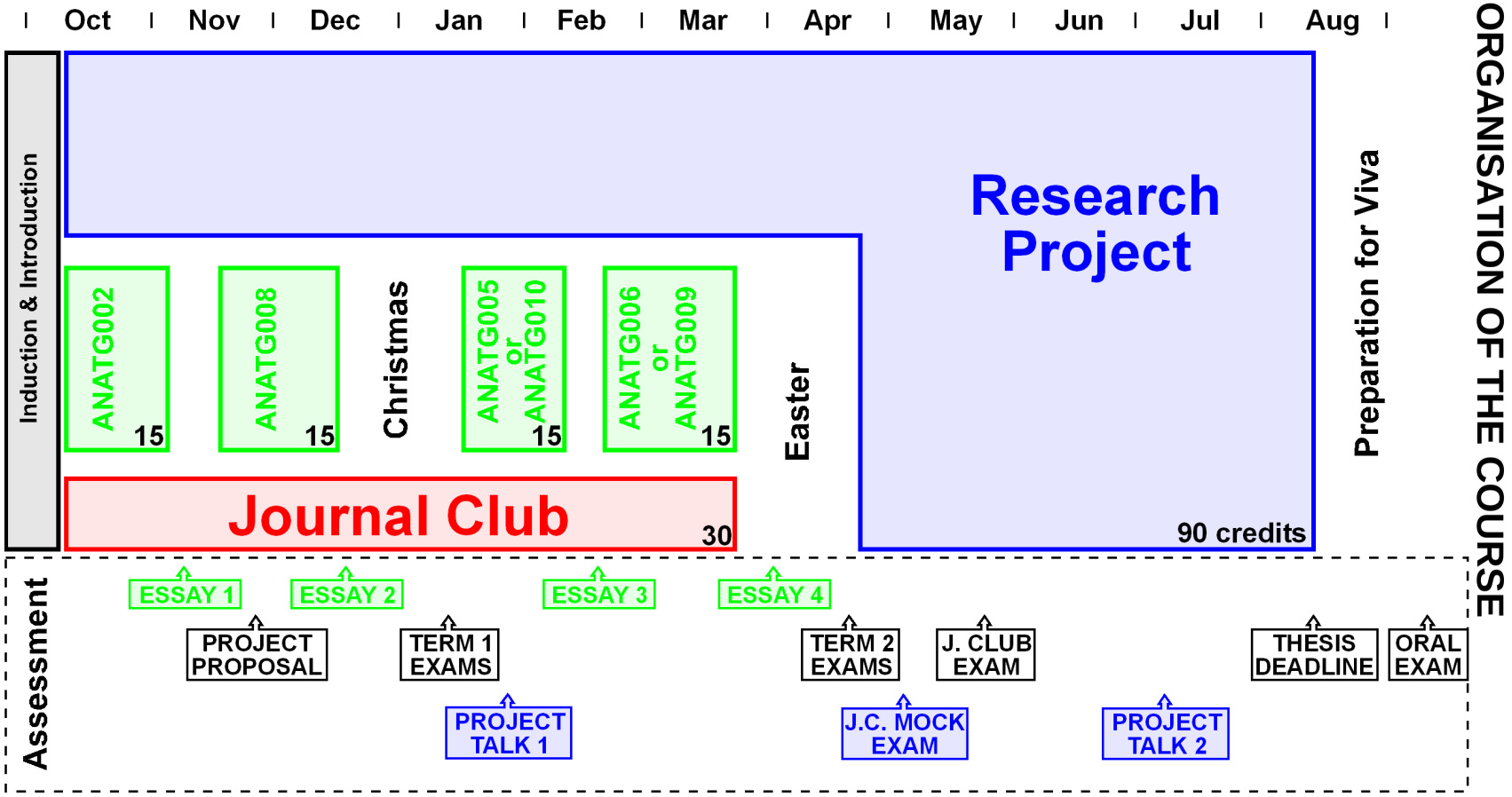
ORGANISATION OF THE COURSE
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Induction & Introduction
Research Project
90 credits
Preparation for Viva
ANATG002
15
ANATG008
15
Christmas
ANATG005 or ANATG010
15
ANATG006 or ANATG009
15
Easter
Journal Club
30
Assessment
ESSAY 1
ESSAY 2
ESSAY 3
ESSAY 4
PROJECT PROPOSAL
TERM 1 EXAMS
PROJECT TALK 1
TERM 2 EXAMS
J. CLUB EXAM
J.C. MOCK EXAM
PROJECT TALK 2
THESIS DEADLINE
ORAL EXAM

# MODULAR ORGANISATION OF THE COURSE

Like all masters courses at UCL, the MSc Neuroscience degree is modular and worth a total of 180 credits. The course is split 50:50 between taught modules and a single research project. The taught component is comprised of four 15-credit lecture modules and the 30-credit tutorial-based 'Journal Club' module. No other modules are allowed. A small number of students from other programmes use the modules on the course.

| MODULE CODE | MODULE NAME | EXAM | WEIGHT | COURSE WORK | WEIGHT |
|---|---|---|---|---|---|
| ANATG002 Block 1 | LECTURE MODULE: Developmental Neurobiology | Unseen One hour written | 50% | One essay (2,000 words) | 50.00% |
| ANATG008 Block 2 | LECTURE MODULE: Receptors and Synaptic Signalling | Unseen One hour written | 50% | One essay (2,000 words) | 50.00% |
| ANATG007 Terms 1 & 2 | TUTORIAL MODULE: MSc Neuroscience Journal Club | Unseen Three hour written | 100% | | |
| ANATG005 Block 3a | LECTURE MODULE: Systems Neuroscience | Unseen One hour written | 50% | One essay (2,000 words) | 50.00% |
| ANATG010 Block 3b | LECTURE MODULE: Systems and Circuit Neuroscience | Unseen One hour written | 50% | One essay (2,000 words) | 50.00% |
| ANATG006 Block 4a | LECTURE MODULE: Neurobiology of Degeneration and Repair | Unseen One hour written | 50% | One essay (2,000 words) | 50.00% |
| ANATG009 Block 4b | LECTURE MODULE: Cognitive Systems Neuroscience | Unseen One hour written | 50% | One essay (2,000 words) | 50.00% |
| ANATG099 Whole Year | PROJECT MODULE | THESIS | 100% | | |

Compulsory modules are indicated in **red.**

**LECTURE MODULES**
Everybody takes the two modules in term 1. During term 2 (blocks 3 & 4) students choose one of:

ANATG005 - Systems Neuroscience **OR** ANATG010 - Systems & Circuits Neuroscience

Followed by, one of:

ANATG006 - Neurobiology of Degeneration and Repair **OR** ANATG009 - Cognitive Systems Neuroscience.

You should discuss with your personal tutor (list on Moodle) and the module organisers about which block 3 and 4 modules to choose. There is a deadline for registering your choice on Portico, which you will be informed about.

<table>
<tr><td colspan="4">ACADEMIC YEAR</td></tr>
<tr><td colspan="2">TERM 1</td><td colspan="2">TERM 2</td></tr>
<tr><td>BLOCK 1</td><td>BLOCK 2</td><td>BLOCK 3</td><td>BLOCK 4</td></tr>
<tr><td>ANATG002 - The Neurobiology of Development</td><td>ANATG008 - Receptors and Synaptic Signalling</td><td rowspan="2">ANATG005 - Systems Neuroscience OR ANATG010 - Systems & Circuit Neuroscience</td><td rowspan="2">ANATG006 - The Neurobiology of Degeneration & Repair OR ANATG009 - Cognitive Systems Neuroscience</td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="3">ANATG007 - MSc Neuroscience Journal Club</td><td></td></tr>
<tr><td colspan="4">ANATG099 - MSc Neuroscience Project</td></tr>
</table>

TEACHING: Each lecture module is 4 or 5 weeks long (see below for module content). Each week has a ‘theme’ which is generally composed of three research lectures each lasting approximately 90 minutes delivered by an expert in the field from around UCL or elsewhere. In the first half of the lecture, the lecturer usually introduces their research field and in the second half they talk about the current research going on in their laboratory. For blocks 1 and 2 there are also ‘introductory lectures’ usually given by the module organiser. Teaching is concentrated into Mondays and Thursdays. The details of the lectures, access to reading lists and copies of slides (where available) are on Moodle.

ASSESSMENT: Each lecture module is assessed by a 2000-word in-course essay (50%) and a one-hour unseen, written examination (50%). There are further details below under ‘Essays’. The exams for modules **ANATG002 – The Neurobiology of Development** and **ANATG008 – Receptors and Synaptic Signalling** will take place after the Christmas break. The other two lecture modules (two from **ANATG005**, **ANATG006**, **ANATG009** and **ANATG010**) will be examined at the end of the college Easter break. Previous exam papers are available on Moodle.

**JOURNAL CLUB**
TEACHING: Journal Clubs are how researchers get together with colleagues to discuss current papers. For this module you will be organised into small groups of

approximately 8-10 students. Each week you will get access to the pdf file of a paper, chosen by your tutor, on Moodle. The tutors are either scientists associated with the course or some of the lecturers from the current lecture module. They will rotate so you don't get the same person each time. The journal clubs last two hours (usually on a Friday morning). Everyone must thoroughly study the paper to get the most out of this system. Usually a pair of students are selected to present the paper to the group and with the help of the tutor discuss the paper. The aims of this module are initially; to teach you how to read and understand a scientific paper more efficiently; then to develop your ability to critically evaluate it.

ASSESSMENT: The MSc Neuroscience Journal Club exam will be in the main examination period around May by a three-hour unseen written examination (100%). It has a very similar format to the weekly journal clubs and therefore tests the skills that you will have developed. One week before the exam the class is issued with a hardcopy of a recently published paper that spans molecular to behavioural neuroscience. You are expected to comprehend everything in it as well as the general area of research that it encompasses. You can use any resources: books; papers; internet; experts in the field; supervisors; postdocs in the lab; etc.; anything except asking the examiners. You can write whatever you want on the copy of the journal article and take that into the examination.

A non-compulsory practice test is set at the end of Term 2 and peer-marked. It is highly recommended that students complete this practice test under examination conditions so that valuable feedback on the assessment style can be provided. **It is really worth your while participating in this practise test. Believe me!**

**RESEARCH PROJECT**

CHOOSING YOUR PROJECT: You are free to choose to do your project anywhere around the UCL campus. Some students need more help than others to choose a project. It is important to choose the 'right' project but it is also important to get started as early as possible. The period up to Easter when you are only two days a week on your project is very valuable time and should not be wasted. To help you choose there is a list of possible projects on Moodle that we add to and update. In the induction week there is the 'supervisor's lunch' which is an hour of 'rapid fire' 3 minute oral presentations by a small sample of the hundreds of possible supervisors. We then mingle over a sandwich lunch where you can inquire further with these supervisors. You will also meet with your personal tutor in the induction or introduction week to discuss your project. We are looking to have projects arranged by the end of October. We will also provide advice on how best to approach a supervisor to ensure you catch their attention.

ASSESSMENT - PROJECT PROPOSAL: a two-page project proposal is written with a deadline in the second half of November. This is written in the form of a mini-grant proposal. You will want to sit down with your project supervisor to find out what the scientific question you are to work on is. How you are going to tackle it and what you hope to find out. This proposal will contribute towards the overall project mark and will be bound into your thesis as an appendix.

ASSESSMENT - PROJECT DISSERTATION: The project is worked on throughout the year and written up during July/August with a submission deadline in mid-August. An oral examination (viva) is arranged for the second or third week in September. There are details of how to write the dissertation below and we will have a workshop about this

# Module Information

**Part-time students** study all of the taught modules in year 1 and do the project in the second year.

**ANATG002: Developmental Neurobiology**
**15 Credits**
**Block 1**
**Module Organiser: Dr Stephen Price**

The course will cover early development of the nervous system (including induction and initial patterning of the CNS, neural progenitors, and genetic analysis of laterality in the developing CNS), origin of neural phenotypes (including organizer patterning in the CNS, migration of cortical neurons and motor circuitry in the developing spinal cord), peripheral development (including neurogenesis and neuron-glial switch, and regulation of Schwann cell development and differentiation), and axons, synapses and circuits (including axon guidance in the visual system of Drosophila, axon outgrowth: $Ca^{2+}$ in growth cones, and early motor neurone-target interactions).

This module aims to expose the students to the world-class research in the development of the nervous system as it is done at UCL.

The students will become familiar with the cutting edge research done at UCL into Developmental Neurobiology. They will grasp and understand the knowledge of the research in this field as it progresses. They will learn about the initial patterning of the nervous system, neuronal differentiation and specification, axon guidance mechanisms and the initial formation of synapses during development. The module will be organized roughly in accordance with the ontogeny of development itself.

**ANATG008: Receptors and Synaptic Signalling**
**15 Credits**
**Block 2**
**Module Organiser: Dr Andrew Batchelor**

How the world of ion channels, neurotransmitters and their receptors contribute to neuronal processing will be explored. From the biophysical properties of ion channels to exploring their role in synaptic plasticity and neuropathologies.

This module aims to expose the students to the world-class research in the neuroscience of synaptic transmission and ion channel function as it is done at UCL.

The students will become familiar with the cutting-edge research done at UCL into synaptic physiology. They will grasp and understand the knowledge of the research

in this field as it progresses. They will learn about individual ion channel families and how their expression and pharmacological properties influence the firing capacity of individual neurons within neuronal circuits.

**ANATG007: MSc Neuroscience Journal Club**
**30 Credits**
**Runs throughout terms 1 and 2**
**Module Organisers: Drs Andrew Batchelor and Daniel Bendor**

The module aims to help students to read and understand research papers effectively and critically. Introductory lectures will be provided that cover the basic areas of the field to be discussed during the journal club. All students will be provided with either one or two journal papers a week in advance of the journal club, and each week two students will give an introductory presentation on the paper(s). The papers will be either relevant to the topic which is being taught that week, or will be very recent papers covering the most recent advances in neuroscience research.

This module aims to develop critical thinking and understanding of published research, to improve presentation (both visual and spoken) and to develop skills of being able to explain complex concepts clearly and precisely.

**ANATG005: Systems Neuroscience**
**15 Credits**
**Block 3a**
**Module Organiser: Dr Stephen Price**

The module discusses sensory transduction from periphery to the central nervous system. It integrates knowledge in each part of sensory processing to provide a coherent outlook on how different sensory modalities are perceived by the nervous system. The sensory modalities included are pain and somatosensation, audition & vision. Additionally, the course will introduce the topic of the autonomic nervous system and discuss whole animal physiology in relation to this important branch of neuroscience.

This module aims to expose the students to the world-class research in systems neuroscience as it is done at UCL.

The students will become familiar with the cutting edge research done at UCL into Systems Neuroscience. They will grasp and understand the knowledge of the research in this field as it progresses. They will learn about all sensory transduction, with the exception of olfaction, focusing first on peripheral transduction, then central information processing. The students will gain knowledge and understanding of how the nervous system operates as a whole to take multiple cues and integrate them to form a clear decision on how to act on external stimuli.

**ANATG010: Systems and Circuits Neuroscience**
**15 Credits**
**Block 3b**
**Module Organiser: Dr Dan Bendor**

The module discusses systems and circuit analysis using a variety of techniques from optogenetics in Drosophila to human neuroimaging and computational modeling. The systems covered span from the generation and maintenance of circadian rhythms, reinforcement and learning in the striatum, to somatosensation and synaptic plasticity and memory.

This module aims to expose the students to the world-class research in systems neuroscience.

The students will become familiar with the cutting edge research into Systems and Circuit based analysis in Neuroscience. They will grasp and understand the knowledge of the research in this field as it progresses. They will learn about a variety of systems in the central nervous system spanning a range of model organisms from Drosophila and zebrafish to human neuroimaging work and computational models of memory.

**ANATG006: Neurobiology of Degeneration and Repair**
**15 Credits**
**Block 4a**
**Module Organiser: Dr Andrew Batchelor**

The module will cover damage, regeneration and repair, pathology of the nervous system and neurological disease (including sodium channels and epilepsy, mitochondria and neurodegenerative disease, brain and spinal cord injury: use of glial cells as reparative bridges, and use of stem cells in animal models of CNS disorders); genetics and mechanisms involved in mood disorders such as schizophrenia.

This module aims to expose the students to the world-class research in the science of damage, repair and pathology of the nervous system as it is done at UCL.

The students will become familiar with the cutting edge research done at UCL into neural degeneration, pathology and damage. They will grasp and understand the knowledge of the research in this field as it progresses. They will learn about neurodegenerative disorders, including huntingtons disease and alzheimers, abnormal neural tube closure, retina degeneration, stroke and ion chanelopathies. They will further gain knowledge and understanding of possible therapies, including the use of stem cells, to aid in combating the effects of these disorders and pathologies.

**ANATG009: Cognitive Systems Neuroscience**
**15 Credits**
**Block 4b**
**Module Organiser: Dr Dan Bendor**

The module discusses cognitive systems and processing in the central nervous system. As well as teaching how the central nervous system processes sensory information (visual, auditory and olfactory), higher-level perceptual and cognitive systems including language processing, face processing, the role of attentional

systems, spatial representation and the use of fMRI to examine visual consciousness are also described.

This module aims to expose the students to the world-class research in clinical neuroscience.
The students will become familiar with the cutting edge research into Cognitive Neuroscience. They will grasp and understand the knowledge of the research in this field as it progresses. Neuroimaging techniques including fMRI, structural MRI, EEG and MEG will be taught in the context of higher-order perceptual and cognitive processes. A comprehension of how the brain constructs abstract models of the external world including object recognition, spatial representation, planning processes and the role of consciousness will be gained.

**ANATG099: MSc Neuroscience Research Project**
**90 Credits**

A laboratory research project conducted in a Neuroscience laboratory of the students choosing within UCL (there are over 400 different research groups operating at UCL in the broad field of Neuroscience). UCL's research strength in Neuroscience is the best in Europe and arguably number 2 in the world. The students are expected to work for two days per week in the laboratory until the end of March and then full time in the laboratory for the remainder of the course. A written dissertation in the form of a research article that could be submitted to the Journal of Neuroscience with an additional 750 word critique of the methods employed in the project and a viva voce examination form the assessment of the module. It is of vital importance that this assessment method is employed for two reasons. First, the MSc Neuroscience is an intensive, research led taught masters programme with research methodology, critical understanding and knowledge of cutting edge research forming the *raison d'etre* of the entire programme. The assessment in the form of the students preparing a research paper that could be submitted to a prestigious journal gives the students a vital experience of how to present data for peer review in clear and concise terms. Second, the research project is a lengthy one and requires a considerable amount of effort on the part of prospective supervisors who agree to take a student on for a whole calendar year and to provide the necessary research reagents and consumables for that student. The resulting generation of a dissertation that is already formatted and presented in the form of a journal article is a valuable way of the course attracting more prospective supervisors to take on MSc Neuroscience students.