Part II PDN and Part II BBS PDN Handbook 2025-2026

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1. INTRODUCTION TO THE COURSE

Welcome to Part II Physiology, Development and Neuroscience. Our overall aim is to provide a broad multidisciplinary course in Physiology, Development and Neuroscience that also allows you to specialise within specific themes. Our course offers modules that fall into three themes that reflect the research interests in the department (Development and Reproductive Biology, Integrative Physiology and Neuroscience). You can focus within one theme or engage your interests across two or three. We hope that this course, with its wide range of modules, ensures that everyone has a programme of study suited to their interests and abilities.

Our course will also teach you a variety of scientific skills that will equip you for future careers in a wide range of areas. It comprises lectures, workshops, seminars, informal discussions and research projects. You will carry out a two-term research project that is either lab-based or literature-based. This complements the knowledge you will gain in the use of techniques and conceptual tools from molecular biology, through membrane and cellular physiology, to the study of systems physiology and the disorders of physiology associated with disease.

As you move from Part I to Part II you will develop new skills and face many new challenges. This year you will be required to work more independently, to make choices about which areas of interest you follow up in more detail, and to question and critically analyse information you are given. Although this may seem daunting, we believe that you will find this to be an interesting and satisfying learning experience. In this handbook, we have tried to provide you with guidance for this process, and to indicate the resources available to you and persons you can turn to if you encounter difficulties at any stage. You will probably find it helpful to refer to these notes many times throughout the year.

We have endeavoured to provide a dynamic, exciting course examining many aspects of physiology, developmental biology and neuroscience, and we hope that you will enjoy this year and find fulfilling your potential at Part II to be a satisfying experience.

Part II PDN Organisers

Hannah Clarke and Amanda Sferruzzi-Perri (Course Organisers)

Nick Brown, James Fraser and Angela Roberts (Theme Leads).

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2. WHO'S WHO

Hannah Clarke (hfc23@cam.ac.uk) and Amanda Sferruzzi-Perri (ans48@cam.ac.uk) are the overall Part II Course Organisers and oversee the BBS course components in PDN. They plan the programme of work in conjunction with the Part II Theme Organisers: Nick Brown (Development; nb117@cam.ac.uk), James Fraser (Integrative Physiology; jaf21@cam.ac.uk and Angela Roberts (Neuroscience; acr4@cam.ac.uk).

Sophie Jones (part2@pdn.cam.ac.uk) is the administrator responsible for the day-to-day running of the Part II course.

Wentao Song and Nigel Prime are our IT Officers and will help you with your computing needs (it@pdn.cam.ac.uk).

The Departmental Librarian, Mehves Dignam looks after the library and is your first point of contact for accessing publications and resources (pdn@lib.cam.ac.uk).

Katie Conran (pdn-maintenance@pdn.cam.ac.uk) is the Principal Assistant for PDN in charge of security and, with the Departmental Safety Officer Rachel Mason (safety@pdn.cam.ac.uk), is responsible for Health and Safety in the two buildings (Physiology and Anatomy).

Ian Bolton and Adrian Newman (avmg@pdn.cam.ac.uk) run the audiovisual unit (AVMG), and they are a useful source of advice on PowerPoint, poster making and colour printing.

Course contributors:

A list of academic staff contributing lectures and acting as Module Organisers can be found at http://www.pdn.cam.ac.uk/directory/faculty, with links to their web pages indicating their research interests.

Useful links:

Department of Physiology, Development and Neuroscience website:
http://www.pdn.cam.ac.uk/

Part II Physiology, Development and Neuroscience webpage:

http://www.pdn.cam.ac.uk/undergraduate/part-ii-courses

Moodle pages (for course schedules and materials):

https://www.vle.cam.ac.uk/login/index.php

The **Common Courses** Moodle page contains all course-specific information.

3. COURSE AIMS AND ORGANISATION

3.1 Course aims

To provide a broad multidisciplinary course in Physiology, Development & Neuroscience, that also allows you to specialise within specific themes.

To teach a variety of scientific skills that will equip you for future careers in a wide range of areas: health sciences, medicine and veterinary medicine, research in life sciences and related disciplines, teaching, publishing and management.

What you can expect by the end of the course:

- To think and write critically and creatively about what you have read, learned and discovered.
- To analyse, both qualitatively and quantitatively, data collected during research projects.
- To use available resources to conduct research into scientific problems, e.g. libraries and computer databases, together with academic and technical expertise.
- To assess and implement analytical and statistical techniques necessary to solve a particular scientific problem and/or test a hypothesis.
- To communicate with expert and non-expert audiences through presentations, project dissertations and essays.
- To use computer searches, as well as more traditional methods, to discover what is already known about a scientific problem.

3.2 The organisation of the course

All students study four modules from a choice of thirteen. The modules are divided into three themes: Development and Reproductive Biology, Integrative Physiology, and Neuroscience. Some students will want to study one theme; however, others enjoy the opportunity to follow a more general course, combining modules across themes.

You are given free choice of how you distribute your four module choices over the two terms (for example: two in Michaelmas and two in Lent or three in Michaelmas and one in Lent etc). However, be aware of your workload and that some combinations are not possible.

In your detailed reading you will want to concentrate on the topics that particularly interest you. Much of your formal teaching lectures will take place during the morning, with a few exceptions, including N2, P7 and some ‘shared’ module slots where the teaching is also facilitated by other departments. Many modules also offer workshops, journal clubs or seminars in the afternoons. These give opportunity for a more interactive style of teaching that students enjoy and find helpful in consolidating the lecture material. Most afternoons, during Michaelmas and Lent terms are free for project work and private study. The Easter Term is kept largely free from formal commitments to allow time for reading and revision.

Projects

All PDN project students do either an experimental lab-based research project or a literature-based project, under the supervision of an appropriate member of staff. Lab-based research projects are limited in number and allocation cannot be guaranteed to all students who wish to do these. Both lab-based and literature-based project findings are written-up in the form of an

8,500-word dissertation (project report). You will also have the opportunity to present yourprogress to the Department as a poster presentation. The times that you work on your project can be negotiated with your supervisor to some extent so that you will have time available for other work and outside interests, but in general students are expected to spend about 16 hours a week on average on their project.

Teaching and Learning Strategy

The formal, organised teaching sessions are only the start of your learning experience this year. In offering these sessions, we provide a framework for your learning as well as a framework for pursuing your dissertation work. We expect you to attend in-person (and on time) all organised teaching sessions relevant to your programme of study this year, and to work diligently on your project.

It is up to you to initiate and explore different ways of achieving your understanding within and beyond the framework that we provide, and to develop your own plan of learning for the year. We expect you to read beyond the lecture material, including the reading suggested by your lecturers. We expect you to identify areas of particular interest to you and to follow them up with further reading, discussion with your peers and with course contributors, and attending related research seminars in the Department and elsewhere. We also expect you to identify problem areas and to take measures to address any difficulties by seeking advice from course contributors and/or your Departmental Advisor, and by reading appropriate background material.

Time Commitment

University figures indicate that Biological Natural Scientists work on average for around 46 hours per week and you should expect to be working for something like 42-46 hours per week on average. The range of different course components means that different students may devote somewhat different times to particular academic activities with some variation over different terms.

In organising your time keep in mind the distribution of marks in your Part II examination. Project students should be devoting around 16 hours per week to their project (covering experimental/library work, data processing and background reading). BBS students should be spending around 8-9 hours per week on their dissertations, although dissertation work will likely fall mainly in the Lent term. The department suggests that Part II students aim to have two supervisions per module.

4. SAFETY AND SECURITY

a) Security and Access to PDN Buildings

At the start of term, your University ID card will be programmed to allow access to the Part II areas of the Physiology and Anatomy buildings.

Swipe card access is granted only to PDN-based project students and BBS 415 students upon completion of the 'Safety and Security for PDN at Part II' form.

Your University ID card must be carried at all times.

Important Security Practices:

- Always shut windows, switch off lights and computers, and lock doors if you are the last to leave.
- Do not allow anyone you do not know to enter with you. Ask them to contact their departmental contact to meet them outside.
- Thefts and break-ins can occur, please be vigilant.
- **If you have any concerns about your safety or security, contact University site security.** Emergency phones are located in the reception areas of both the Physiology and Anatomy buildings. For full details, see section f) Emergency Contacts.
- Please do not bring friends or family into the department.

Fire Safety:

- Alarm Testing:

  Anatomy building: Wednesdays at 8.45am

  Physiology building: Thursdays at 8.45am
- Familiarise yourself with fire exits and assembly points in both buildings.

First Aid:

- First aid kits and posters are located in key areas throughout both buildings.
- **Physiology Reception is the primary contact point** for requesting a trained first aider. If you are unable to make the call yourself, please ask someone nearby to assist you.
- All incidents, accidents, and near misses must be reported to your supervisor and recorded in AssessNet. A QR code linking to AssessNet is available on each first aid box.

b) Good Working Practice

Training & Documentation:

Complete all required safety training before starting research. Your supervisor will maintain a training record.

Risk Assessments (RAs) and Control of Substances Hazardous to Health (COSHH) forms must be completed and signed by your supervisor before beginning work.

PPE:

Wear appropriate personal protective equipment (PPE) such as lab coats, gloves, eye protection, and masks. Your supervisor will advise on suitable PPE.

Working Hours & Out-of-Hours Work:

Core working hours are 8.45am–5pm, Monday to Thursday, and until 4pm on Fridays.

Part II students must be supervised by a member of laboratory staff when working in a laboratory.

Non-hazardous lab work may be carried out outside these hours, including weekends, only if a Working Out of Hours Risk Assessment has been completed, signed by your supervisor, and approved by the Department Safety Officer (DSO).

Lab-based Projects:

Your supervisor will conduct a local lab induction covering:

- Safety regulations and lab practices
- Completion of required RAs, COSHH, and understanding SOPs
- Swipe card access, once induction is complete
- Do not proceed with any task unless you are confident, seek assistance if unsure.

Food and Drink:

Only consume in designated areas.

Remote Work:

If working mainly from home, stay in regular contact with your supervisor. Home workstation setup guidance is available here: Home Working Guidance or in the General section of the Common Courses Moodle page.

Safety Manual:

Essential departmental safety information, including the Safety Manual, is available in the General section of the Common Courses Moodle page.

c) General Data Protection Regulation (GDPR)

Lectures:

The updated policy on recording teaching materials and lectures is available here: Recording Policy. Interactive PDN sessions will not be recorded. If you choose to speak during a recorded lecture (where it is not required), your consent is assumed. You may request to have your contribution removed by emailing the lecturer and part2@pdn.cam.ac.uk

Photography:

Not permitted unless directly relevant to your project and approved by your supervisor.

Computer Use:

Only use department computers for legitimate academic purposes. Internet use is monitored; inappropriate activity is subject to disciplinary action.

d) Communicable Diseases

Respiratory infections (e.g. flu, coronaviruses) spread easily. If you are feeling unwell or have a fever, stay home until recovered. For more information, visit:

Cambridge Student Support – Communicable Diseases

e) Wellbeing

Your wellbeing is a priority. The department website includes links to support staff and University wellbeing services, including counselling: Student Support

f) Contact Information

Health & Safety

General safety queries: safety@pdn.cam.ac.uk
PDN Safety Team:

- Rachel Mason (Health and Safety Coordinator/Departmental Safety Officer)
- Katie Conran (Facilities Manager/Departmental Safety Officer)
- Yuhui Xie (Senior Safety Technician)

First Aid

Physiology Reception: (01223) 333899

Site Security

Routine: (24/7): (01223) 331818
Emergency: (01223) 767444 or 101 (from a network phone)

Emergency Services

Dial 999

5. IT SUPPORT

Departmental Computer Workstations

A number of computers are available for your use in the Part II Study Room, situated on 'C' Floor of the Physiology Building. A new user account has been set up for you, details of which are included below. You are reminded that the use of any computing resource in the department is subject to the rules made by the Information Technology Syndicate; these are published in ordinances and are available for inspection.

Computer Network User Account

A new user account has been set up for you, enabling you to log on to and use the computers in the computer room, running Microsoft Windows operating system.

To log on to Part II computer:

DOMAIN name: blue.cam.ac.uk
USERNAME and PASSWORD: your CrsID and your UIS/Raven password

This account, like your UIS/Raven account, is for you only. Do not 'lend' your account to or share your password with other users. Log off when not at the computer [always do this even if only leaving the room for a moment]. The keystroke combination Ctrl+Alt+Del will display the Windows Security dialogue box, Select sign out.

Resources are provided for use in accordance with the aims of the University and Colleges (currently promulgated via the University's Mission Statement); in general, this means *bona fide* academic and related purposes. However, in line with the aim "to provide a stimulating and broadening educational environment", all users may use facilities for which they are registered for small amounts of personal use, such as correspondence.

Wireless Connection for Personal Computers

The University of Cambridge Wireless service provides wireless hotspots at various locations throughout the Anatomy building and the Physiology building.

Eduroam: our recommended Wi-Fi network

Eduroam, an international initiative, for academic visitors or internal users. Set this up once and stay connected to the network around Cambridge. You can also pick up wifi in thousands of locations around the world. To use Eduroam, you will need to explicitly configure your wireless device. See additional information at: https://help.uis.cam.ac.uk/service/wi-fi

File Storage and Backup

You are responsible for keeping backup copies of your files. Many Cambridge file servers are backed up regularly, but not in such a way that individual files can be readily retrieved. It is very easy, as many people have found out the hard way, to lose a file, for instance by accidental deletion or overwriting. You cannot assume that a file you have stored on a local drive or moved to

the Recycle Bin on a particular machine will still be available on that machine when you come back ten minutes later.

The easiest way to keep a copy of files is to use Cloud-based storage, (e.g.: OneDrive for Business – Microsoft's cloud-based file hosting service for individuals up-to 1TB of storage space (Users with an A1 licenses only have a 100GB quota); Google Drive – Google's cloud-based file hosting service gives each member of the University 500GB of free file storage) see more information at: help.uis.cam.ac.uk/service/data-and-file-storage

Please note that hard disc drives on the computers in the Part II Room are regularly cleaned.

Some points to remember about data stored on your computer:

- Never keep unique data on your computer's internal HD
- Use OneDrive,
- *And* use strong passwords and consider encrypting your disk,
- *And* back up your computer as frequently as you can't afford to lose to an external HD (at least 2x capacity of your computer HD),
- *And* avoid routinely carrying your laptop and its backup HD together in the same bag.

Project Computers

Some computers in the Part II study room have project work related software installed, If you need access to available software, please email the part II administrator at part2@pdn.cam.ac.uk who will coordinate with the IT teams.

NOTE: Computing facilities (departmental/college/home computers, etc) may be running other software programs and different versions of the same program that you are using. If you encounter problems in swapping between computers or between different versions of the same program, please ask for advice.

eresources@cambridge off campus access

Most of the resources we list in our website are only available off-campus to current staff and current students at the University of Cambridge who have been issued with a Raven password or a VPN (Virtual Private Networking) connection.

The Computing Service VPN service enables users connected via an ISP (broadband) to authenticate themselves and gain access to CUDN (Cam only) facilities, see the UIS VPN service link https://help.uis.cam.ac.uk/service/network-services/remote-access for details on current client support.

The VPN service is free and anyone with a valid CRSid can use it. You do not need to apply to use the VPN because it uses a Network Access Token username and password you have created on the UIS tokens website (https://tokens.uis.cam.ac.uk), just like the Eduroam wireless network. You should create a separate token for each device you use to connect to the VPN.

Printing, copying and scanning

You can print, copy and scan documents using the University's DS-Print enabled multi-function devices (MFDs) in many Colleges and Departments. DS-print is installed in the PDN library, you can find the details via https://www.ds.cam.ac.uk/dsprint/site/PDN

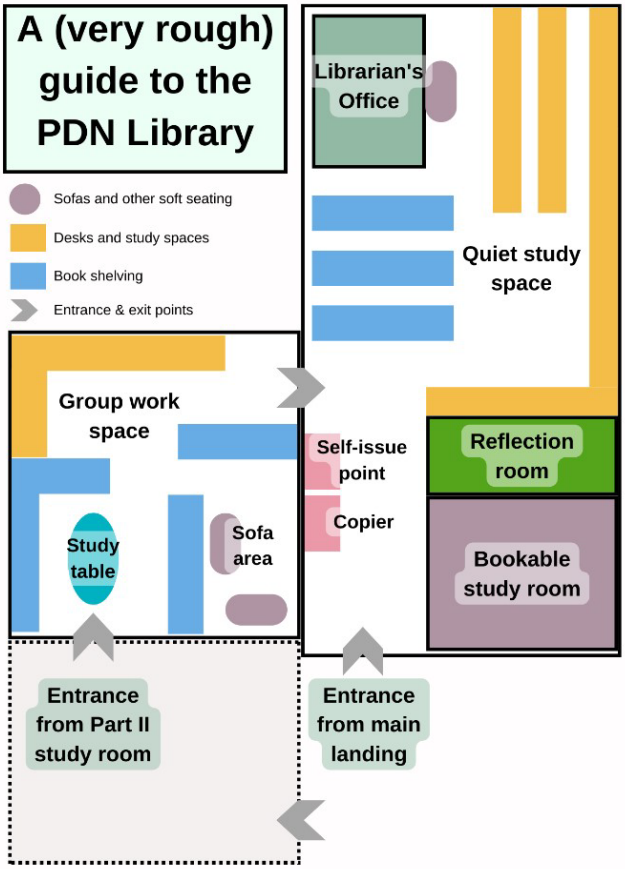
It's important you are compliant with data protection laws (UK GDPR) while working using your own computer. Please read the important security guidance about working from home and keeping safe online to prevent compromising the security of the University's data.

You are able to use your own personal laptop or desktop computer by taking a few precautions:

- separate your work data from your home data by setting up another user account.
- always use the clear screen policy
- make sure your device uses an operating system that is still supported by the software vendor and is set to update automatically (so that all applications are patched regularly)
- make sure your device has up-to-date malware protection running (see installing malware protection, which is available free of charge from the University)
- encrypt your device (see the third paragraph of storing and sharing personal data on encryption and How to check if your laptop is encrypted)
- make sure your device has the local firewall enabled (see How to set up your firewall)
- use unique pass-codes, passphrases and passwords, that you do not share, to access resources (Find out more about how you can choose a strong password and keep your password safe. You may also wish to consider using a password manager)
- only download software from a reputable source

Remember, this is general advice. Please take advice from your local IT staff for how best to set up your home device to suit you and the work you do for your institution.

6. THE PDN LIBRARY



The PDN Library can be found on the first floor of the Physiology Building and contains a good selection of books as well as lots of study spaces, comfy seating and a bookable study room for group work. You can pick where you want to study.

Mehves Dignum, Academic Support Librarian, can help you to achieve your goals for learning and research objectives. And delivers teaching sessions for Critical Evaluation, Literature Searching and supporting your referencing skills.

Kiva Varcan Sonmez, Senior Library Assistant, can provide information and resources. We are always open to suggestions on how to make the library a great place for you to work, so if you have any feedback, send your emails to pdn@lib.cam.ac.uk

Printing

You will find our printing facilities in the main Library space. The PDN Library is on the University's DSPrint system so you can use your Common Balance any time.

Collection

The PDN Library's collections contains core reading for the pre-clinical Medical and Veterinary Sciences Tripos and key textbooks covering topics taught by the Department in the Natural Sciences Tripos. It includes most set texts on reading lists as well as other useful resources. Find out more on the PDN Library website.

Electronic Legal Deposit (ELD) Terminal

The PDN library has an Electronic Legal Deposit (ELD) machine which will enable you to access resources publishers have deposited electronically to the Cambridge University Library, being a legal depositing Library. These materials can be identified in iDiscover by the appearance of the phrase ***"Available on designated PCs in the UL and most Faculty and Departmental libraries"*** Only one concurrent user is permitted to access a given eLD item via any of the designated PCs throughout Cambridge libraries.

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Find information

Reading lists are invaluable resources that collate essential and recommended reading materials for students in a subject area. It should be a starting point for finding information to support your learning. You will find reading lists within your Moodle courses.

Use our quick guide to using the iDiscover library catalogue. You can also use the the A-Z list of databases to find and search specific databases by title or alphabetically. This directory provides easy access to the library's collection of electronic databases, journals, and other digital resources. Find out more via the 'resources' section on the School of Biological Sciences (SBS) Libraries website.

Develop your skills

Students with Library skills are more equipped to producing high-quality academic work.

Library skills encompass a range of competencies, essential for finding, evaluating, managing and using information. These skills are critical not only to academic success, but also for navigating daily life and thriving in the workplace.

The SBS Libraries Team can help you enhance your library and academic skills. We can offer specialist advice, tutorials and 1-2-1 support on finding information, referencing, conducting a literature review, avoiding plagiarism, managing your time, reading and note taking. Please be aware there will be teaching sessions and workshops will run during the Michaelmas Term.

LibGuides

Libguides, short for "Library Guides", is another valuable tool that provide students with a curated collection of key resources, making it easier for students to find relevant materials for research and coursework. See our PDN Libguides and the Natural Sciences Tripos LibGuide for recommended databases, journals and online resources relevant to your specific subject area.

Other LibGuides include the CamGuides , a one-stop shop for library support available to you across Cambridge, from tips about referencing to time management and critical reading and study skills. Cambridge LibGuides serve as an important tool to help the university community navigate the wealth of information available through the Cambridge library system.

Past dissertations

The Biological Sciences Libraries Team manage a digital collection of BBS dissertations from previous students for you to get inspiration from when writing up your own work. This collection was designed to support BBS students but is open to anyone working at Part II. A full list of available titles and how to request access can be found on the SBS Libraries website.

Past part II project dissertations will be available from the start of Michaelmas Term in the 'Past Resources' section of the PDN Part II Common Courses Moodle Page.

7. PART II STUDENTS – PARTICIPANTS LIST

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8. PREPARING FOR STUDY AT PART II

At Part I, most teaching consisted of lectures in which you were given information, and College organised supervisions in which you were given the opportunity to discuss topics further and address any concerns. At Part II, the style of teaching is quite different. Firstly, the teaching sessions are a mix of information giving and interactive teaching. The sessions provide you with core material for the course. Each lecturer will attempt to summarise for you the key areas of their subject and offer further reading. Often this will involve the development of problems or ideas rather than a set of agreed answers, such as you tended to get at Part I. At Part II level, there is often no agreed body of knowledge surrounding a topic. You will need to develop the skills of critically evaluating hypotheses and ideas. You will have to work alone and with others to follow up the topics that interest you.

The level and quality of background knowledge and understanding that each of you has from Part I will vary, and inevitably you will find some topics more demanding than others. You should feel free to ask questions of lecturers at the end of their session, or to follow up with an emailed query or brief discussion. However, a large amount of your development this year will come from your own independent reading around topics that interest you, following up references suggested by the lecturer and those that you find yourself.

Reading

Unlike your Part I course, Part II lectures are simply a starting point for your learning this year. You will get a reading list from most lecturers consisting of original papers, reviews and books. You should be aware that considerable follow-up reading is desirable if you are to benefit maximally from the course. As far as is possible, this reading should be done contemporaneously with the lectures and not left until the exams. It is usually helpful to make notes while you read.

Electronic versions of your teaching materials such as slides, reading lists, where available, will be compiled on the Part II PDN Moodle pages. Their completeness and timeliness depend on how early each lecturer provides this material and how much each lecturer is able to provide. We also have extensive access to electronic journals.

To help you with reading papers, we provide an introductory session at the start of the course. In addition, many modules will have organised journal club sessions. These provide an excellent way of getting to grips with reading methods, and so even where these are optional, we strongly recommend that you attend all sessions. As part of your project, you will discuss papers with your supervisor, and your paper reading and critiquing skills will improve as part of this process. You may find the guidance notes in the handbook section ‘Guide to reading papers’ helpful to refer to several times throughout the year. If you find that you are concerned about reading papers you can discuss this with your Departmental Advisor. You can speak to the librarian if you are struggling to access papers.

Time management

This year you will need to balance lectures, seminars, journal clubs, projects and independent study. You must always prioritise your lectures. All lectures should be delivered in-person and you should attend them in-person to ensure that you maximise your learning experience. Doing so will enable you to keep to your timetable and you will find that lecturers are usually available for questions afterwards. The University has an expectation that recordings of lectures should be provided to students, but we cannot guarantee the quality or availability of recordings. Links to lecture recordings should be posted within 48 working hours of the end of the lecture. If you find that a recording is missing, please email the lecturer and Module Organiser in the first instance and copy in part2@pdn.cam.ac.uk.

You may find that you sometimes have too many papers to read in too short a time so you will need to prioritise. You will need to decide how many papers and topics you can realistically study in greater detail. If you are concerned or struggling to do so, consult your Director of Studies, Departmental Advisor, or perhaps someone who has supervised you in the past, and do so as soon as possible. Not everybody will give you the same advice, but listen to various suggestions, and then decide for yourself on an approach that suits you. It is important that the approach you take is consistent with the structure of the examination. It is also important to stay on top of the material throughout the year as much as possible.

As a general guide, each student will have approximately 6 hours of lectures each week on average. Students will also be expected to spend time working on their project each week in the Michaelmas and Lent terms. Your project supervisor will discuss this with you, but bear in mind that your final project mark will be worth 36% of the total mark, and you should certainly leave enough time for reading related to your module course work. As a guideline, students should expect to spend *an average* of about 16 hours per week on their projects.

Precise work patterns will vary according to the nature of your project and you should discuss this with your Project Supervisor.

You can help us and each other by arriving for lectures, seminars and journal clubs on time. If you know you will not be able to make it, or will be late for any teaching session, it is a courtesy to let someone know, either one of your classmates or the lecturer or Sophie. This is especially important in small group teaching sessions and will mean that lecturers do not waste time waiting for you to arrive. It would be especially helpful if you can let us know in advance about events affecting large numbers of students e.g., clinical school open days and interviews, PfP (preparing for patients), etc. We have a complex timetable involving people from many places within and outside Cambridge and occasionally there may be a problem about getting here. We will always give you as much notice as possible of any changes to the timetable, but please also keep an eye on the Departmental timetable provided as it is updated regularly.

9. THE MODULES

A summary of each Module is provided below. The themes to which the modules belong are indicated as follows: (D) Development and Reproductive Biology, (P) Integrative Physiology, (N) Neuroscience.

Modules N1, P6 and P9 are run jointly with Part II Zoology and P4 is run jointly with Part II Genetics and Part II Zoology. Not all module combinations are possible due to clashes in the timetable.

In addition, our Project and PDN-BBS (major 415) students can select **up to** two* of their four module choices from the SBS Shared Neuroscience modules (S-N). These modules are offered by two other departments: Psychology and Zoology. *Spaces are limited. If oversubscribed, places will be allocated at random. Shared modules are taken *in place* of a PDN module choice.

Michaelmas Term Modules:

N1: Developmental Neurobiology (D, N)
Module organiser: Prof. Clare Baker (cvhb1@cam.ac.uk)

Shared with the Dept. of Zoology

This module addresses how the nervous system is assembled during embryonic development. Although we now understand a considerable amount about the processes involved, many fascinating questions remain.

We begin by discussing the formation of the vertebrate neural tube (future brain and spinal cord), and how this is patterned to generate distinct neuronal fates in different regions, including the cerebral cortex. We also consider the evolution of the cerebral cortex and the potential for regeneration within the brain. Once neurons have formed, they extend axons to their targets to 'wire up' the nervous system: the process of axon guidance is considered in detail. We consider the formation of the peripheral nervous system from the migratory neural crest and cranial neurogenic placodes (good models for understanding the control of cell migration and fate-choice). We discuss how circuit designs lead to function, and we explore how axons make and refine the synapses that will generate functional neural circuits.

This is an interdepartmental course (with Zoology), given by researchers in the Departments of PDN, Genetics, Zoology, and the MRC Laboratory of Molecular Biology.

It is best suited for students who have studied some neurobiology in Part IB, either in MedST/ VetST or in NST, but others will be able to take it if they are prepared to do some background reading.

N2: Neuroscience: Experimental Tools for the Neuroscientist and how they are Shaping Scientific Discovery (N)
Module organiser: Prof Angela Roberts (acr4@cam.ac.uk)

This module will consider the current generation of experimental tools available to the neuroscientist and how their application is contributing to our understanding of brain organisation and function.

The range of state-of-the-art technologies and approaches will include opto- and chemo-genetics, multichannel recording, single and multiphoton calcium imaging, multimodal MRI, computational

modelling and brain organoids. Not only will you learn about the neurobiological foundations of each experimental tool, but also how it is transforming our understanding of neuroscientific topics ranging from sensory perception and motor control to memory and higher-order decision making.

Teaching will be a mixture of traditional lectures, interactive sessions and student-led presentations. Along the way, you will gain core generic skills of scientific presentation, scientific debate and critical reading of primary scientific papers. By the end of the module, we hope you will have a comprehensive overview of the landscape of neuroscientific research and how the different techniques and experimental approaches provide insight into brain function across multiple levels of analysis from molecules and cells at single synapses to local and large-scale neural networks.

This module complements any of the other neuroscience modules. It is recommended especially for those neuroscientists wishing to take the 'neuroscience theme' in PDN, taking four neuroscience modules alongside a two-term neuroscience research project. It replaces the workshops for 'neuroscience theme' students that we have run in PDN for many years

This module cannot be taken with P9: Cell Assembly and Interactions

N3: Neuroscience: Circuits and Systems (N)
Module organiser: Dr David Parker (djp27@cam.ac.uk)

We know a lot about the brain in terms of its molecular and cellular properties and the roles of specific brain regions. What we lack is insight into how the molecular and cellular properties of specific brain regions generate cognitive functions and behaviours. Gaining this insight is widely considered to be one of the major problems facing science.

This module will address this problem by considering how cellular and circuit interactions generate cognitive functions and behaviours. It will focus on various conceptual and experimental approaches to circuit/system analyses. Lectures will start with an introduction to neural circuits/systems and their analysis. This will be followed by a consideration of connectomic analyses of neural circuits underlying sensory and motor function. Lectures will then focus on hypothalamic circuits underlying reproductive functions and metabolism. Neural systems will then be considered in lectures that focus on visual system pathways and the role of the vestibular system in perception and spatial navigation. The module will end with an introduction to artificial neural networks and their relevance to circuit and system understanding.

A large number of students have taken the module in the two years it has been running. This has made it difficult for most lecturers to give conventional small group supervisions or read and comment on essays. At a minimum each lecturer will give a Q&A session a week after their lectures to address any questions related to the lecture material. In previous years some lecturers have done additional Q&A sessions when there is demand, and held sessions where they work through approaches to addressing essay questions.

The module will also include interactive student debates where topics related to the content of the module will be discussed (e.g. the relative merits of experimental and computational approaches or what we can learn about the brain from brain injuries).

This module complements any of the neuroscience modules. P1N4 provides complementary cellular detail, and P8 a complementary systems perspective.

P1N4: Cellular Signalling (P)

Module organiser: Dr Ali Rasooli-Nejad (smar4@cam.ac.uk)

Deep mechanistic understanding of organs and systems must include an appreciation of cellular and molecular properties and interactions. Neuronal and non-neuronal cells detect and respond to changes in their external environment using many signalling pathways. In this module we look at cellular signalling involving ions, including sodium, calcium and protons.

The lectures will cover: how ions enter cells via voltage and ligand gated ion channels; how their concentrations are regulated in cellular microdomains; how they influence cell signalling; and what the consequences of this are for neuronal and non-neuronal cells, including action potential firing, sensory transduction, synaptic plasticity and glial cell function. The lectures will emphasise research approaches used to study these signalling pathways.

This Module works particularly well with N1, N2, N3, N9, and P8.

P3: Fetal and Placental Physiology (D, P)

Module organiser: Prof Dino Giussani (dag26@cam.ac.uk)

The study of the fetus and placenta is a unique aspect of physiology with relevance for basic and clinical sciences. This module will explore a wide range of topics, including the normal development of the fetus and placenta, adaptations to the intrauterine environment, responses to challenges in utero, mechanisms of parturition and the transition at birth. The scientific basis underlying the aetiology of miscarriage and preeclampsia, and the consequences of prematurity, maternal obesity and intrauterine growth retardation will be discussed.

In addition, the course will give insight to current ideas on the developmental programming of health and disease.

Modules that complement P3 are: P2 for a developmental focus, P4/ P6 for students interested in cellular/morphological changes and P7/P8 for a wider physiology or pathophysiology theme.

P4: Early Development & Patterning: Genetics and Cellular Mechanisms (D)

Module organiser for PDN: Dr Felipe Karam Teixeira (fk319@cam.ac.uk) and Alberto Rosello-Diez (ar2204@cam.ac.uk)

Shared with the Department of Genetics (Lead, M2,) and the Department of Zoology (ZM10)

This course is the first of two complementary modules (with P6), which can also be taken on their own. This module will look at:

Early embryo development

How animals' body plans are formed

Gene regulatory & signalling interactions

Dynamic cell behaviours & morphogenesis

You will therefore learn about the key principles of embryonic development, taking examples from a range of early developmental events, such as cell fate determination, germline development, gastrulation, segmentation, and somitogenesis, in both invertebrate and vertebrate systems.

During the course of the module you will be introduced to a range of modern techniques applicable to the study of development including molecular, genetic and imaging technologies.

The module will compare mechanisms across a broad range of experimental organisms and processes, in order to highlight the essential principles of developmental biology.

The module works well in combination with all other PDN modules.

P9: Cell Assembly and Interactions (D)
Module organiser: Prof Milka Sarris (ms543@cam.ac.uk)

Shared with the Dept. of Zoology

*This module **cannot** be taken with N2: Experimental Tools for the Neuroscientist and how they are Shaping Scientific Discovery.*

Cells are highly organised and dynamic structures. In this module we will explore how the architecture of the cell is constructed and how cells interact with each other and their environment in order to fulfil their myriad roles in animals. Our current knowledge of these vital topics will be presented in depth, with a focus on the molecular mechanisms that regulate cell behaviour. We will examine how cells use basic cell biological mechanisms in their complex activities within animals, including cellular behaviour during development and how cellular activities provide key physiological functions in the adult.

We will begin with an examination of how cells become polarized and adhere together to form higher order multicellular assemblies. This is followed by a study of how membrane compartments are constructed, and the dynamics of transfer between them. Then we will discuss current ideas about of how cells were created during evolution, and how eukaryotic cells arose from prokaryotes. The next two blocks will revolve around how cells sense and respond to the mechanical properties of their surroundings and the key role of the cytoskeleton in determining cell shape, organization and movement. After this we switch focus to the nucleus and how the genome architecture determines gene expression. Finally, we discuss how cells maintain protein homeostasis and discuss the important process of autophagy in cellular physiology. Thus, we provide a comprehensive picture of different fundamental cellular processes and introduce a broad range of techniques to visualise and study these processes in live cells, in vitro and in intact animals.

In addition to lectures there are several interactive sessions (such as journal clubs) in which there will be discussions of key papers, experimental techniques and major concepts in the field.

P9 works well with the other ‘Developmental and Reproductive Biology (‘D’) Theme’ modules.

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Lent Term Modules:

N6: Higher Order Brain Function and Dysfunction (N)

Module organiser: Prof Angela Roberts (acr4@cam.ac.uk)

This module considers the neurobiological basis of a range of higher-order functions in the brain including (i) perception, recognition and decision making in the visual domain, (ii) executive functions and their relationship with intelligence and (iii) positive and negative emotions and their regulation. These are the product primarily of the functioning of high-order association cortices found in the temporal and frontal lobes. They will be discussed in relation to findings from a range of experimental approaches in humans and animals including non-human primates and rodents.

Vision is a main source of information for primates, and our life greatly depends on the ability to recognise behaviourally relevant objects. This section will consider how a visual input is analysed to detect objects including faces, and how such information can be memorised and recalled to guide our behaviour. It will consider how the physical shape of an object is analysed along the ventral visual stream to create a neuronal representation of the object independent of angle and size in viewing; how memorised objects are represented by neurons in medial temporal lobe; how these memories can be recalled through local processing as well as global interaction of brain regions and how new information can be stored in the brain as detectable changes within specific neurons.

In considering executive function, a particular focus will be placed on the important role of the prefrontal cortex and associated networks, in particular the hippocampus. The unity and diversity of executive functions and their instantiation within prefrontal cortical networks alongside the specific relationship between the hippocampus and prefrontal cortex will be discussed. This section will finish by considering the dysregulation of executive functions that occur across a range of psychiatric disorders including Schizophrenia, Depression, Obsessive Compulsive disorder and anxiety and the failure of current therapies to treat cognitive symptoms.

Finally, the circuits involved in both the regulation and dysregulation of positive and negative emotion will be described. Emphasis will be placed on the contribution the prefrontal cortex makes to the top down regulation of subcortical circuits known to induce appetitive approach and negative avoidance behaviour. Throughout this module use of state-of-the-art technology to measure and intervene in brain function will be highlighted alongside the translational potential of studies in animals to inform our understanding of higher-order functions and dysfunctions in humans.

This module works best when taken with any of the other neuroscience modules.

N9: Modulation, Plasticity and Behaviour (N)

Module organiser: Dr Sue Jones (sj251@cam.ac.uk)

A fascinating feature of the nervous system is neuronal plasticity: the ability for neurons and their connections to be modified in response to an ever-changing external or internal environment. Alongside neuronal plasticity, the modulatory effects of neurochemicals provide additional flexibility in the response repertoire of neurons. In the mature mammalian brain, neuronal plasticity and modulation enables complex neural networks to remain dynamic and adaptive.

Two key questions in modern neuroscience are: what are the mechanisms of neuronal plasticity, and how do neuronal plasticity and modulation contribute to behaviour? This module will look at these questions and explore examples of plasticity and modulation in defined neuronal systems, ranging from endocrine modulation of hypothalamic circuits in the context of sexual maturation and behaviour, to the plasticity of neurons in brain reward pathways and how this is hijacked by drugs of abuse. Contemporary as well as traditional research methods for investigating neuronal plasticity and modulation will be considered, including opto- and chemogenetic approaches, imaging and electrophysiology.

This module would work very well in combination with any of Modules N3, N4 and N6, although none are essential.

P2: Development and Stem Cells (D, P)

Module organisers: Drs. Erica Watson (edw23@cam.ac.uk) and Claire Senner (ces207@cam.ac.uk)

A mammalian zygote is a remarkable cell because it carries the molecular and genetic information required to form an adult organism with reproductive potential. The initial cell divisions of an embryo are crucial to lay down the framework for reproductive success since they establish the embryonic and extra-embryonic lineages. For normal development to continue, the free-floating embryo must implant into the uterus, a process that requires complex interactions of cells from two different individuals. As mammalian embryogenesis occurs internally in the female reproductive tract, it is a logistical and ethical challenge to study these normal developmental processes and to identify when and why they go awry to cause pathologies or embryo loss.

In this module, we focus on the earliest stages of normal mammalian embryogenesis in the pre-, peri-, and post-implantation embryo to consider how the cell fate decisions are taken and what signaling cascades, transcriptional networks, and epigenetic modifications play a role in their establishment and maintenance. We consider specific genetic mouse models that are used to study these early developmental events as well as the recent exciting advances in human stem cell models of embryogenesis that allow better access to key developmental questions at these early stages of human life. These in vitro models include stem cell derivation from embryonic and extraembryonic lineages, embryoid bodies, gastruloids, stem cell-derived embryo structures, trophoblast and endometrial organoids, and the co-culturing of embryos with uterine cells to model implantation.

We will ask questions such as: how does poor lineage decision making alter subsequent mammalian development? Can researchers really grow a mammalian embryo in a dish, and do in vitro models reliably teach us about in vivo development? What are the benefits and limitations of each stem cell model? How is the regulation of embryogenesis altered by environmental change, such as occurs during assisted reproduction (e.g., IVF), alteration of parental diet including folate (folic acid) intake, or toxicant exposure. Should researchers consider events in germ cell development and maturation to fully appreciate the factors required for early embryogenesis? How can we use stem cell models in the conservation of endangered species?

The module will involve lectures, Q&A sessions, a workshop, and journal clubs.

Useful combination modules include: P3 Fetal and placental physiology (M), P4 Early Development & Patterning: Genetic and Cellular Mechanisms (M), P6 Development: Cell differentiation and organogenesis (L).

P6: Development: Cell Differentiation and Organogenesis (D)

Module organiser: Dr Emma Rawlins (elr21@cam.ac.uk)

Shared with the Department of Zoology

This course is the second of two complementary Developmental Biology modules (with P4) that can also be taken on their own. This module examines a second phase of embryonic development, following the initial steps of defining axes, major cell layers, and broad pattern domains (covered in P4).

A series of topics will be presented, each using particular tissues or organs to highlight individual developmental mechanisms. Thus, the diverse mechanisms to make tubular organs will be used to highlight the importance of cell polarity and cell shape changes, and used as a framework for discussing key techniques in the study of developmental biology; the development of the heart will be used to discuss the transcriptional programmes that drive differentiation, and to highlight the links between of the early developmental patterning events such as left-right symmetry breaking and organ morphogenesis; the importance of stem cells in the formation and maintenance of organs will be discussed using a variety of examples, including intestine, epidermis and oesophagus; the formation of the vertebral column illuminates mechanisms of cell allocation and morphogenesis and how these are integrated with mechanics; limb development illustrates how patterning mechanisms are coordinated with cell proliferation and explores the re-use of developmental mechanisms during regeneration.

A mixture of examples from simpler invertebrate models and vertebrates will show how developmental mechanisms have diversified with increasing cell number.

This interdepartmental course (with Zoology) works well with any of the other developmental and cell biology modules, particularly P2, P4 and P9.

P7: Pathophysiology of Cancer (D, P)

Module organisers: Prof Hugh Robinson (hpcr@cam.ac.uk) and Dr Maria Alcolea (mpa28@cam.ac.uk)

We will examine cancer and malignant progression of solid tumours as examples of how to integrate a physiological approach to disease; giving consideration to modern genetic tools and techniques as well as to the unique physiological challenges of malignancy. We will also discuss how this impacts therapeutic choices and drug development. Consideration will be given to how research on pathophysiology is influenced by modern understandings of systems biology and physiology.

The course will include lectures, question-and-answer sessions and discussions of selected relevant articles. The course is suited to both NST and MVST students.

P7 works well with all other modules.

P8: Systems and Clinical Physiology (P)

Module organiser: Prof Stewart Sage (sos10@cam.ac.uk)

Systems physiology is central to the practice of scientific medicine. The idea behind this module is to give you a more detailed view of some aspects of systems physiology and to include some clinically oriented material that is of particular importance to the practising doctor.

Cardiovascular topics include cardiac arrhythmias, the genetics and energetics of heart failure and a look at the pulmonary circulation from a clinical viewpoint. Renal physiology includes the autoregulation of renal blood flow and glomerular filtration rate as well as acute and chronic renal failure. Several areas of endocrine physiology are explored in the form of pancreatic islet and gut hormones, brain control of food intake, the ever-increasing problem of diabetes mellitus and the physiology and pathophysiology of bone.

The lecturers giving this course are from the Department of Medicine, The Royal Papworth Hospital and the Institute of Metabolic Science as well as PDN.

This module is reasonably self-contained and can be taken in combination with any other modules.

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PDN MODULE FOR BBS STUDENTS ONLY

Minor Subject 137: Surgical and Radiological Anatomy

Organiser: Prof. Cecilia Brassett (cb457@cam.ac.uk)

This course introduces students to areas of anatomy that are especially relevant to surgical and radiological procedures. The need for a good working knowledge of anatomy in surgical and radiological practice is of course paramount in clinical safety.

Applicants for Core Surgical Training and Specialty Radiology Training may improve their scores in the "Experience in and commitment to specialty" component by having chosen to take a relevant module such as this course.

Students also choose one practical activity from the following options: attendance at operating theatre sessions; diagnostic and/or interventional radiology session; or preparation of an anatomical prosection.

Assessment includes a 1-hour Short Answer Questions paper, a short written report and oral presentation on the practical session. Lecturers are current consultant radiologists and surgeons.

Further details can be found in the Surgical and Radiological Anatomy Course Booklet

10. THE SBS SHARED NEUROSCIENCE MODULES (delivered by departments outside PDN)

In Michaelmas Term:

PS3: Advanced Topics in Behavioural Neuroscience* (S-N)

Module Organiser: **Dr Jane Garrison** (jrg60@cam.ac.uk)

*This module is run by the **Department of Psychology** (*limited places for PDN students)*

This module cannot be taken with: P4 Early Development and Patterning: Genetics and Cellular Mechanisms

PS3 consists of the following three 8-lecture blocks:

- Motivation: Emotional and Cognitive Mechanisms of Preparatory and Consummatory Response
- Recent Advances in Research on Stress and Stress-related Disorders
- Synaptic Plasticity, Engrams and Memory

Motivation: Emotional and Cognitive Mechanisms of Preparatory and Consummatory Responses

The aim of this course is to present an advanced, up-to-date and critical assessment of brain mechanisms of motivation. This course may also interest students of animal behaviour, learning theory, cognitive neuroscience, and biological aspects of abnormal psychology. The course will examine what has been discovered about the neural mechanisms underlying motivation and learning using the classical techniques of physiological psychology, including lesioning, electrical and chemical stimulation, electrophysiological recording and in vivo monitoring of transmitter release. Particular emphasis will be placed on neuropharmacological advances which have implicated the monoaminergic, cholinergic and peptidergic neurotransmission in the control of behaviour. The course initially will be organised around two main topics: the re-assessment of the role of specific neurochemical systems and the hypothalamus in motivation; and the neural substrates of reward and punishment, focusing especially on obesity and drug addiction. Detailed topics will include: hypothalamic syndromes and homeostatic mechanisms underlying behaviour; the functional organization of the striatum and corticostriatal circuitries with an emphasis on understanding the neural and psychological mechanisms underlying reward and drug addiction; stress and arousal; neural mechanisms of aversive emotional learning, and cognitive enhancing drugs in neuropsychiatry.

Recent Advances in Research on Stress and Stress-related Disorders

The term stress is widely used in everyday language but defining precisely what we mean by stress turns out to be anything but straightforward not least because different people often react in different ways to the same stressor. This module provides an up-to-date analysis of stress research from the Founder of stress theory – Hans Selye – to the critically important psychological concepts of coping and control. We consider the brain mechanisms that support adaptive stress responses that depend on homeostatic regulatory systems before discussing how chronic stress affects the structural and functional integrity of the brain, ultimately to affect social and cognitive

functioning and the incidence of such stress-related disorders as obesity, depression and schizophrenia. The implications of new research on putative immunological mechanisms and the application of computational approaches to help interpret stress-related research will also be discussed.

Synaptic Plasticity, Engrams and Memory

These lectures consider memory at multiple levels of analysis, with a strong emphasis on cellular-level and circuit-level mechanisms informed by studying memory in animals. We will consider the insights that can be gained by studying memory using cutting-edge techniques in animal models and how these complement studies in humans, before presenting the leading theories of how memories are stored and represented within the brain at the cellular level. We will discuss how different types of memory are supported by different memory networks and neural structures, and how these may change over extended periods of time through systems-level consolidation. Finally, we will conclude by considering how our understanding of memory can be leveraged to enhance or disrupt memory in neurological and mental health disorders.

ZM5: Evolution and Behaviour: Genes and Individuals* (S-N)

Module Organiser: Prof. Nick Mundy *(nim21@cam.ac.uk)*

*This module is run by the **Department of Zoology** and also shared by part II Psychology students (*limited capacity to PDN and Psychology students)*

The classical way to study animal behaviour separates questions concerned with function (what is the adaptive value of the behaviour? what is its evolutionary history?) from those focused on causation (how is the behaviour controlled? how does it develop during a lifetime?).
The aim of this course is to show how recent research is sweeping aside these traditional distinctions in two different ways, yielding new insights into the way that evolution works. Specifically:

1) Animal behaviour, and the mechanisms by which it develops, can contribute to evolutionary change: by changing ecological conditions; by imposing selection on other parts of the phenotype and other individuals; by influencing patterns of inherited variation; and by facilitating reproductive isolation.

2) At the same time, the mechanisms controlling behaviour and its development are themselves subject to natural selection and are adaptations for the ecological conditions in which an animal lives. This means that we can predict the particular mechanisms involved in behavioural development, as well as an animal's immune function and its specific cognitive and sensory capacity, from aspects of its ecology.

The first half of the course focuses on the genetic foundations of behaviour and the consequences for evolutionary processes such as adaptation and speciation. In the second half of the course, the emphasis is on the adaptive value of cognitive, sensory and immune function and how they contribute to individual variation.

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In Lent Term:

PS2: Advanced Topics in Cognitive Neuroscience* (S-N)

Module Organiser: **Dr Jane Garrison** (jrg60@cam.ac.uk)

This module is run by the ***Department of Psychology*** *(*limited places for PDN students)*

This module cannot be taken with P7 Pathophysiology of Cancer.

PS2 consists of the following three 8-lecture blocks:

- Advanced Methods in Human Neuroimaging
- Computational Approaches to Cognition
- Human Memory: Cognitive, Neural and Clinical Perspectives

Advanced Methods in Human Neuroimaging

This module provides an in-depth exploration of advanced methods in human neuroimaging, including fMRI, EEG, and MEG, and their integration with brain stimulation techniques. Students will gain a critical understanding of the methodological foundations, applications, and limitations of these tools in cognitive neuroscience. Emphasis will be placed on both the potential for meaningful insight, and the interpretive challenges and inferential limits of these methods, equipping students to engage critically with current literature and evaluate the strength of empirical claims.

Computational Approaches to Cognition

These lectures address the cognitive operations undertaken by the brain to extract information from the senses, hold it in memory, evaluate evidence to decide on actions, and send signals to the motor system to carry them out. A central challenge for the brain is randomness, both in the form of unpredictability in the external world and "noise" that corrupts signals in the neural system. Crucial insights have come from considering optimal strategies to cope with uncertainty: What is the best way to use ambiguous sensory input to interpret one's surroundings? How can we make good decisions based on incomplete and unreliable evidence? How should we control our bodies' imperfect muscular system to best achieve movement goals? Once optimal rules have been identified, we will discuss how the brain could carry out the computations needed to implement them, drawing on evidence from neural recordings and neural network models. The lectures will cover some basic elements of probability theory that are important for the computational approach but will not assume previous mathematical knowledge.

Human Memory: Cognitive, Neural and Clinical Perspectives

This set of lectures will consider evidence relating to a number of theoretical distinctions that have been proposed within human memory, focusing in particular on long-term episodic and semantic memory. In each case, evidence from a variety of sources will be discussed, including cognitive experiments (in the book by Michael W. Eysenck and Mark T. Keane) on healthy individuals, neuropsychological studies of patients with brain lesions, and functional

neuroimaging investigations. The objective will be to achieve an understanding of the cognitive and neural mechanisms responsible for different aspects of remembering.

We will also consider human memory from a clinical perspective: how well do the patterns of difficulties and strengths exhibited by patients in the memory clinic map onto the theoretical distinctions described? How do models of memory inform assessments and help make diagnoses, and can we try to help people to cope with their memory difficulties?

ZL3: Evolution and Behaviour: Populations and Societies (S-N)

Module Organiser: Prof Rufus Johnstone *(raj1003@cam.ac.uk)*

This module is run by the ***Department of Zoology*** *and also shared by part II Psychology students (*limited places for PDN and Psychology students*)*

This module aims to provide a functional interpretation of variation in animal social behaviour and inter-species interactions. The underlying theme is that individuals will behave in ways that promote their genetic contribution to future generations. The way in which they do so is constrained by their ecology and by social interactions with members of their own and other species.

The course aims to provide you with an understanding of:

1) the framework of evolutionary theory that is used to explain variation in animal social behaviour;

2) the way in which ecology and social competition constrain and control evolutionary options;

3) the empirical evidence that supports functional interpretations of social behaviour and life history (including observation, comparative and experimental studies).

Lecture blocks deal with communication, family life, group living and collective behaviour, coevolution (from mutualism to parasitism) and major transitions in social evolution.

11. PROJECTS AND PROJECT DISSERTATIONS

This chapter provides guidance for students taking experimental or literature-based **projects** as part of PDN Part II.

Part II BBS dissertations must be prepared in accordance with the guidelines issued by the Faculty Board: https://www.biology.cam.ac.uk/undergrads/nst/bbs/dissertations

We outline below guidelines to help you begin your project and produce your dissertation:

11.1: Examination of your dissertation (PDN project students only)
11.2: Guidance for Part II PDN projects
11.3: Guide to writing your dissertation
11.4: Responsibilities of project supervisors

11.1 Examination of your dissertation (PDN project students only).

This section is the formal guidance for your project dissertation: *it is essential that you read this section* *to ensure you know how your project will be examined and what is required of you.*

The examination of your project dissertation will contribute 36% of your final mark.

Deadlines

Provisional dissertation titles (via an online form): **12pm (noon) on 13th March 2026.**
Your title should accurately reflect the project as it will be used to select the two examiners.

Project dissertation submission deadline: **5pm on 28th April 2026*.**
You should submit two electronic versions of your project dissertation and your Statement of Originality by the deadline.

*Students may self-certify for a small extension of up to three days in PDN Part II. Details of how to obtain an extension will be communicated by the end of Lent term.

The NST policy on late submissions:

You should familiarise yourself with the NST policy on late submissions here (: https://universityofcambridgecloud.sharepoint.com/sites/NST_NaturalSciencesTripos/SitePages/Coursework%20Extensions.aspx

> Students are required to self-certify before or on the original submission date. Retrospective requests will not be accepted.
>
> Where a student does not self-certify and does not submit their coursework by the original submission date, zero marks will be awarded.
>
> Where a student has self-certified and does not submit their work by the revised submission date, zero marks will be awarded, unless a further extension has been granted by the [..]EAMC.
>
> Where a student has applied for a further extension via the [..] EAMC and does not submit their work by the agreed submission date, zero marks will be awarded.

All dissertations will be checked for plagiarism (see section 16) and word count. You must submit one complete version of your dissertation in pdf format and one in Microsoft Word format (or

equivalent), for the word counts and Turnitin check. The file size limit for the Word submission is 100MB (Turnitin restriction). The file name for the 2 electronic copies should be your Blind Grade Number (BGN).

We aspire to retain a copy of all dissertations for reference by our academics and future students. We will explain further and seek your permission to add your dissertation to our repository at the point of submission.

PDN project dissertation format

Your dissertation must contain (in this order):

- Title page
- A Summary of not more than 500 words
- Main text: Introduction, Methods, Results, Discussion
- Bibliography

You must also submit a separate Statement of Originality

The main text **must not exceed 8,500 words** (including literature citations in the text). Exceeding the word limit *will* disadvantage you. Please use Calibri or Aptos fonts, point size 12 and 1.5 line spacing

Figures and figure titles/captions/legends, tables and their titles/captions/legends, bibliography, acknowledgements and appendices are not included in the word count.

The Appendix should not be more than 5 pages.

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Obligatory Statement of Originality for PDN dissertations

The following statement must be submitted by the project deadline and must be dated and signed by you (e.g., insert a scan or photo of your signature) and your supervisor (it is your responsibility to obtain their signature before the deadline).

Statement of originality: Student

I confirm that the material in this dissertation is not copied from any published or unpublished material and is not a paraphrase or abstract of any published material, unless it is clearly identified as such and a full source reference given.

I understand that the examiners may use any means available to test for plagiarism within my dissertation.

I confirm that I have read and understand the Handbook guidance on academic misconduct. I confirm that I have not used any form of AI to write any part of my dissertation.

I confirm that my Discussion is entirely my own work and I have not received feedback from my supervisor or other lab members or another academic.

I confirm that, other than where indicated, this dissertation is my own work.

I confirm that the word count is: .....

Signature .....

Name ..... Date .....

Statement of originality: Supervisor

I confirm that, to the best of my knowledge, the draft of the dissertation that I have read was written by the student and the student had not used text or Figures from previous projects in the lab.

I confirm that I have read and provided comments on no more than one version of the Introduction, Methods and Results. I have not read or provided comments on the Discussion

Signature .....

Name ..... Date .....

Marking criteria

The key points that an examiner will be looking for in a PDN dissertation are:

(i) How well the relevant background and framework for the project has been researched, explained and presented (Introduction)

(ii) How well the experimental approaches, data analysis or literature searching are explained, justified and critically evaluated (Methods).

(iii) How well the data are described and presented, in text and figures (Results). Most projects will generate data, either from experiments, from data analysis, or from literature searching. If you project is primarily a method development project, there are likely to be data that demonstrate your progress. Results do not need to be 'positive', but they should be explained and presented.

(iv) How well the outcomes (generated/anticipated) of the research are discussed and put into the context of the literature, how well they are critically evaluated, and how well you consider further/ future work.

Dissertations are marked according to **the Faculty of Biology criteria** (following pages). Examiners also follow a **marking template for PDN projects** (following pages), although this is applied flexibly where projects do not follow the standard format.

As this is a component of the exam, we ask that your project supervisor only reads one draft of your Introduction, Methods and Results, and that they do not read any version of your Discussion.

Project marks and viva (PDN project students only)

Your project mark is based on your written dissertation, not on the type of project you did, what you achieved in the lab/ in your theory project, and not on your supervisor's assessment. It is assessed by two Examiners who may or may not have detailed knowledge of the topic of your dissertation. Both Examiners read your project dissertation and independently assign a provisional mark. They then discuss their provisional mark with each other and confirm their final mark.

The Examiners can arrange a project viva with any student if they wish to clarify your contribution to, and your understanding of the project and dissertation. Therefore, you may be called for a project viva. **Please note that most PDN students will not have a project viva: this is a change from past years.**

If you are called for a viva, provisionally this will be held the week of **11th May 2026**. Keep this week free: you will be notified at least 3 days in advance. The viva should take about 20 minutes. The viva will be held online with two examiners: typically the Senior Examiner and one other Examiner; the External Examiner may be present. Please note, the examiners in your viva will not necessarily be the Examiners who marked your project. The Examiners will ask you questions about your dissertation. You should have a copy of your dissertation ready to consult during the viva if needed.

All projects need to be marked in time for any vivas that are needed in May. Therefore self-certified extensions of **a maximum of 3 days** are allowed.

Faculty of Biology marking criteria

Class	Keyword	Content Argumentation	Research/ Presentation	Subdivision
Very high First	Excellent	The dissertation is an original contribution to its field; the argument presented is sophisticated and highly challenging, yet written with clarity and precision; could provide the basis of an article to be submitted to an academic journal	Shows clear evidence of exhaustive background research undertaken, with critical and analytical assessment of the major contributions; presentation and referencing are immaculate.	
First	Very Good	Contains originality of argumentation, an interpretative and considered approach, and demonstrates comprehensive knowledge of the field; very well structured with clear expression and judicious illustration; should be challenging.	Demonstrates extensive use of available research resources; scientific literature handled judiciously and analytically; polished presentation and referencing	Upper - Uniformly original and sophisticated Lower - Well-crafted and very resourceful
Upper Second	Good	A good, sound argument containing competent discussion of the topic while demonstrating satisfactory overall knowledge of the field; should show clarity and organization with appropriate selection of material	Competent use has been made of available text books; account is taken of journal articles, although perhaps not uniformly; satisfactory presentation and referencing	Upper - Ideas should show increasing cogency and resourcefulness Lower - Restricted to a relatively narrow set of routine ideas
Lower Second	Fair	Average level of argumentation containing basic ideas, although generally limited to straightforward narrative treatment (e.g. synopsis); limited knowledge of the field; adequate structure, but often not well developed; illustration not always to the point.	Use of scientific literature is limited to provision of ideas, often substituting for first hand knowledge of journal articles; while use of text books and review articles is acknowledged, they are not dealt with critically or analytically; presentation and referencing will often have inconsistencies.	Upper - A number of ideas of interest are discernible Lower - Marked tendency towards padding; paucity of own ideas
Third	Poor	Very basic approach; does not have a consistent thesis; ideas are unstructured or tacked together; often irrelevant and undirected argumentation; little apt illustration; nevertheless, should show some knowledge of the scientific literature.	Little or inappropriate use of scientific literature has been made; while not showing evidence of outright plagiarism, ideas will often be heavily dependent on the work of others; possibly sloppy presentation and severely inconsistent referencing.	Upper - A valid but commonplace underlying argument is discernible Lower - Direction-less and / or padded
Fail	Fail	Fails to demonstrate competent knowledge or understanding of the scientific literature.	The use of scientific literature, even if acknowledged, is unscholarly; presentation will show extreme carelessness.	Upper - Allowance for Ordinary (i.e., there is some valid argumentation Lower - Outright fail

N.B. The University regards plagiarism in examinations, in connection with essays, dissertations, project work and other such work, as a matter of great concern and will treat cases of plagiarism with the utmost seriousness and severity. Candidates who submit essays, dissertations, project work and other such work for examination must give full and proper acknowledgement to the work of others. Severe penalties may be imposed if plagiarism is detected. Your dissertation must be accompanied by a signed declaration, not bound to your dissertation, that it is your own original work, and that it does not contain material that has already been used to any substantial extent for a comparable purpose. The Faculty Board has issued a statement on plagiarism

PDN project marking template

Overall presentation (5%)		
Poor presentation. Little or no logical structure or format. Poorly written.	0-1	
Patchy presentation. Inadequate structure, quite poorly written. Information can be extracted only with perseverance.	2	
Satisfactory presentation. Structure is adequate, text is readable.	3	
Good presentation. Sensible structure, well written text.	4	
Excellent presentation. Exemplary structure, very well written.	5	
Background to project, referencing, project aims (25%)		
Minimal coverage of appropriate background. Poor understanding. Poor/ selective referencing. Hypothesis/ Question unclear.	0-4	
Patchy or superfluous coverage of background. Conveys limited understanding. Patchy referencing. Hypothesis/ Question given but unclear or not linked to Background.	5-10	
Average coverage of appropriate background. Conveys reasonably good understanding. Satisfactory referencing. Hypothesis/ Question clear and quite well linked to Background.	11-16	
Good coverage of appropriate background. Focussed. Conveys good understanding. Comprehensive referencing. Hypothesis/ Question clear and linked to Background.	17-21	
Excellent coverage of appropriate background. Focussed. Conveys excellent understanding. Comprehensive referencing. Hypothesis/ Question clear and linked to Background.	22-25	
Methodology (15%) *Experimental, data analysis, or literature searching methods.*		
Little methodology given or poorly described. Difficult to follow.	0-3	
Patchy methodology: some aspects explained well and justified, other aspects difficult to follow.	4-6	
Satisfactory methodology, with some justification. Possible to follow.	7-9	
Clearly explained and well-justified methodology. Easy to follow.	10-12	
Excellent, comprehensive methodology, well justified.	13-15	
Results (20%) *Experimental work/ data analysis/ literature searching.*		
Poorly described in text. Poor quality figures & figure captions.	0-4	
Uneven presentation in text & figures. Figures could be improved.	5-8	
Satisfactorily described in text. Figures & captions adequate.	9-12	
Good description in text. Good figures and helpful figure captions.	13-16	
Excellent description of results. High quality figures and figure captions.	17-20	
Discussion, critique and further work (35%) *Supervisor should not read Discussion.*		
Little discussion of results/ critique/ ideas for further/ future work.	0-7	
Limited discussion of results/ critique/ ideas for further/ future work.	8-14	
Satisfactory discussion/ critique/ ideas for further/ future work.	15-21	
Thorough discussion. Good critical insight/ ideas for future work.	22-28	
Thorough discussion. Mature critical insight. Original ideas on how work could be taken further.	29-35	

Academic misconduct and Plagiarism

You must read the following section and the University's Definition of Academic Misconduct (https://www.plagiarism.admin.cam.ac.uk/what-academic-misconduct/definition-academic-misconduct) and the information on plagiarism and Turnitin software in section 16 of the handbook. As noted on those pages, please work through the University's online guide to 'Good academic practice and avoiding plagiarism':

https://libguides.cam.ac.uk/plagiarism

You will be asked to sign a Statement of Originality that you have read and understood the University policy on academic misconduct (see section 16).

If you use AI for any aspect of your project (e.g. help with writing code), it is important that you first discuss that with your supervisor, to ensure the usage is appropriate and fair, and that you declare and justify the use of the AI so that the examiners can take that into consideration. You must not use AI to write any part of your dissertation.

Most or all illustrations should be produced by yourself. If you use illustrations from published works, you must give full acknowledgement in the legend and describe it in your own words. You must not copy the figure legend/ caption from the published article. We recommend that you put a note in each figure legend stating the source, including 'own work' if it is your own. If you reproduce a published figure legend as verbatim text, then the copied text must be in quotation marks as well as giving the source.

Your dissertation will be submitted to Turnitin UK at the time of submission. The University Turnitin Policy is available the https://www.plagiarism.admin.cam.ac.uk/home .

11.2 Guidance for Part II PDN projects and dissertations

The following is guidance, intended to help you complete and write up your project.

Time Devoted to Projects

You must balance time spent on your project with that you spend on the other parts of the course. Take care not to fall behind in reading for your Modules. An important skill that you must master during this year is how to balance your time and prioritise tasks through the week. As a rough guide, you are expected to devote about 16 hours per week to your project (experimental or literature based). Remember that you will be assessed on the write up, not on the amount of data/ information you have.

Risk and Research

Researching a novel question is exciting; however, there is a necessary element of risk, which is part of the challenge of scientific research. A common misconception amongst students doing experimental projects is that the dissertation mark is directly related to the generation of "positive" results. **The project dissertation is assessed on how well you present the project in your dissertation, not on the number of experiments, data analysis, literature searching or results**.

When you start your project, you may be given an initial plan of expected project milestones. You should frequently review your progress. Is your approach answering the question that you first posed? If so, what do the results mean? Are there other possible interpretations of these results and how might you distinguish them? What controls must you perform to verify these interpretations? If your approach/analyses are not working, why not? Was the design of the approach/analyses flawed or were your initial assumptions incorrect? What can you change or how can you readdress the question?

Your Project Supervisor

You will be under the supervision of an academic member of staff, although for experimental projects the day-to-day help might also come from a senior postgraduate student or post-doc. Be sure that you know who your points of contact are, how and when you are expected to report on your progress, and whether you will be expected to attend and present at lab meetings. You will need to discuss any possible timing constraints on your experiments with your project supervisor and decide how to schedule these into your week. Some projects will require you to align your project time with other things happening in the lab.

Your project supervisor has other commitments and will require adequate warning and time to have meetings with you or to read your written work. Agree in advance a programme with your project supervisor and establish when they are going to be absent from Cambridge or very busy. It is your responsibility to make arrangements with your project supervisor, not the responsibility of your project supervisor to organise you.

For literature-based projects:

The role of the project supervisor is NOT to tell you what to do, but to help you to make decisions for yourself. Your supervisor should support you in leading and driving your research, in focusing and clarifying the questions to be addressed, in helping you develop (re)search strategies for gathering evidence, in selecting for use published evidence of different types by rigorous and appropriate criteria, and in structuring your dissertation professionally.

Please note that questionnaires are no longer allowed as part of a dissertation.

11.3 Guide to writing your dissertation

General advice

The dissertation should be a scholarly piece of work, written in the style of an academic or scientific document. Your writing style should not be journalistic, casual, over-complicated or obscure: examiners want to read clear, plain English. Focusing on the essential argument or evidence is an important skill. Short sentences, each conveying a single piece of information, are most useful. The arguments should be substantiated by citing qualitative or quantitative data where appropriate, and by references to the literature.

SAVE YOUR WORK FREQUENTLY AND USE A CLOUD-BASED BACK-UP; STUDENTS WHO DID NOT HAVE LOST THEIR WHOLE DISSERTATION.

Layout and format

(i) Statement of Originality (***obligatory***). Submitted separately and by the project deadline.

(ii) Title Page: (include the project title, Blind Grade Number (BGN), academic year; specify whether your project is experimental or literature-based.) **You must not include your name or the names of your supervisor(s) or lab members anywhere in your report, nor any University, College or Departmental logos.**

(iii) Summary (no more than 500 words) (***obligatory***): *From the journal 'Cell':* "An effective summary includes the following elements: (1) a brief background of the question that avoids statements about how a process is not well understood; (2) a description of the results and approaches/model systems framed in the context of their conceptual interest; and (3) an indication of the broader significance of the work."

(iv) Table of Contents (***not obligatory***)

(v) Introduction & Question/Hypothesis: *From 'Cell'*: "Good introductions are succinct, presenting only the background information needed for readers to understand the motivation for the study and the results."

(vi) Materials and methods: For theory-based projects, this should include information on literature sources, e.g. search engines and key words used and how you narrowed down your search and avoided missing key sources. For lab-based projects, it would include all aspects of the experimental work (subjects, study design, technical details, data analysis methods). For a data analysis project, it is helpful to give a short summary of the experimental method that was used to generate the data, to show you understand where the data came from, but you must be very clear that you did not do the experiments. The main methodology will be how the data were analysed.

(vii) Results: This section should present your project outcomes in a logical order (not necessarily the order in which you did the work!). Any computational or mathematical models that you created or modified, i.e., that did not exist before the project started, should be presented here, not in the Methods. Explain clearly what you did and why, i.e., **provide the rationale, approach and conclusions for each experiment/part of the project**. Refer to all graphs, figures and tables in the text. Label figure panels so that you can refer to specific panels in the text and figure legend (e.g. A, B, C). Use subheadings to provide structure. *From 'Cell'*: "In our view, good subheadings convey information about the findings, so we encourage you to be specific. For example, say 'factor X requires factor Y to function in process Z' rather than 'analysis of factors X and Y using approach Q.'...Each figure legend should have a brief title that describes the entire figure without citing specific panels, followed by a description of each panel. In writing the figure title, we encourage you to re-use the subheadings of the results section to make the relationship clear."

(viii) Discussion: This should explain the significance of the results/outcomes and set them in a broader context. It should also indicate what you might do next and include a section summarising what you have learnt about the methodology you used: its limitations and advantages, and whether you would use a different methodology if doing further work and if so why. **This must be your own work.**

(ix) Acknowledgments: This section should detail all help received, e.g. from technical staff or other lab members who helped with assays or data analysis. **You should refer to them by role rather than by name. You could use similar phrases to the following, if applicable:**

'Thanks to my supervisor for… (regular meetings and guidance, for example) and to the Postdoc who… (supervised me in the lab, for example), as well as other members of the lab for… (general advice and cake, for example).

'Data were provided by a Postdoc/ PhD student in my host lab'.

'The data in Figure 1 were collected/ analysed in collaboration with another Part II PDN student'.

(x) Bibliography (see below)

It is appreciated that the precise format may vary with individual dissertations.

Collaborative work and shared projects

In collaborative work you should take care to point out which components of the project were performed by you and which performed by others. **In projects shared between students you should clearly explain who did what. You may wish to consider discussing with your supervisor and lab partner how you can explore different aspects of the project.**

Style

Use 1.5 line spacing throughout. You should use Calibri or Aptos: these are very 'readable' for your examiners. Examiners will appreciate 12-point font size (you should not use less than 11 point). Think about the layout: include headings and subheadings to structure the text and make it easy to read. Use a style of writing that distinguishes clearly when you are reporting the findings and work of others from when you are drawing or offering conclusions of your own. Use continuous prose throughout the report. Do not use bullet points or footnotes.

Around 4% of the population have a colour vision deficiency and may be unable to distinguish red and green, so accessible colour combinations are strongly recommended. For example, for two-colour images, you could use green and magenta instead of green and red and use differently styled symbols and lines rather than relying on differently colours in graphs. For more information, please refer to the Color Universal Design (CUD) website ('How to make figures and presentations that are friendly to Colorblind people'): https://jfly.uni-koeln.de/color/

Data handling

Where appropriate, use appropriate statistical tests to add validity to the conclusions drawn. Explain why you chose the particular statistical test used. Give sample sizes and distinguish between biological and technical replicates. If your data are not numerical, think about what other means may be used to give confidence in your claims. Your supervisor can help in this regard.

Data Videos

It is possible to submit short audio-free video clips of essential data that cannot be easily visualised or presented as standard images or graphs. Guidance on how to submit video clips will be provided nearer the time.

Abbreviations

If abbreviations are used, the terms should be written in full when first used, the abbreviations then being given in parenthesis. Use capitals without full stops, for example HIV, DNA. Use of abbreviations not commonly found in the literature can be more confusing than helpful and is

discouraged. Do not use acronyms for single words, or lab shorthand (e.g. write out paraformaldehyde, not PFA; ethanol, not EtOH).

Bibliography

It is essential to give credit to people whose work you have used. This means citing papers (or books) whose conclusions or ideas you are referring to. See: https://libguides.cam.ac.uk/plagiarism/referencingadvice for guidance on referencing. All statements of fact in the text should be supported by citations, which may be to a review(s) or to a specific data paper(s), depending on the point being made. References should be used to substantiate major points, or to direct the reader to key recent further material that is relevant to the point you are making. A reasonable guide would be no more than 60 references. References in the text must correlate with the bibliography at the end. References should be cited in the text with the name and date, not a number e.g. Cowan et al., 1997; Sondheimer and Lindquist, 2000; King, 2003. Use 'et al.' (the abbreviated form of the Latin phrase *et alia*, meaning "and others") when there are more than two authors. The order of authors within brackets should preferably be by year of publication (oldest first).

We strongly recommend that you use a reference manager to organise your references and generate your bibliography. Zotero is free to download and use. If you use a reference manager, use the style of Harvard/ Elsevier-Harvard, which will make the correct type of citations and bibliography (as below). If you do not use a reference manager, please format the bibliography as follows:

Article in a periodical: Sondheimer, N., and Lindquist, S. (2000). Rnq1: an epigenetic modifier of protein function in yeast. Mol. Cell *5*, 163–172.

Article on a preprint server or other repository: De Virgilio, C., Hatakeyama, R., Péli-Gulli, M.-P., Hu, Z., Jaquenoud, M., Osuna, G.M.G., Sardu, A., and Dengjel, J. (2018). Spatially distinct pools of TORC1 balance protein homeostasis. Mendeley Data, 10.17632/m9s42s94fc.1.

Article in a book: King, S.M. (2003). Dynein motors: Structure, mechanochemistry and regulation. In Molecular Motors, M. Schliwa, ed. (Weinheim, Germany: Wiley-VCH Verlag GmbH), pp. 45–78.

An entire book: Cowan, W.M., Jessell, T.M., and Zipursky, S.L. (1997). Molecular and Cellular Approaches to Neural Development (New York: Oxford University Press).

A clinical practice guideline published online by a committee or agency (NICE, WHO, etc): The committee or agency that developed the guideline should be named as the 'corporate' or 'group' author (when no individual authors are credited). The committee/ agency should be defined in full at first usage in the text, and in the Bibliography, but acronyms can be used thereafter for in-text citations. The NICE and WHO example citations given below are copied from the APA style webpage (link below), which has detailed specific guidance for the year of update, etc - keep scrolling past the example citations in the blue box for further guidance: https://apastyle.apa.org/style-grammar-guidelines/references/examples/clinical-practice-references#3

National Institute for Health and Care Excellence. (2019). *Hypertension in adults: Diagnosis and management* (NICE Guideline NG136). https://www.nice.org.uk/guidance/ng136

World Health Organization. (2017). *Guideline: Protecting, promoting and supporting breastfeeding in facilities providing maternity and newborn services*. Guideline Central.

https://www.guidelinecentral.com/share/summary/5acc36cc939f5#section-society

Software/app: Check the software/app website to see what the company requests when citing their software/app.

In the Bibliography, if the number of Authors (N) exceeds 10 authors, you may substitute "et al." for authors 11-N. References should be listed alphabetically by last name of first author (and where there are several papers by the same author these should be arranged in alphabetical order of the last name of the second author, etc. If all authors are the same arrange in chronological order).

Appendices

Appendices should not exceed 5 pages. They should be reserved for things are peripheral but relevant to the dissertation, for example, raw data, computer code. The appendices are not to be used as a means to exceed the word limits. The examiners are not obliged to read appendices – all essential material must be contained with the main text of your dissertation.

11.4 Responsibilities of Project Supervisors

PDN project supervisors are expected to:

- Ensure students are aware of lab and data safety and security.
- Ensure students are properly trained in the relevant techniques and analytical tools.
- Ensure students have a day-to-day contact with members of the lab, if not the actual supervisor.
- Discuss the aims of the project and the expectations of the supervisor in terms of time commitment at the start of the project.
- Suggest appropriate reading material.
- Provide guidance on the use of appropriate statistical analysis of the data. Project supervisors should take care to check the statistical analysis in the draft dissertation and provide further guidance if necessary.
- Advise on the appropriate and inappropriate use of AI
- Read one full draft (***and only one!***) of Introduction, Methods and Results and provide constructive comments.
- Not read the Discussion.
- Sign the declaration for the student to submit with their dissertation, confirming that they have read no more than one copy of the Introduction, Methods and Results, and that they have not read any version of the Discussion, which must be entirely the student's own work. Students must obtain their supervisor's signature in good time.

12. GUIDE TO READING PAPERS

In Part II you shift from the learning of given facts to understanding how research is carried out, and as part of this process you will be reading research papers. Reading an academic or medical paper critically and effectively is an essential professional skill. In addition, critical reading is an essential part of your dissertation and course work. In large part, your ability to read critically will determine how much you get from the course. We will be offering you different formats to help you develop this skill over the year, and each Module should provide you with opportunities. Early in the course we will offer a session on reading research papers. By the end of the course, you should be able to:

(i) Read published papers effectively

(ii) Make clear and pertinent summaries of the material that you read

(iii) Have a better feel for the research techniques used, their value and limitations

(iv) Think critically about what you read

A general point about scheduled journal club sessions (optional or compulsory): if you are to benefit from these sessions, it is important that you all engage with them enthusiastically and prepare for them thoroughly. Our experience is that the sessions can be very useful in developing a critical approach to your reading.

Tips on reading papers

Remember that papers are written by academics and doctors, and they are people! They can therefore make errors of judgement and interpretation. Their research output reflects human fallibility as well as creativity and intellectual achievement.

Before starting, you might wish to reflect on what you consider to be the ***purposes of an academic publication***. What types of publication are there? How do their roles vary? What are they are trying to achieve? The next question to ask is ***why you are reading it***. Are you looking for a general review of a field, or are you looking for detailed information, or tips on a technique, or wishing to compare procedures with another article which found the same or different results?

To break the ice, it is always best to ***read the abstract/summary section,*** which will give a preliminary indication that the article has the potential to cover what you are looking for. Don't feel you have to persevere with something just because the title looked (misleadingly) interesting, selectivity is important. If the abstract is interesting, then reflect for a moment to see how the overall story fits together - why did they do it, what (and how) did they do, what did they find and how does that relate to the original question?

The following sections follow the typical order of most papers and indicate what you might expect to find in each section. However, bear in mind that you may not always want to read a paper from start to finish in this order. For example, you may be more interested in the methodology section. Or you may want to take a quick look at the figures to see how the authors have presented their data.

The ***introduction,*** if well written, will start off describing the general problem and the background information relevant to the paper, in which areas of uncertainty are highlighted, and culminating in the formulation of a question or hypothesis. It may not be explicitly stated, and you may have to extract the question yourself. *There is little point in proceeding if you are not clear about the questions they are asking/hypothesis they are testing*. It is even possible that there is no hypothesis.

The ***materials and methods*** section should be written so that you could go away and do the same experiment to test whether their findings are reproducible and therefore more likely to be valid. They are rarely written this way, partly because of shortage of space and partly because of other reasons only to be guessed at. You are likely to be confronted with jargon, abbreviations and cryptic technical references. Try not to be too tied up by the details. Hold onto your understanding of the question they are asking and try to determine how their overall approach and experimental design would allow them to answer it. You may wish to check a more general text in the library (e.g. Molecular Biology of the Cell) to help you understand the terminology and methods. Before you go onto the results section, *try to envisage how the outcomes might look*. This prediction gives you a mental framework against which you can assess their findings and also is a self-check that you really do understand the general theme behind the study.

The ***results*** section is where the Authors present their data and so you should make sure that in reading through them you form an independent assessment of the effects. Always look at the control groups first because by their nature, these are the groups where the responses should be most easily predicted. They should fit a pattern similar to that seen in previous studies and where different parts of a study perform similar control procedures, the results from those groups should be similar. If the control data wobble around, the measures are variable and so the experimental findings may be sensitive to coincidences. Look at the axes scale and ask yourself, *do I see what the authors tell me to see*? Pay attention to tricks of the trade such as truncating axes to make relatively small differences look huge and transformation of data (which can on occasion, but not always, be legitimate/necessary). Have a think about sample sizes for the control and experimental groups and the choice of the statistical analyses. The *statistical analyses* often cause fear for students. Do not worry about them: during the year you will become more familiar with the ways in which they are used and presented. They are necessary: science without statistics is black magic. Having decided for yourself what the pattern is when comparing control and experimental groups, go back to the original predictions formulated and ask whether the observations fit with the prediction or not. It will hopefully be apparent whether the findings contradict the original hypothesis.

The purpose of the ***discussion*** is for the Authors to set their own findings into a wider context: where they complement previous work and where there are discrepancies. The latter can be really important because it often points the next move forward. Ask yourself, are the Authors being honest in their presentation of discrepancies? Can the current findings be slotted into a larger picture? Has the same answer been arrived at by several different approaches? The discussion should end with a prospective view on where uncertainty still lies and how this might be better

addressed. Try asking yourself, given the outcome, what would you do next? That is always the key question in science!

Critical reading

All papers submitted are sent by the journal editor to two or more expert referees who advise whether the paper is worth publishing and whether the experimental design, data, and writing are satisfactory. Usually, authors and referees do a satisfactory job and you will not find anything overtly wrong (although you might!), but you shouldn't assume that everything is as the authors say it is. Some possible questions to ask yourself are:

-Are the authors just reporting data which fit their preconceived idea?

-Is the effect biologically significant? Did they use satisfactory controls?

-Were other experiments to confirm or refute the hypothesis not done (or not reported - negative results are hard to publish)?

-If A is supposed to cause B, is it more than a correlation? Does exogenous A induce B? Does blockade of A abolish B? Are these interventions reversible?

-Have suitable statistical tests been used? Absence of evidence is not evidence of absence!

-Have they justified their conclusions? Are there alternative explanations?

-Do their results apply as widely as they claim? If the results were in vitro, will they apply in vivo? If in a rat, will they apply in a human?

-What more might they do to test their hypothesis or find out if it is more generally applicable?

Be only constructively critical and make sure any criticism you make is scientifically based with appropriate citing of supporting evidence. Also, think about the merits of the work!

13. GUIDE TO POSTER PRESENTATIONS

At the beginning of Lent term, all PDN project and PDN-BBS students will begin to prepare and present a poster on your ongoing project work. We will arrange a poster session that will be open to members of the Department and to your supervisors and peers to view all of the exciting projects in Part II this year. During the poster session, members of the academic staff will be assigned to discuss your poster with you, and others may come and speak with you about your work too.

At the end of the Michaelmas term there will be compulsory workshop lecture that will cover essential information to help you get it started. It will also cover tips on making suitable figures and arranging them into a poster. You must let us know at part2@pdn.cam.ac.uk if you cannot attend due to illness or a lecture clash.

Your poster session itself will be in Lent term and details will be communicated to you at the start of term.

The objectives of the poster session are:

(i) to gain feedback which may help in completing your project/dissertation

(ii) to encourage you to evaluate these experiences constructively

(iii) to give you experience in planning and presenting a poster

(iii) to explore what other students are doing in their project/dissertation

(iv) to practice discussing your work

14. EXAM INFORMATION

The formal information for examination purposes is given in Sections 14.1, 14.2, 14.3: it is essential that you read these sections to ensure you know how your written papers will be examined and what is required of you.

14.1 Examination of the written exam papers

Examination of the Module material will be in the form of separate papers for each Module. Part II PDN students will sit four papers in May-June.

Exams will be typed and 'closed-book' (i.e. using a computer in an invigilated room without access to any other resources). The exam board will use Inspera, as used at Part IA & IB. Information about actions to take in the event of technical issues will be provided nearer the time.

Each PDN Module will be examined in a separate session lasting 3 hours. Students with extra time allowances are expected to complete their assessment within their allocated time. The University's normal procedures for reasonable adjustment will be followed.

Students will answer **three questions from a choice of six questions** for each PDN lead Module exam. There is no word limit for the essays. Where appropriate, hand-drawn diagrams/ formulae/ calculations can be included using the provided sheets.

Questions will be based on material covered in Part II lectures. In addition, when writing your answers, you are strongly encouraged to make use of relevant information from your own reading, journal clubs, other lectures, seminars, and any other sources.

Students **must not copy and paste text** from one essay into another essay or essays, or use the same diagrams for more than one essay. Copying and pasting will be detected by Turnitin and marks will be deducted accordingly.

Examiners will use Turnitin to review scripts for plagiarism. Students should review the University's plagiarism and academic misconduct policy to ensure they understand the rules (https://www.plagiarism.admin.cam.ac.uk/). **You must read section 16 of the handbook on plagiarism.** This reproduces the University's Definition of Academic Misconduct and the Faculty Board of Biology's guidance on plagiarism and how to avoid it.

The examination **timetable** will be announced after it has been set by the University. Details will also be given on the PDN Moodle site. Some students may have exams scheduled on consecutive days. Please note that the Department and the Examiners have no influence over the exam timetable, which is scheduled centrally by the University.

***Note*: NST Part II Regulations state that the use of a *viva voce* is at the discretion of the Examiners. PDN does not routinely hold post-exam vivas but we reserve the right to do so if required.**

14.2 Examined components of the Part II PDN courses:

Part II PDN

Dissertation: 36%

Examination of module material: 64%

Deadline for submitting your dissertation: **12.30pm on 28th April 2026.** See Section 11.

Part II BBS

Dissertation: 20%

Major Subject module material: 64%

Minor Subject module material: 16%

Deadline for submitting your dissertation is no later than **12.30pm on 1st May 2026.**

Written examination:

For Major Subject module material, you will sit four of the same Module papers as the Part II PDN students (see 14.1).

For PDN Minor Subject material, you will sit the paper for that Module.

Your Major Subject, Minor Subject, and Dissertation are marked independently, and the marks are added to determine your final mark and class.

Past papers

Past examination papers for the Part II PDN course Modules are available on Moodle via the Past Papers button on the Common Courses page.

Will all topics be in the exam?

Our Part II PDN exam regulation is that you write 3 essays from a choice of 6 essays: we cannot put more than 6 questions on an exam paper. Some Modules have more than 6 blocks of lectures; therefore, it is not possible for the Examiners to cover all topics in 6 questions. Sometimes, Examiners will use 'either/or' questions to provide more coverage of the Module topics. However, in response to student feedback and consideration by the Examiners, these will be used minimally this year. Please ensure you revise enough topics in your exam preparation that you will be able to answer 3 questions, even if not all topics are represented on the exam.

14.3 The assessment procedure for Part II PDN and Part II BBS

All exam essays are marked by an expert marker, usually the person who gave the lectures or, in some cases, by the Module Organiser or an appropriate examiner. Exam essays for every question will also either be marked or moderated by an examiner.

Criteria used in Marking Tripos Essays (scroll down to the Part II criteria):
https://www.biology.cam.ac.uk/exams/AllExams/marking-tripos-essays
(These criteria are reproduced on the next page of the handbook.)

See additional guidance in section 14.4.

Guidance for Marking Part II Dissertations:
https://www.biology.cam.ac.uk/exams/AllExams/marking-part-ii-dissertations
(This guidance is reproduced in section 11 of the handbook.)

Information about the Part II project dissertation (for Part II PDN project students only) is in section 11 of the handbook.

The Examiners are not allowed by University regulations to give you feedback on your examination performance.

Note on citations in exam essays:

Examiners like to see evidence that you have read original research papers (and would be especially impressed if these went beyond the lecturer's list of most important ones). **In your exam essays, you will not be penalised for failures to formally cite sources or to present a bibliography. However, we encourage you to indicate which study you are referring to by giving the name of one of the authors and, if possible, a date. This allows examiners/ assessors to see which papers you have read, particularly when you have read beyond the reading list (detailed citations of all authors/ journal name/ volume/ pages are absolutely not required).** You may be able to give your own assessments of the evidence in some of them. If you describe technical details, remember to explain enough to show that you understand them.

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Criteria used in marking Part II Tripos essays (Faculty of Biology)

https://www.biology.cam.ac.uk/exams/AllExams/marking-tripos-essays

First: Work, which is excellent both in the range and command of the material covered and in the argument and analysis. Work that is excellent in its understanding of the subject; that has engaged closely with the question; that has shown some originality and treated the evidence critically; that brings in relevant material from an appropriate range of sources; and that is well-planned and complete.

A first class mark may be awarded on more than one set of criteria: there may be a great deal of relevant information, displaying substantial knowledge and understanding; the arguments and presentation may be stylish; the approach may be original, critical or unorthodox. An upper first would be an outstanding performance, meeting all, or virtually all, of these criteria. A low first would meet at least some of these criteria.

Upper Second: Work that shows a good broad-based knowledge of the topic and the lecture material; that is presented in an organised way; and clearly argued and focused on the set question.

Answers at the top end of this class would often include material from outside the taught material and where relevant, from different lecture courses and would include some attempt to treat the evidence critically and to synthesise arguments. Answers at the lower end of this class would be competent, accurate in reproducing lecture material and show evidence of reading of the principal sources of published work on the subject.

Lower Second: Work that overall shows a reasonable competence in the understanding and presentation of the relevant material.

Answers at the top end of this class would show competent understanding of the basic lecture material or reasonable organisation and focus; an answer at the lower end would show gaps in understanding and coverage together with poor organisation and focus.

Certain types of uneven work would fall into this class; detailed factually-correct work that did not relate a broad knowledge of the topic to the specific question asked, or work with clear organisation and some insight but with serious omissions of factual knowledge.

Third: At the upper end of the class, work that just shows competent knowledge of the basic, core material. At the lower end of the class, work that shows some knowledge of the material but with serious deficiencies in understanding, coverage and organisation. This will include work that is unduly brief or largely misses the point of the question.

Fail: Work that is irrelevant, shows a considerable degree of ignorance or is short and superficial. Where the question is barely attempted.

14.4 Writing essays in the Part II exam

All exam essays are marked by an expert marker, usually the person who gave the lectures or, in some cases, by the Module Organiser or an appropriate examiner. Exam essays for all questions will also either be marked or moderated by an examiner: they are likely to differ in the extent of their expertise. A good answer will aim to address the needs of both types of reader, addressing details of recent relevant research but also setting the subject matter in its broader context. Part II essays are typically more involved and complex than part I essays, requiring you to think and read further about the topic rather than replicate what was in the lecture.

PDN examiners/ assessors will consider the following:

(i) Does the essay answer the question?

(ii) Is the structure and organisation of the essay logical and clear? If diagrams are used, are they helpful?

(iii) Does the essay cover key relevant material from the lectures?

(iv) Does the essay include relevant material from beyond the lectures?

(v) Does the essay convey poor/ OK/ good/ excellent understanding of the topic, knowledge of the key studies and understanding of relevant conceptual and technical details?

(vi) Does the essay provide a balanced critique? Original ideas? Suggestions for further/ future work?

There are **three common reasons why students do less well when writing Part II essays**, particularly in the exam when you have the pressure of time against you - bear these in mind as you practice essays throughout the year:

(i) The essay contains a lot of factual information but does not convey a good understanding of the key ideas and concepts, and the facts are somewhat randomly presented rather than organised into a developed and balanced argument or discussion related to the question.

(ii) The essay shows a good understanding of the key concepts but includes a poor level of detail and insight.

(iii) The essay demonstrates a good understanding of concepts and contains a good level of detail but none of this is related to the specific question being asked, and therefore the student has not answered the question.

In writing your essays, here are some **general guidelines to avoid the following mistakes**. You should also read the Faculty of Biology criteria used in marking Part II essays (see above).

(i) **Read the question carefully**. Think about what the question is asking before you start writing and ask yourself what topics you will need to cover in order to develop your answer.

(ii) A short **plan** can be helpful: organise the structure into key topics that address the question.

(iii) An introductory paragraph can be helpful to show that you have a balanced view of the subject. You may not have time to cover everything that you think is relevant, so use the Introduction to provide the bigger picture and to indicate what you will focus on. Highlight topics of particular importance and relevance to the question.

(iii) Use sub-headings or good paragraphing to maintain a logical structure. Keep related material in the same paragraphs, start a new paragraph for new material. Remember to reiterate in key places how the developing argument relates to the question. This will keep you and the reader on track.

(iv) As a general guide for each topic/paragraph: introduce it, use a key sentence to emphasise how it is relevant, give clear explanations of the key concepts to show that you understand them, provide the detail and experimental evidence where appropriate, then finish by concluding whether/how it supports/does not support the question etc., before moving on to the next topic.

(v) Clearly drawn and labelled diagrams can be very effective. Poorly drawn diagrams with no clear labels will not impress examiners.

(vi) Draw everything to a close. In general, you will want to summarise the key points of your argument and then make some kind of conclusive statement that answers the question (even if your conclusion is that the question cannot be answered) based upon the evidence you have presented.

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15. Part II BBS-SPECIFIC INFORMATION

The coordinators for BBS in the Department are Profs Hannah Clarke (hfc23@cam.ac.uk) and Amanda Sferruzzi-Perri (ans48@cam.ac.uk) They are always willing to answer questions or discuss problems concerning the course.

There is a BBS Welcome Event held for all BBS students on Thursday 9th October, from 4-6pm. The BBS administrator will provide details.

15.1 BBS options and modules in PDN

BBS Option	Title	Modules
Major subject		
415	Physiology, Development & Neuroscience	Any 4 of 15 PDN modules*
Minor subjects		
111	Higher Order Brain Function and Dysfunction	N6
137	Surgical and Radiological Anatomy	-
138	Developmental Neurobiology	N1
142	Development and Stem Cells	P2
143	Systems and Clinical Physiology	P8
152	Neuroscience: Circuits and Systems	N3
153	Cell Signalling	P1N4

*Part II BBS students in PDN are able to take the same modules as the Part II PDN project students. Students may replace one of their four PDN-based module choices for a 'shared neuroscience' module but this is subject to capacity set by the 'home' department; if oversubscribed the spaces on these modules will be allocated at random.

BBS students will sit the same exam papers as the Part II PDN students (section 14, 'Examinations').

As a Major Subject student, you will be a member of the Department just like the Part II PDN project students, so all chapters of this handbook are relevant to you, except for the Projects section.

Major option students are also assigned a departmental advisor with whom you can discuss your own progress or difficulties in the course.

Mailing lists: for PDN-BBS major students: pdn-part2-bbs@lists.cam.ac.uk
for PDN-minor subject only students: pdn-part2-minors@lists.cam.ac.uk

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15.2 BBS Dissertations

During the beginning of Michaelmas Term, you will need to arrange a topic and Supervisor for your dissertation. Early in the term, you will be notified by e-mail of a list of possible dissertation titles that are offered by PDN with members of the Department willing to supervise them. Alternatively, you could consult other lecturers or Module Organisers if you would like to review a different topic. You should arrange meetings with Supervisors of titles that interest you, to discuss what would be involved. It is intended that only one student will take a given title, so if there is competition for titles, please discuss with the Supervisor whether two related topics could be set.

If a BBS student wants to propose their own title in PDN but with a non-PDN supervisor, they must check the proposed title with the PDN Course Organisers **before** submitting to the Faculty. If they do not do this, PDN reserves the right to decline the title.

We are able to accommodate up to five BBS minor students to do their dissertation in PDN.

Part II BBS dissertations must be prepared in accordance with the Faculty Board dissertation guidelines: http://www.biology.cam.ac.uk/undergrads/nst/bbs/dissertations

Deadlines:

You must notify the PDN Course Organisers of your proposed title for approval via the electronic form sent to you, including the name of your supervisor, by the PDN Departmental deadline: **12pm Thursday 23rd October 2025**

When approved by PDN, you must complete the form available on the BBS Moodle site, following the instructions stated there. This must be done no later than Division of Michaelmas term, that is **4.00 pm on Friday, 7 November 2025**.

You must notify the PDN Course Organisers (via part2@pdn.cam.ac.uk) and the Faculty Office of any subsequent changes to either the title or the subject of your dissertation. To change your title, please obtain the permission of your Supervisor and Course Organisers and then fill in the required form available on the BBS Moodle site so an update can be made with Student Registry. The latest date by which you can change the title of your dissertation is the last day of Lent Term, that is **Friday, 20th March 2026.**

Please note that you are free to do a dissertation in your minor subject, but you should inform your major subject Course Organisers if you take this option.

A copy of your dissertation, in its complete form, must be submitted in electronic form via Moodle, in accordance with the guidance provided by the department you have written your dissertation in, by the deadline of **12.30 pm on Friday 1st May 2026.**

BBS Formatting requirements can be found on the Faculty of Biology Website https://www.biology.cam.ac.uk/undergrads/nst/bbs/dissertations**.**

PDN does not have different or additional formatting requirements for BBS dissertations.

15.3 Plagiarism

You must read the University's **Definition of Academic Misconduct** (https://www.plagiarism.admin.cam.ac.uk/definition) and the information on **plagiarism and Turnitin software** in section 16 of this handbook.

As noted on those pages, please work through the University's online guide to **'Good academic practice and avoiding plagiarism':** https://libguides.cam.ac.uk/plagiarism.

15.4 Advice on preparing your dissertation*:*

(extract from: https://www.biology.cam.ac.uk/undergrads/nst/bbs/dissertations#toc-3)

The purpose of the dissertation is to give you an opportunity to produce a substantial piece of original work, which will form part of the assessment on which your class in the Tripos will be based. The advice that follows relates particularly to dissertations on scientific subjects; if you are doing a dissertation in a discipline which is not, in the narrow sense, scientific, you should listen particularly carefully to the advice of your supervisor and model your work on well-written reviews in the field in which you are working. Nevertheless, much of the advice that follows is applicable to all writing - scientific or otherwise.

- **Define your topic:** The dissertation must not exceed 6000 words. It is an extended account of a topic or question that lies broadly within the field of one of the courses you are taking. Before you begin, you should spend time defining your topic, discussing this with your supervisor, other members of staff and your colleagues. If you can define your objectives clearly, you will find that the rest of the process is much easier.

- **Focus on the essential question:** Beware of trying to do too much. You will find that you will need to refine your initial topic to make your dissertation manageable. Remember that, if you try to cover too wide a canvas you will not be able to do your topic justice in the space you are allowed. For example, "The role of genes in cancer" would be too wide but, "Is the xxx gene implicated in cancer of the lung?", would be manageable. Focusing on the essential question is a critical first step; be prepared to spend time on this and interact with your supervisor during this process.

- **Writing Style:** The dissertation is a scholarly piece of work. That means that you should write it in the style of a scientific document. The exact form depends on what you do, but your dissertation should be divided into sections, reflecting the nature of the evidence that you are reviewing and the arguments should be backed by references, where appropriate. The overall objective is a critical assessment of a restricted topic. This means that part of your dissertation will be devoted to presenting the evidence or data which forms the topic (hence the need for references), and part will be your own assessment of what you have read or otherwise found out. You should make sure that a reader can distinguish which is which.

- **Sources:** The sources of your material can be various. Reading the relevant literature is essential and, at the end of your text, you must provide a list of the references you have quoted. If you quote a reference, it will be assumed you have read it. If you have not, you

should refer to the source in which it was cited. Your supervisor will help you with the literature and also point you in the direction of other people who have knowledge in the area you have chosen. The task of locating the relevant literature is made much easier these days by the use of computerised literature searches; if there is a particular key paper in your field of interest, a computer (using Web of Science, for example) can tell you all the more recent scientific papers that have cited it - a particularly useful method for tracking the development of a subject following a key contribution. Resist the temptation to include every paper you have seen or can think of. Most dissertations contain about 20 to 40 references. Do not exceed the latter figure without very careful thought and consultation with your supervisor.

- **Hint toward future research:** It will often be a good idea to include a separate section setting out promising lines of future research. This could, in some cases, represent a substantial part of your dissertation, and you might approach the writing of this section as if you were preparing a research proposal for a grant-giving body. It is an opportunity for you to display real originality and creativity. You may even lay the foundations for your future research career!

- **Proofread multiple times:** Short sentences are better than long sentences! Try to be entertaining without being either facetious or colloquial. Remember that a good critic justifies his/her criticism by careful argument. A good critical assessment is a creative process. Do not be afraid of uncertainty. Prune the first version of your dissertation mercilessly.

- **Final product:** The final product should look like an extended, balanced, informative critique. You should have assessed the various categories of evidence and weighed them. You should point to gaps in the knowledge (see paragraph 7), or to flaws in the evidence. You should say why your topic is important. Beware of starting the work for your dissertation with your mind already made up.

15.5 Poster Presentation for BBS Major Students

Part II BBS major students in PDN join PDN project students to participate in poster presentations held in Lent term (*see section 13 of the handbook for more information*).

16. PLAGIARISM

16.1 Definition of Academic Misconduct

You must read the **University's Definition of Academic Misconduct,** reproduced below (from https://www.plagiarism.admin.cam.ac.uk/what-academic-misconduct/definition-academic-misconduct),together with all the information on plagiarism and Turnitin UK software provided on the following pages.

With effect from 1 October 2019, the University has outlined Rules of Behaviour for both current and former registered students (Statutes and Ordinances 2019, Chapter II, Section 19; p.191; https://www.admin.cam.ac.uk/univ/so/). All registered students and formerly registered students are responsible for following the Rules of Behaviour. **Not knowing or forgetting about the rules or their consequences is not a justification for not following them.** These Rules include a definition of academic misconduct, replicated below:

'Academic misconduct' is gaining or attempting to gain, or helping others to gain or attempt to gain, an unfair academic advantage in formal University assessment, or any activity likely to undermine the integrity essential to scholarship and research. It includes being in possession of unauthorised materials or electronic devices during an examination, including recording or communication devices or devices that can store data, even where the Registered Student is unaware that such materials or devices are unauthorised, has no intention of using them, or is unaware that they have them in their possession. Academic misconduct also includes:

- Plagiarism: using someone else's ideas, words, data, or other material produced by them without acknowledgement;
- Self-plagiarism: using the Registered Student's own ideas, words, data or other material produced by them and submitted for formal assessment at this University or another institution, or for publication elsewhere, without acknowledgement, unless expressly permitted by the assessment;
- Contract cheating: contracting a third party to provide work, which is then used or submitted as part of a formal assessment as though it is the Registered Student's own work;
- Collusion: working with others and using the ideas or words of this joint work without acknowledgment, as though it is the Registered Student's own work, or allowing others to use the ideas or words of joint work without acknowledgment;
- Impersonating someone or being impersonated in an examination or arranging for someone to impersonate someone else by sitting their examination;
- Fabrication, falsification or misrepresentation of data, results or other outputs or aspects of research, including documentation and participant consent, or presenting or recording such data, etc, as if they were real; or
- Failure to meet legal, ethical and professional obligations in carrying out research. This includes failure to follow agreed protocol if this failure results in unreasonable risk or harm to humans, other sentient beings or the environment, and facilitating of misconduct in research by collusion in, or concealment of, such actions by others. It includes any plan or conspiracy to attempt to do any of these things.

Breaches of academic misconduct will be taken forward under the Student Disciplinary Procedure. Full information on the Student Discipline Procedure is available from the Office of Student Conduct, Complaints, and Appeals (OSCCA):
https://www.studentcomplaints.admin.cam.ac.uk/student-discipline

16.2 Student's Responsibilities

From https://www.plagiarism.admin.cam.ac.uk/what-academic-misconduct/students-responsibilities:

1. **Read, and ensure that you understand**, the University-wide Definition of academic misconduct which defines misconduct, and the forms that it can take.
2. **Familiarise yourself with guidance** issued by your faculty or department which outlines the referencing techniques and other academic conventions that you will be expected to adhere to. This will be given to you in your handbook or other induction materials, but if you are in doubt ask your Director of Studies or Tutor.
3. **Ensure that you always follow these conventions**, and ask for clarification or support if you need it from your Director of Studies or Tutor. If in doubt about any aspect of academic integrity it is always best to seek clarification at an early stage.

On our Resources and support pages, you can find more information about the various referencing conventions in use at Cambridge and guidance on good academic practice and sources of support.

Remember the Golden Rule: THE EXAMINERS MUST BE LEFT IN NO DOUBT AS TO WHICH PARTS OF ANY SUBMISSION ARE YOUR OWN ORIGINAL WORK AND WHICH ARE NOT.

Part II PDN students are required to sign a statement to submit with their project dissertation to say they have read and understand the guidance in this Handbook on academic misconduct.

16.3 Plagiarism

Please read the University's guide on 'Good academic practice and avoiding plagiarism': https://libguides.cam.ac.uk/plagiarism

The following guidance is from the Faculty of Biology's Guidance on Plagiarism: https://www.biology.cam.ac.uk/exams/AllExams/plagiarism

As agreed by the General Board**: "Plagiarism is defined as submitting as one's own work, irrespective of intent to deceive, that which derives in part or in its entirety from the work of others without due acknowledgement; or, in the case of self-plagiarism, unless explicitly permitted by regulation, submitting one's own work that has already been submitted for assessment to satisfy the requirements of any other academic qualification, or submitted for publication without due acknowledgement. It is both poor scholarship and a breach of academic integrity."**

Examples of plagiarism include **copying** (using another person's language and/or ideas as if they are a candidate's own), by:

- quoting verbatim another person's work (or your own previously submitted work) without due acknowledgement of the source;
- paraphrasing another person's work (or your own previously submitted work) by changing some of the words, or the order of the words, without due acknowledgement of the source;
- using ideas taken from someone else without reference to the originator;
- cutting and pasting from the Internet to make a pastiche of online sources;

Plagiarism can occur in respect to all types of sources and media:

- text, illustrations, musical quotations, mathematical derivations, computer code, etc;
- material downloaded from websites or drawn from manuscripts or other media;
- published and unpublished material, including lecture handouts and your own or other students' work.

Failure to conform to the expected standards of scholarship (e.g. by not referencing sources) in examinations may affect the mark given to the candidate's work. In addition, suspected cases of the use of unfair means (of which plagiarism is one form) will be investigated and may be brought to one of the University's Courts. The Courts have wide powers to discipline those found guilty of using unfair means in an examination, including depriving such persons of membership of the University, and deprivation of a degree.

16.4 How to avoid plagiarism

The main points that apply to submitted work (e.g. dissertations, project reports) are:

- when presenting the views and work of others, include an indication of the source of the material, e.g. 'as Sharpe (1993) has shown...' and give the full details of the work quoted in your bibliography;

- if you quote text verbatim, place the sentence in inverted commas and give the appropriate reference and give the full details in your bibliography as above;
- if you wish to set out the work of another at length so that you can produce a counter-argument, set the quoted text apart from your own text (e.g. by indenting a paragraph) and identify it by using inverted commas and adding a reference as above. NB long quotations may infringe copyright, which exists for the life of the author plus 70 years.
- if you are copying text, keep a note of the author and the reference as you go along, with the copied text, so that you will not mistakenly think the material to be your own work when you come back to it in a few weeks' time;
- if you reproduce an illustration or include someone else's data in a graph include the reference to the original work in the legend, e.g. (figure from Webb, 1976);
- if you wish to **collaborate** with another person on your project, you should check with the Course Organiser to see whether this might be allowed and then seek their permission;
- if you have been **authorised to work together** with another candidate or other researchers, you must acknowledge their contribution fully in your dissertation. Make very clear what your contributions were and what their contributions were;
- be especially careful if **cutting and pasting** work from electronic media; do not fail to attribute the work to its source. Do not copy and paste in the exam from one essay to another: this is self-plagiarism.
- don't memorise substantial blocks of text in lieu of essay answers;

The Golden Rule

The examiners must be in no doubt as to which parts of your work are your own original work (and not previously submitted) and which are not.

You can avoid plagiarism by **NEVER COPYING AND PASTING TEXT** (unless you want to give a direct quotation, in which case the copied text must be in quotation marks AND the source given).

Instead, **make the point in your own words - <u>including when you are making revision notes</u> - AND give the source** of your information.

Think how you might explain the point you're making to someone else verbally and write this down as your starting point. Making the point in your own words (including for your revision notes) also shows that you understand it.

16.4 Turnitin UK Text-Matching Software

All assessed written work will be submitted to Turnitin UK. The information below is slightly modified from the following University's information for students: https://www.plagiarism.admin.cam.ac.uk/investigating/turnitin/students

What Turnitin does

Turnitin compares the text of submitted work to sources in its database, which is made up of internet content, selected journals, and previous student submissions. The software then provides a Similarity Report, which identifies the extent of matched text by highlighting the matches and providing an overall percentage match. The matched text can often include a number of entirely innocent matches, such as entries in the bibliography or the essay title used by all students. Reports are scrutinised by an examiner, who will determine whether the matches indicate poor scholarly technique or an attempt to gain unfair advantage, and whether any further action should be taken.

Consent to submit

Participation in a course at Cambridge is deemed as acceptance of the University's right to apply specialist software (like Turnitin) to your work for the purposes of plagiarism education and detection; the University's Definition of Academic Misconduct includes this consent: https://www.plagiarism.admin.cam.ac.uk/what-academic-misconduct/definition-academic-misconduct

However, you do retain the right to remove your work from the Turnitin comparison database after it has been checked. We hope that you will choose to keep your work within the database, so as to maximise the effectiveness of the software and to protect your work from future attempts to plagiarise it. If you would like to make such a request, please contact your course administrator in the first instance.

Consequences of matched text

Under the University's Definition of Academic Misconduct (see above link), **plagiarism does not require intent to deceive** - in other words, it is still plagiarism even if you didn't deliberately intend to copy someone else's work**. It is your responsibility to understand and demonstrate good scholarly technique**. To help you understand what is expected of you, see the University's pages on Students' Responsibilities (excerpt copied in section 16.2): https://www.plagiarism.admin.cam.ac.uk/what-academic-misconduct/students-responsibilities and the University's 'Good academic practice and avoiding plagiarism' guide: https://www.plagiarism.admin.cam.ac.uk/resources-and-support/resources

If you are in any doubt, contact your Tutor or Director of Studies.

If matched text is identified, the Examiners will follow University procedures and undertake further investigation. You may be called for an interview or *viva voce* examination, and further disciplinary action may be taken. For more information see the Procedures and policy for investigating plagiarism and the Turnitin FAQ webpage: https://www.plagiarism.admin.cam.ac.uk/investigating/turnitin

17. FEEDBACK

We are always looking for ways to improve our courses: your help in this process is essential and incredibly valuable to us. At the end of each term, we use an online survey to collect feedback from you about how the course is going and on each individual module you have taken. After the exams, we will ask you for feedback on the course overall. Each feedback form is very simple and takes little time to complete, and your responses are anonymous.

While your feedback is valuable to us, please bear in mind that even when lectures have not gone very well for you, the lecturer has probably made a substantial effort to prepare it. Therefore, please try to keep all feedback constructive and positive as far as possible.

Once collated, data from the surveys is fed back to the Course and Module Organisers. Student Representatives sit on the Feedback Committee and attend termly meetings to discuss the survey findings, where they can also voice any concerns that may have been directly relayed to them in advance of the meeting.

If you would like to be a Student Representative, contact the part II administrator.

18. Dates for Your Diary

Faculty BBS Welcome Event (BBS students only)	Thursday 9th October 2025 4-6pm
PDN Orientation Day (compulsory for Project & BBS Major students)	Wednesday 8th October 2025
Project students arrange to meet with their Project Supervisor	Week 1, M
Project students arrange to meet with their Departmental Advisor	From week 1, M
BBS students submit their Dissertation Title and supervisor details to PDN form for PDN approval	12pm Thursday 23rd October 2025
Mid-term meeting with Departmental Advisor for Project students	Week 5, M
BBS students arrange to meet with their Dissertation Supervisor and Departmental Advisor	From week 6, M
End of term meeting with Project Supervisor, arranged by student	Week 7, M
Poster Day briefing workshop (**compulsory for all PDN and PDN-BBS major students**) Interactive and will not be recorded.	Wednesday 26th November 2025
End of Full term	***Friday 5th December 2025***
Students arrange to meet with Departmental Advisor	Week 1, L
Poster Presentation Sessions	23rd February & 09th March 2026
Project students submit Provisional Dissertation Title	12pm Friday 13th March 2026
Mid-term meeting with Departmental Advisor	Week 5, L
End of term meeting with Project Supervisor, arranged by student	Week 8, L
BBS students last opportunity for Dissertation Title Change	Friday 20th March 2026
End of Full term	***Friday 20th March 2026***
Project students submit Project Dissertation (Electronic)	5pm Tuesday 28th April 2026
BBS students submit BBS Dissertation (Electronic)	12.30pm Friday 1st May 2026
Vivas (Not all students will be called for viva, but keep the week free!)	11th -15th May 2026
Exams window Easter Term 2026	**TBA** - *usually* late May to mid-June
End of Full term	***Friday 19th June 2026***

19. Research Seminars in Cambridge

There are many research talks in the local and wider Cambridge community. Within the Department there are the Foster Club Talks (Thursday afternoons) and the Adrian Seminars in Neuroscience (Monday afternoons). A number of talks by guest speakers are likely to be given during the year. There are also seminars run by the Loke Centre for Trophoblast Research, and other University departments on themes such as Developmental Biology, Neuroscience and Psychology.

You should keep an eye on notice boards and screens around the Department. Most seminars are advertised on Departmental web pages and may also be available on Camtalks. Links to online talks and seminars may be emailed to you by the Part II administrator and there is a dedicated section in the General Information button of the Common Courses Moodle page. **You must not share or forward links or content emailed to you to anyone else.**

Although these talks may not be directly related to your modules they have several important roles. They will help you understand what lecturers and researchers do when they are not teaching. You may come across new ideas and experimental approaches that turn out to be more relevant to your course work and projects than your realised. You will see how science is presented amongst scientists, and how to ask questions. Therefore, we strongly encourage you to attend seminars.