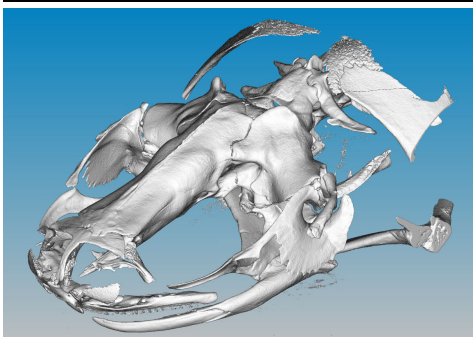
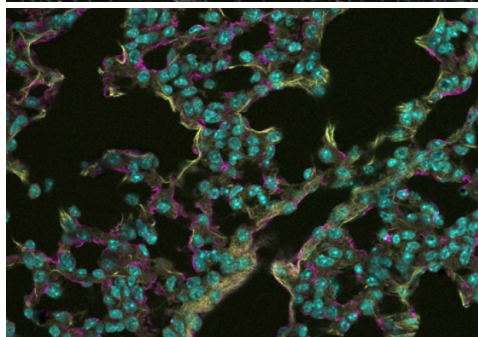
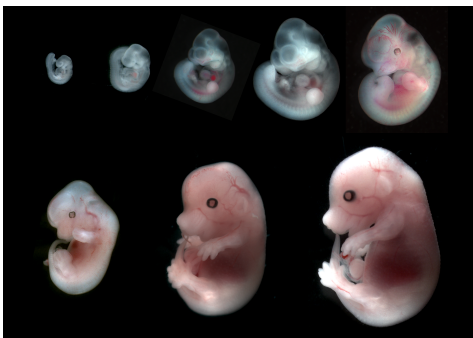
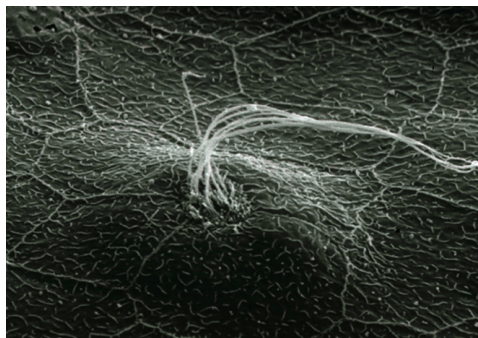




pdn part II

Department of Physiology,
Development and Neuroscience

2023-24



UNIVERSITY OF
CAMBRIDGE

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1. INTRODUCTION TO THE COURSE

Welcome to Part II Physiology, Development and Neuroscience. The PDN course offers modules that fall into three themes that reflect the research interests in the department. It offers the opportunity to focus within one theme or to engage your interests across two or three. As part of the course, you will be carrying out a two-term research project that is either lab-based or library-based. 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 overall aim is to provide a broad multidisciplinary course in Physiology, Development & Neuroscience that also allows you to specialise within specific themes. We also teach you a variety of scientific skills that will equip you for future careers in a wide range of areas. We hope to meet these aims by offering a modular course of lectures, workshops, seminars, informal discussions and research projects, and by training you 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

Amanda Sferruzzi-Perri, Hannah Clarke (Sabbatical) Clare Buckley (Course Organisers)

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

2. WHO'S WHO

Amanda Sferruzzi-Perri (ans48@cam.ac.uk) and Clare Buckley (ceb85@cam.ac.uk) are the overall Part II Course Organisers, and oversee the BBS course. 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 (it@pdn.cam.ac.uk).

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

Katie Conran (kc662@cam.ac.uk) is the Principal Assistant for PDN in charge of keys and security and, with the Departmental Safety Officer Karen Whitehead (safety@pdn.cam.ac.uk), is responsible for Health and Safety in the two buildings.

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 students for future careers in a wide range of areas: health sciences, medicine and veterinary medicine, research in the 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 fifteen. The modules are divided into three themes: Development & 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.

All PDN Project students registering for the Neuroscience theme (i.e., taking four N modules from N1, N3, N4, N6 and N9) must attend four neuroscience workshops in addition to their four modules,

You are given free choice as to 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) but be aware of your workload and that some modules have restricted numbers (see module descriptions in section 9).

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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 P7 and some 'shared' module slots where the teaching is also facilitated by other departments. Many modules also offer two-hour 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 for discussion. The examinations will consist of one paper per module.

Projects

All PDN project students do either an experimental research project or a literature-based project, under the supervision of an appropriate member of staff. Laboratory based Research Projects are limited in number and allocation cannot be guaranteed to all students who wish to do these. The findings are written-up in the form of an 8,500-word dissertation (project report). You will have the opportunity to present your progress 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) Communicable diseases

Respiratory infections such as coronaviruses and flu spread easily. The University encourages a cautious approach to help maintain a healthy place of work and study. If you have cold or flu symptoms and are feeling unwell or have a temperature, then stay at home until you feel better.

Further information can be found on the Cambridge University Stay Safe pages <https://www.cam.ac.uk/coronavirus/stay-safe-cambridge-uni>

b) Security and access to PDN buildings

At the beginning of term your current University ID card will be programmed to allow access to the Part II areas of the Physiology building and the main Anatomy building via swipe card.

Normal working hours are 8.45am-5pm weekdays (4pm on Fridays) for both the Physiology and the Anatomy buildings. You should have your University ID card on you at all times.

When entering and leaving the department buildings using your ID card, do not allow anyone in that you do not know, however persuasive they may be. Likewise, please do not allow anyone you do not know to gain access to the Part II rooms or facilities. For anyone attempting to enter without a swipe card, ask that they call their department contact to meet them outside. If you have problems then contact security.

Remember to shut all windows and lock all doors, switch off lights and computers if you are the last to leave an area. Thefts and break-ins do occur within the department.

If you are in any doubt about your safety or security, please contact the University site security on (01223) 331818 or (01223) 767444. There is an emergency phone in the reception area of both the Physiology and the Anatomy buildings. We cannot over-stress the importance of these practices for the safety and wellbeing of everyone.

Please do not bring friends or family into the department.

c) Good working practice

- All students must complete the required training as discussed and signed off by your supervisor, before beginning any research work. A copy will be kept by your supervisor and updated throughout your time in PDN as necessary.

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- All research work must be risk assessed prior to commencing and include Control of Substances Hazardous to Health (COSHH), emergency procedures and a Personal Protective Equipment (PPE) assessment.
- Appropriate PPE must be worn at all times. PPE may be the difference between a small incident and a life-changing event. PPE: lab coats, eye protection, gloves and masks can be obtained from BioPath stores so please ask your supervisor about this. Lab coats are laundered regularly.
- Part II students are **not allowed** to work in a laboratory by themselves outside of normal working hours unless there is a member of laboratory staff present. Laboratory work must be restricted to non-hazardous tasks after 5pm Monday-Thursday, after 4pm Friday and at all times at the weekend. Any work outside normal working hours must be risk assessed and a Working Out of Hours Risk Assessment submitted to the Department Safety Officer (DSO). This must first be discussed and signed off by your supervisor.
- If you are doing office work out of hours, you will still need to fill in a Working Out of Hours Risk Assessment. Ensure to lock the office door if you are away from the office for more than a couple of minutes, keep in contact with other colleagues in the building and let them know when you leave.
- Essential departmental safety information including the Safety Manual can be found here <http://www.pdn.cam.ac.uk/intranet/new-starters/safety>. Please ensure you read the relevant sections.
- Projects: If you are carrying out a lab-based project, your supervisor will ensure that you are aware of the health and safety regulations and safe laboratory practices. If in doubt, always ask.
- **To be granted swipe card access to the laboratory area you will be working in you must first complete a lab induction. This should be arranged through your supervisor.**
- Food and drink must only be consumed in designated areas.
- If you need to work primarily from home, it is important to maintain regular contact with your supervisor. Discuss how often you will communicate and what method you will use.

Guidance to help you set up your home workstation can be found here <https://www.safety.admin.cam.ac.uk/system/files/hsd203p.pdf>.

d) General Data Protection Regulation (GDPR) and you

- Lectures: you can [view the full updated policy on recordings of Teaching Materials and Lectures here](#). Interactive sessions in PDN will not be recorded. Where you choose to speak in a recorded lecture (i.e., where it is not a requirement to do so), your consent to being recorded is assumed by

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your choice to do so. You may request that your interaction be removed from a recording by emailing the lecturer and part2@pdn.cam.ac.uk.

- Photography is not permitted in the department unless it specifically relates to your project and has been approved by your supervisor.
- Computers: only use computers for legitimate scientific purposes. Internet use is monitored centrally and any accessing of inappropriate web addresses is brought to the attention of the Department. You should note that students have been disciplined severely in the past for abuse of computer access through the University network.

e) Wellbeing

Your wellbeing is of the utmost importance to the department and the University. If you need support or advice, the department webpage has information about people in the department you can speak to and links to the University counselling service and other resources:

<https://www.pdn.cam.ac.uk/intranet/human-resources/wellbeing/wellbeing>.

If you need any health and safety advice please contact the Departmental Safety Officers (DSO), Karen Whitehead and Katie Conran at safety@pdn.cam.ac.uk.

f) Key contact numbers

First Aid: If you require a first aider please call reception in the first instance who will contact a first aider on your behalf:

- Physiology reception (01223) 333899
- Anatomy reception (01223) 333750 (linked to Physiology reception)

There is a list of first aiders and contact numbers attached to both Anatomy and Physiology reception for direct contact. If you need help ask someone in the vicinity to make contact for you.

Site Security: Routine calls (01223) 331818
Emergency calls 101 (network phone) or (01223) 767444

Emergency Services: 1999 (network phone)

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, or Shutdown if after 6.00 p.m. Computers should be switched off when you leave after 6.00 p.m. on weekdays, or at any time during weekends and public holidays before you leave the department.

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

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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 5TB 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 20GB 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, e.g.:

Visiopharm (CAST) - controls the microscope, scanning, laser module, tools and the image acquisition and processing.

Prism GraphPad - a powerful combination of biostatistics, curve fitting (nonlinear regression) and scientific graphing. The Department or your project supervisors will distribute licences, on request, later in Michaelmas term, so that you can install and run the software from your personal computers until July.

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Remote Desktop (RDP) - is a program or an operating system feature that allows a user to connect to a computer in another location (e.g.: a lab computer), see that computer's desktop and interact with it as if it were local. You cannot normally remote access the practical PCs unless you use Cambridge VPN service. Please make sure your computer is on VPN when you start a remote session. You can verify this by visit <https://myip.uis.cam.ac.uk> to confirm your computer IPv4 address is one used by the VPN service provided by University Information Services.

If you need access to any of the software please email Sophie, who will coordinate with the IT teams to enable access from your own laptops for the duration of the project.

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

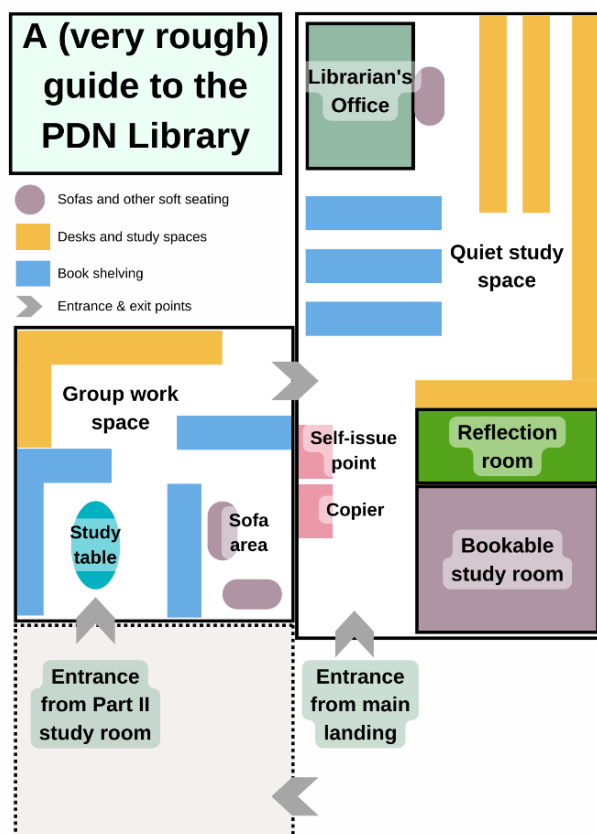
You can print, copy and scan documents using the University's DS-Print enabled multi-function devices (MFDs) in many Colleges and Departments. DS-print is installed in the PDN library, you can find the details via <https://www.ds.cam.ac.uk/dsprint/site/PDN>

6. THE LIBRARY

The PDN Library

Your Librarian is George Cronin who is also the Library Manager for Biological Sciences. They know a lot about Cambridge, research, and study skills so they will be able to help you with anything you might need in your Part II studies.

George will also be offering training sessions throughout the academic year on topics such as effective literature searching, referencing skills, and critically evaluating research to check if it is worth using in your work. You can find more information about our training opportunities on our [dedicated Natural Sciences LibGuide](#) or you can email George to set up a 1-2-1 supervision to talk about your work.



We've put together a very rough guide to our spaces so you can pick where you want to study. We're always open to suggestions for the Library and how to make it a great place for you to work, so if you have any feedback you can always let us know by emailing us at pdn@lib.cam.ac.uk.

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 borrow up to ten books with our self-issue machine and you will get most things for a week with automatic renewals (and no fines!). You can find physical and online resources from across the whole University by using our [search and discovery system iDiscover](#). You can also check your loans from across most Cambridge libraries by logging into your account.

We have other services that you might expect such as photocopying, scanning and printing facilities in the main Library space. The PDN Library is on [the University's DS-Print system](#) so you can use your Common Balance any time.

Finding academic literature for your dissertation and project

We have [an online course](#) as well as [live teaching sessions](#) covering how to find academic literature as well as other related skills. If you want to get started quickly, a great first step is to see what [you can find with iDiscover](#). Librarian Tip: remember to log in to iDiscover to get as many results as possible!

iDiscover will show you online articles and books, but also things in libraries across Cambridge so if you happen to be in your college, or the PDN Library, you can filter by library location to get results for stuff that is in the same place as you...which is quite helpful!

If you want to do some really in-depth searching across a topic, you can access a range of specialist scientific databases which have lots of information about the latest scientific literature. You can find a full list of what the University subscribes to [through our A-Z Database guide](#). Another Librarian Tip: try filtering by subject to find stuff in your area of interest.

You can often access full PDF versions of papers through these databases, but if you find something does not work, let us know as we will be able to see if we can get a copy for you from another library. The same applies if a lecturer has recommended something to read that you cannot find...just ask!

One final Librarian Tip: [consider installing LeanLibrary](#). This is a browser plugin so if you hit a paywall when trying to access an article, LeanLibrary will look for alternative versions for you, even ones that are free and completely legal to access, saving you lots of time having to hunt around yourself.

Past dissertations

The Biological Sciences Libraries Team manage a digital collection of 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, as well as information on how to request access, can be [found on the Biological Sciences Libraries website](#). For any other dissertations, you can ask the PDN Part II Administrator at part2@pdn.cam.ac.uk.

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 organised College 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. These sessions provide you with the 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, handouts, 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 prepared or 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

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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. **This year all lectures should be delivered in-person and we encourage you to 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. We ask lecturers to upload a link to the recording of their lecture onto the Moodle page for the module within 48 hours of the end of the lecture. If you find that a recording is missing, please email the 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. That is the time to sort out your priorities. You are going to have to decide how many topics you can realistically study in the detail that you would wish. 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 and is consistent with the structure of the examination. It is 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, 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

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to the timetable, but please also keep an eye on the Departmental timetable provided as it is updated regularly.

Supervisions and Departmental Advisors

Supervision, in the regular pattern that you received in Part I, is inappropriate for Part II because the material covered is much more specialised and no single supervisor can possibly cover the ground. The Part II course offers you a much less directed approach to learning than you have had in your first two years, and you are encouraged to take personal responsibility for the organisation of your work including the arrangement of supervisions and essay feedback with lecturers (see below for more information). There are all sorts of ways of getting advice and help, depending on what your need is.

Every student will be appointed a Departmental Advisor. You should meet with your Departmental Advisor at the beginning and around the middle of each term, to discuss any concerns you may have and your progress with your project and course material. **It is your responsibility to arrange these meetings.** If you are having difficulty arranging to have essays marked, your Departmental Advisor may be willing to mark a sample essay for you or help you to find somebody who can, to help you practice writing at Part II level.

Every student will also have a project or dissertation supervisor with whom you will meet and whose advice you will probably find more widely useful beyond the actual project or dissertation.

Many of the Modules will have journal club or seminar style sessions, which are much more informal and offer the chance to discuss topics in further depth or to clarify any difficulties.

For more specific questions relating to the Modules, you should be assertive in asking lecturers questions at the end of the lecture if anything was unclear, or if you would like to follow up a particular point.

Finally, you may wish to arrange a small group supervision-style session, and members of the Department will always try to help in this way if they can. See whether any other students also wish to discuss similar topics with the lecturer concerned and then approach the lecturer, explaining which specific topics you wish to discuss. Some lecturers will suggest that you write an essay on this topic, others may prefer to use an essay as the basis for a supervision, while others may prefer to simply discuss any questions you may have, expecting you to set the agenda of what you wish to cover. If a lecturer is unable to supervise, they may be able to suggest a colleague who can. Other lecturers may arrange dedicated supervision slots or question and answer sessions which may require a sign-up and can help you to address any queries.

The overall message is that you are regarded as responsible adults and should, by now, have a fairly clear idea of what you want to get out of the University and feel comfortable about who you can ask for help and advice when you need it.

9. THE MODULES

A summary of each Module is provided below. Timetables and course material will be placed on Moodle. The themes to which individual 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, P4 is run jointly with Part II Genetics and Part II Zoology, and P5 is run by Part II BBS Bioinformatics at the Department of Genetics. Not all combinations are possible due to clashes in the timetable.

In addition, and new for AY2023-24, we are able to offer some of our Project and PDN-BBS (major 415) students the opportunity to select **up to** two of their four module choices in a selection of shared neuroscience modules (indicated by S-N). These modules are offered by two other departments: Psychology and Zoology. *Spaces are very limited, and we expect demand to be high. If oversubscribed, places will be allocated at random. Shared modules will be taken *in place* of a PDN module, not in addition to.

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 cell fates in different regions. Once neurons have formed, they extend axons to their targets to 'wire up' the nervous system: we explore axon guidance and how axons make and refine the synapses that will generate functional neural circuits, and discuss how circuit designs lead to function. We consider mechanisms underlying the formation of neuronal subtypes in different regions of the mammalian brain and the evolution of the cerebral cortex. We also discuss models of human brain development (cerebral organoids) and regeneration in the brain. Finally, 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).

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.

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 of the role of different brain regions in behaviour. What we lack is insight into how the molecular and cellular properties interact to generate cognitive functions and behaviours. This is widely considered to be the major problem facing neuroscience, illustrated by the current billion Euro and billion Dollar projects that aim to address this question.

This module will consider this problem. It will begin by considering cellular interactions in neuronal circuits, before turning to consider how these circuits act in neural systems to generate cognitive functions and behaviours.

The module will focus on various aspects of conceptual and experimental approaches to circuit/system understanding. Lectures will start with an introduction to neural circuits/systems and their analysis. This will be followed by consideration of connectomic analyses of neural circuits underlying sensory and motor function in *Drosophila*. Lectures will then focus on neural circuits underlying reproductive functions in mammals and cerebellum circuits that influence motor learning and behaviour. Neural systems will then be considered, with lectures on visual system pathways and the role of the vestibular system in perception and spatial navigation. The module will finish with an introduction to artificial neural networks and their role in system and circuit understanding.

The module will include interactive discussions on general features of circuit/system functions and their analysis. This will include the relative merits of experimental approaches (e.g., imaging compared to electrophysiology, will the 'photon replace the electron'; the relative merits of experimental and computational analyses; and ultimately how can we link neuronal, circuit, and system function.

This module complements any of the neuroscience modules. P1 provides complementary cellular detail, and P8 [provides] a complementary systems perspective.

N4: Cellular and Molecular Neuroscience (N)

Module organiser: Prof Ole Paulsen (op210@cam.ac.uk)

This module **cannot** be taken with P1 Cellular Physiology (including BBS minor 141)

While many approaches can be used to study the structure and function of nervous systems, any deep mechanistic understanding must include an appreciation of the cellular properties of different types of neurons and glia, as well as their interactions and the molecules involved.

This module aims to give students an understanding of important principles in contemporary neuroscience at cellular and molecular levels. The lectures will cover voltage-dependent ion channels and their role in electrical signalling, ligand-gated ion channels and their role in synaptic transmission, intracellular signalling in

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neuromodulation and synaptic plasticity, sensory transduction mechanisms, and cellular techniques applied to circuit neuroscience.

This module aims to provide insights that will be useful in the other PDN neuroscience modules. N4 complements any of the other neuroscience Modules.

P1: Cellular Physiology (P)

Module organiser: Dr Christof Schwiening (cjs30@cam.ac.uk)

This module **cannot** be taken with:

- N4 Cellular and Molecular Neuroscience, (BBS minor 153)
- P4 Early Development & Patterning: Genetic and Cellular Mechanisms (shared with Genetics and Zoology module)
- PS3 Brain Mechanisms of Emotional Regulation and Motivation (shared neuroscience module).

Cells detect and respond to changes in their external environment through a cornucopia of signalling pathways. Many of the pathways involve complex biochemical reactions, but some are more amenable to study by the physiologist – in particular membrane potential, calcium and pH. Thus, in this module we look at cellular signalling from a Physiological viewpoint rather than 'stamp collecting' all of the signalling pathways. The three main signalling mechanisms we have selected here are used by both excitable and in-excitable cells to transmit information from the cell surface to effector systems. We start the module by looking at the basic ionic regulation mechanisms that allow signalling to exist including sodium and calcium regulation. We then move to looking at the ion channels that allow calcium into cells. This is followed by a series of lectures on intracellular calcium signalling.

This year we are including a lecture on endoplasmic reticulum interactions with the mitochondria which can sculpt calcium signals. The calcium signals also result in pH microdomains, which are also potential intracellular 'second' messengers. We then focus on the membrane and consider how ligands can result in potential changes and how these potential changes can be modified by signalling pathways. We end the series of lectures by bringing together membrane potential changes and calcium signalling with lectures on skeletal muscle and meta plasticity.

The module contains a series of workshop/seminars on mathematical modelling, molecular techniques, fluorescence measurements and microelectrode techniques.

P3: Fetal and Placental Physiology (D, P)

Module organiser: Dr Alison Forhead (ajf1005@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

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transition at birth. The scientific basis underlying the aetiology of miscarriage, preeclampsia and sudden infant death syndrome, 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, P7/P8 for a wider physiology or pathophysiology theme.

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

Module organiser: Dr Richard Adams (rja46@cam.ac.uk)

This course is run by the Dept of Genetics, and also shared with the Dept of Zoology.

This module **cannot** be taken with:

- P1 Cellular Physiology
- PS3 Brain Mechanisms of Emotional Regulation and Motivation (shared neuroscience module).

This newly updated course is the first of two complementary modules (with P6 in Lent term), which can also be taken on their own. The module works well in combination with all other PDN modules.

This module will cover how the early embryo develops from a fertilized egg to form the body plan. It will focus on our understanding of how gene regulatory and signalling interactions drive cell fate decision making within cells and combine this with our understand of how dynamic cell behaviours drive the shaping of tissues through 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. In doing so, you will also be introduced to a range of modern techniques applicable to the study of development including molecular, genetic and imaging technologies.

An emphasis across the module is in comparing the mechanisms across a broad range of experimental organisms and processes, in order to highlight the essential principles of developmental biology.

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P9: Cell Assembly and Interactions (D)

Module organiser: Prof Nick Brown (nb117@cam.ac.uk)

Shared with the Dept. of Zoology

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 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 study how cells become polarized and adhere together to form higher order multicellular assemblies, how membrane compartments are constructed, and the dynamics of transfer between them. We will discuss current ideas about how cells were created during evolution, and how eukaryotic cells arose from prokaryotes. We will explore how cells sense and respond to the mechanical properties of their surroundings and the key role of the cytoskeleton in determining cell shape, organisation and movement.

We switch focus to the nucleus and how the genome architecture determines gene expression and discuss how cells maintain protein homeostasis, and 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. If taken with N modules, please note that students **cannot** take part in optional PDN Neuroscience Workshops during Michaelmas Term due to timetable clashes.

Shared Neuroscience Modules in Michaelmas Term:

PS3: Brain Mechanisms of Emotional Regulation and Motivation (S-N)

Module Organiser: Prof Nicky Clayton (nsc22@cam.ac.uk)

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

This module **cannot** be taken with:

- P1 Cellular Physiology (including BBS minor 141)
- P4 Early Development and Patterning: Genetics and Cellular Mechanisms

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The PS3 module consists of the following three 8-lecture blocks:

- Motivation: Emotional and Cognitive Mechanisms of Preparatory and Consummatory Response
- Advances in Research on Stress and Stress-related Disorders
- Emotion Regulation and Aberrant Motivation

The module takes different approaches to the question of emotion and motivation: what is motivation, what is emotional regulation and what are the psychological and neural mechanisms associated with adaptive and maladaptive motivation? Therefore, this module will explore why we take some actions, avoid taking others; do what we are supposed to do and what is best for us and do things that are clearly harmful. Some behaviours are simply elicited by the environment and others might be thought to serve regulatory needs, but most are too complex to be explained in simple terms. The module provides you with a range of approaches in current psychology, from behavioural neuroscience to abnormal psychology and demonstrates potential applications to real world issues.

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.

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) spatial navigation, long term memory and cognitive map theory 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 navigation and long-term memory, a particular focus will be placed on the important role of the hippocampal formation. Evidence for the hippocampus as a cognitive map will be critically reviewed along with its role in encoding spatial and non-spatial representations. This section will finish by considering the crucial role of the hippocampus in Alzheimer's disease, which is the most common cause of dementia, causing the most profound deficits in long term memory.

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)

This module **cannot** be taken with P8 Systems and Clinical Physiology

A fascinating feature of the nervous system is neuronal plasticity: the ability for neurons and their connections to be modified in response to specific patterns of activity in 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 focus on both of these questions, and will 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, and the neuronal plasticity in sensory, motor and cognitive networks. Contemporary as well as traditional research methods for investigating neuronal plasticity and modulation will be considered, including opto- and chemogenetic approaches, imaging and electrophysiology. The first lecture will include an introduction to different forms of cellular and synaptic plasticity and modulation.

This Module works best when taken with any of the other neuroscience Modules.

P2: Development and Stem Cells (D, P)

Module organisers: Dr Erica Watson (edw23@cam.ac.uk) & Prof. Magda Zernicka-Goetz (mz205@cam.ac.uk)

The transformation of a fertilised egg into a human embryo encompasses a series of fundamental cellular events. During this process the initial totipotent egg generates stem cells that, progressively become restricted to different fates. The first differentiation event is a separation between extra-embryonic trophectoderm and the pluripotent inner cell mass, and the second, within the inner cell mass, between the embryonic epiblast and the extra-embryonic primitive endoderm. In this module we will explore how these cell fate decisions are taken and what stem cell niches, transcriptional networks, and epigenetic modifications reinforce them. We will explore how we can build embryo ourselves using stem cells growing in vitro. We will also consider subsequent formation and functions of the extra-embryonic lineages, and how interactions between the trophectoderm and the maternal tissues and metabolism lead to implantation and establishment of a successful pregnancy.

The module will start by examining the development of cell polarisation and the effects of subsequent symmetrical and asymmetrical cell division and cell position in creating unique cell populations in the mouse and human embryos. The subsequent differentiation of the inner cell mass, the concept of embryonic stem cells and their therapeutic potential in

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regenerative medicine will then be explored, with comparisons being made between the mouse and human. We will then investigate how the extra-embryonic lineages interact with the maternal tissues to establish a human pregnancy. This will include consideration of endometrial receptivity, implantation, decidualisation and the factors that regulate trophoblast development, including interactions with the maternal immune system, metabolism, and microbiome. Correlates will be drawn between normal pregnancies and the common complications, including miscarriage and preeclampsia, in which extra-embryonic tissue formation and function is impaired.

The technologies that researchers use in the lab to study mammalian development will be touched upon including: stem cell derivation, synthetic embryos, organoids, epigenome analysis, and animal models. The module will involve a mix of lectures 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).

P5: Bioinformatics (P)

Module organiser: Dr Alexia Cardona (ac812@cam.ac.uk)

This course is run by the Department of Genetics (maximum of 46 students)

This module **cannot** be taken with ZL3 Evolution and Behaviour: Populations and Societies.

Bioinformatics is an interdisciplinary field that uses computational ways to process biological data. With the biological and biomedical sciences becoming more data-driven than ever before, bioinformatics is central to these areas. This course introduces the fundamental bioinformatic concepts and methodologies used to analyse biological data. It is structured around 2 main blocks: data science, omics and approaches to analysis of biological data.

In the **Data Science for Bioinformatics** block we will introduce statistics and machine learning topics that are popular in the bioinformatics field. These topics are fundamental to the analysis of data which are currently in high-demand due to the data-driven approach of answering research questions, driven by the increasing amount of data becoming available. Knowledge gained from this set of lectures and practicals can be applied and transferred to different research domains.

The **Bioinformatics Approaches to Omics and Analysis of Biological Data** block introduces bioinformatics workflows used to process omics datasets with hands-on practice on genomic data. This follows with genome-wide association studies (GWASs), a popular approach in population studies which allows the identification of associations between single-nucleotide polymorphism (SNPs) loci and traits. We will then introduce gene set enrichment analysis to link results obtained from the previous analyses back to biology and identify classes of genes or proteins that are over-represented in our results which may have an association with disease phenotypes. It will also introduce basic

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concepts of biological networks and their analysis with hands-on practice using Cytoscape, a widely used platform for Network Analysis.

The course is specially designed for students coming from the biological and biomedical sciences. It provides data foundation sessions that go over programming, data visualisation and manipulation that will be used throughout the course. Topics throughout the course are introduced through a set of lectures that introduce theoretical concepts, and practicals which provide hands-on practice using real biological datasets.

More information can be found at <https://bioinfotraining.bio.cam.ac.uk/undergraduate>

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.

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 muscles will be used to discuss the transcriptional programmes that drive differentiation, and to highlight different strategies used to generate the pattern of muscles in the body; the importance of stem cells in the formation and maintenance of organs will be discussed using a variety of examples, including oesophagus and intestine; the formation of the vertebral column illuminates mechanisms of cell allocation and morphogenesis, including the role of mechanics; and limb development illustrates how patterning mechanisms are coordinated with cell proliferation.

A mixture of examples from simpler invertebrate models and vertebrates will show how developmental mechanisms have diversified with increasing cell number. We will discuss human diseases that impact on the development of these organs, and how our understanding of organogenesis provides the foundation for regenerative medicine approaches to the treatment of these diseases.

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 Randall Johnson (rsj33@cam.ac.uk) and Prof Hugh Robinson (hpcr@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 and journal club discussions of selected relevant articles.

This 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)

This module **cannot** be taken with N9 Modulation, Plasticity and Behaviour.

Systems physiology is central to the practice of scientific medicine. This module gives students a more detailed view of some aspects of systems physiology and includes some clinically oriented material that is of particular importance to the practising doctor. Cardiovascular topics include cardiac arrhythmias and the genetics and energetics of heart failure. Renal physiology covers autoregulation of renal blood flow and glomerular filtration rate, acute kidney injury 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 pathophysiology of obesity and the physiology and pathophysiology of bone.

The lecturers giving this course are from the Department of Medicine 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. There is a small amount of overlap with some of the material covered in other P modules, including P1, P3 and P7, but it is not necessary to take any of these modules in order to understand the material in P8.

Shared Neuroscience Modules in Lent Term:

PS2: Memory (S-N)

Module Organiser: Prof Nicky Clayton (nsc22@cam.ac.uk)

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

This module **cannot** be taken with P7 Pathophysiology of Cancer.

PS2 consists of the following three 8-lecture blocks:

- Computational Approaches to Cognition
- Synaptic Plasticity, Engrams and Memory
- Human Memory

This module will consider evidence relating to a number of theoretical distinctions that have been proposed within human memory, covering short-term or “working” memory, and long-term episodic and semantic memory. In each case, evidence from a variety of sources will be discussed, including cognitive experiments involving 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?

Understanding how information is encoded and retrieved is major research area in behavioural and cognitive neuroscience. Why does one person remember different information to another about a particular event? Why do memories come to mind suddenly and seemingly unbidden? What makes a “good” memory? In this module memory is considered at several different levels of analysis. The module considers memory from the anatomical level to the network, cellular and molecular levels. Topics include: amnesia in humans and animals; theories of hippocampal function; computational models of memory; emotional memory and the amygdala; cellular-level consolidation and reconsolidation.

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 capacity to PDN and Psychology students)*

This module **cannot** be taken with P5 Bioinformatics (including BBS minor 128).

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

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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.

If taken with PDN-based N modules, please note that students **cannot** take part in optional PDN Neuroscience Workshops during Michaelmas Term due to timetable clashes.

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: https://www.biology.cam.ac.uk/files/sara_booklet_2023-24_updated_02.02.23.pdf

10. THE NEUROSCIENCE WORKSHOPS

Workshops Organiser: Prof Angela Roberts (acr4@cam.ac.uk)

Experimental Approaches in Brain Research. These workshops have restricted numbers. All students registering for the Neuroscience theme in Part II PDN must attend four of these workshops in addition to four modules chosen from N1, N3, N4, N6 and N9. Any spaces left may be filled by students not registered for the Neuroscience theme.

Each workshop will be composed of a one-hour teaching session in which the advantages and limitations of different research techniques available to the neuroscientist will be discussed in the context of specific neurobiological research topics (e.g. neuronal fate, information processing in neuronal networks, how the brain makes decisions).

Students will then be given the opportunity to work in groups to follow up particular questions arising from that teaching session and to present a summary and lead a discussion of the issues in student-led presentation sessions a week later. The questions may involve designing experiments (useful for answering such questions in the exam), critically reviewing a paper or comparing and contrasting research methods or results.

These workshops are structured in such a way as to develop not only your intellectual abilities, but also your skills in communicating ideas effectively to others, both orally and in writing, and in working with others collaboratively. Thus, you will develop skills that are of value not only in biomedical research but in many other careers as well.

List of neuroscience workshops offered in 2023/24

Michaelmas Term

Understanding neuronal networks: current progress and future promises

Dr David Parker

Neuronal networks assemble the cellular components needed to process sensory inputs, perform cognitive functions, and pattern motor outputs. However, despite their central role in the nervous system, our understanding of neuronal networks is limited at best. This workshop will examine the conceptual and experimental approaches to examining the organisation and function of local neuronal circuits, highlighting the claims of new experimental and analytical techniques and the questions that are likely to remain.

Experimental approaches to axon guidance

Dr Geoff Cook

Experimental techniques used to characterize the mechanisms of axon guidance will be discussed and examples given of their application to specific biological systems. Those taking this workshop will be encouraged to consider the advantages and limitations of each of the experimental approaches.

Shedding light on brain function: Optogenetics and beyond

Prof Ole Paulsen

This workshop will explore new optogenetic approaches to the study of neurons and their circuit functions. We will describe the basic principles of cell-type-specific expression of light-activated channels, and how they can be used to activate or silence neurons. We will discuss the opportunities offered by this new technology, and also some possible problems and caveats.

Lent Term

Unravelling Neural Circuits of Behaviour: Technical Insights and Approaches

Dr Sepiedeh Keshavarzi

This workshop will cover contemporary methodologies for investigating the neural underpinnings of animal behaviour. The main goal is to highlight how modern neuroscience establishes a link between the components of neural circuits – their activities, connections, and interactions – and behaviour, thereby illuminating the pathways to sensations, cognition, and actions. We will delve into studies differentiating between learned and innate behaviours, as well as the contrast between restrained and freely moving animals, with a predominant focus on the mouse model. Additionally, we will explore emerging technologies for recording (large-scale electrophysiology and calcium imaging) and manipulation (optogenetics and chemogenetics) of neuronal activity, along with the integration of these neurophysiological data with behavioural observations.

Studying behaviour in translational neuroscience: the dos and do nots.

Dr Christian Wood & Dr Kevin Mulvihill

This workshop will consider a range of psychological tests that are available to the Behavioural Neuroscientist for studying the brain mechanisms that underlie cognition and emotion in animals. An intrinsic problem with all psychological tests is that they never just measure the one particular psychological process that you are interested in. So, how do you gain the specificity that you are looking for? Moreover, how relevant are the results in animals to our understanding of the brain mechanisms underlying human behaviour? This workshop will consider issues of specificity, sensitivity and translatability, focussing on anxiety, depression, cognitive flexibility and long term memory.

Discovering endophenotypes: the connection between genes and neuropsychiatric syndromes

Prof Jeff Dalley

This workshop will review the concept of endophenotypes in experimental Psychiatry. The notion that genes and environment combine to confer susceptibility to the development of complex, polygenic brain disorders such as schizophrenia, attention-deficit hyperactivity disorder (ADHD) and drug

addiction was first proposed by Gottesman and Shields in 1973. We will explore the utility of measuring intermediate phenotypes (e.g., based on neurophysiological, biochemical, endocrinological, neuroanatomical and cognitive components) to the discovery of gene influences in brain syndromes and discuss how this approach can aid disease diagnosis and the development of animal models.

Cutting edge tools for studying the hippocampal cognitive map

Dr Julija Krupic

This workshop will present how development of new tools such as optical imaging combined with navigation in virtual reality, specific viral targeting of individual brain regions or cell types, high density electrophysiological recordings and other techniques allows asking the most 'bold' questions in spatial cognition. As a case study we will identify 'an important research question', design an experiment and 'build' state-of-the-art experimental setups to solve it.

Date	Start	End	Type	Neuroscience Workshop Title	Lecturer
MICHAELMAS TERM					
19-Oct-23	15:00	16:00	Lecture	Understanding neuronal networks: current progress and future promises	David Parker
25-Oct-23	15:00	17:00	Presentation	Understanding neuronal networks: current progress and future promises	David Parker
02-Nov-23	15:00	16:00	Lecture	Experimental approaches to axon guidance	Geoff Cook
08-Nov-23	15:00	17:00	Presentation	Experimental approaches to axon guidance	Geoff Cook
16-Nov-23	15:00	16:00	Lecture	Shedding light on brain function: Optogenetics and beyond	Ole Paulsen
22-Nov-23	15:00	17:00	Presentation	Shedding light on brain function: Optogenetics and beyond	Ole Paulsen
LENT TERM					
16-Jan-24	15:00	16:00	Lecture	Neural circuit mechanisms of behaviour	Sepiedeh Keshavarzi
24-Jan-24	15:00	17:00	Presentation	Neural circuit mechanisms of behaviour	Sepiedeh Keshavarzi
30-Jan-24	15:00	16:00	Lecture	Studying behaviour in translational neuroscience: the do's and don'ts	Christian Wood & Kevin Mulvihill
07-Feb-24	15:00	17:00	Presentation	Studying behaviour in translational neuroscience: the do's and don'ts	Christian Wood & Kevin Mulvihill
13-Feb-24	15:00	16:00	Lecture	Discovering endophenotypes: the connection between genes and neuropsychiatric syndromes	Jeff Dalley
21-Feb-24	15:00	17:00	Presentation	Discovering endophenotypes: the connection between genes and neuropsychiatric syndromes	Jeff Dalley
27-Feb-24	15:00	16:00	Lecture	Cutting edge tools for studying the hippocampal cognitive map	Julija Krupic
06-Mar-24	15:00	17:00	Presentation	Cutting edge tools for studying the hippocampal cognitive map	Julija Krupic

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 dissertation guidelines issued by the Faculty Board:

<https://www.biology.cam.ac.uk/undergrads/nst/bbs/dissertations>

The common objective of experimental and library-based research projects is to give you experience of scientific research.

At the end of your project you will produce a dissertation (project report). This will be assessed on how well you present the project, not on the outcome of your research, according to its demonstration of: 1) your understanding of the scientific problem addressed in your research project; 2) how well you present any new findings you have made; 3) your critical consideration of the work of others and of your own new data and/or new ideas that arise or are predicted from your findings/ formulated grant proposal; 4) how well you set any new findings/models/hypotheses in the context of what is currently known in the scientific literature.

It is very important that early on in your research project you gain a clear understanding of what you are hoping to discover and how the approach you are taking may achieve this.

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

- 11.1: Guidance for experimental projects
- 11.2: Guidance for literature-based projects
- 11.3: Dissertation requirements and deadlines (PDN project students only)
- 11.4: Guide to writing your dissertation
- 11.5: Responsibilities of project supervisors
- 11.6: Project dissertation viva (PDN project students only)
- 11.7: Faculty of Biology guidelines for marking Part II dissertations

11.1 Guidance for experimental projects

The objectives of the experimental projects are to:

- (i) Give you the opportunity to tackle a real experimental problem by generating data from the literature or using data from a research lab;
- (ii) Gain experience of experimental design;
- (iii) Learn new experimental skills, consider the importance of measurement, repetition and statistics in assessing results;
- (iv) Critically evaluate your work and present it in the context of your findings and the scientific field;

Time Devoted to Projects

It is difficult to be prescriptive about how much time you should devote to your project. As with any activity, you will get out what you put into your project in terms of effort and planning. However, 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.

Risk and Research

Researching a novel question is exciting, however, since research projects break new ground, there is a necessary element of risk - part of the challenge of scientific research. A common misconception amongst students is that the value of the project dissertation is directly related to the generation of "positive" results. What if a project does not give a clear and decisive answer? In fact, all scientists live with this risk: it is an intrinsic part of science. During your project it is not whether or not you get a clear result that is important. Rather, it is learning to recognise how relevant the result is and realising what you could do in the future to get clearer outcomes. Experiments that "go wrong" can be just as informative as those that appear not to! **The project dissertation is assessed on how well you present the project, not on the outcome of the research** (see "Your dissertation" below).

When you start your project, you may be given an initial plan of expected project milestones. Think about why these were suggested and what questions are being asked. As time progresses you should frequently review your progress. Is your approach and milestones definitions 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? What would you do next? 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? It is not a problem if the initial focus of your project changes as you progress: this is how science works!

Your Project Supervisor

You will be under the supervision of a member of staff, although 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 and how and when you are expected to report on your progress, such as 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. All project supervisors would be happy for you to spend all of your free hours working on your project but remember that you have other commitments during the course too.

Likewise, 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 whether and/or when they are going to be absent from Cambridge or very busy. It is your responsibility to organise your project supervisor adequately, not the responsibility of your project supervisor to organise you.

Your Dissertation

To help you prepare your dissertation, we have outlined below a list of key points that an examiner will be looking for in a dissertation from an experimental project:

- (i) How well the background and framework for the research have been presented, and how well the relevance of the research is explained.
- (ii) How well the data are presented. This includes whether the figures are appropriate, clearly representing and communicating the data, with good presentation (e.g. clear and appropriate labelling) and the results are summarised clearly in the text, whether controls are included or discussed, the use of quantification where appropriate etc. Also, the extent to which the methods have been documented properly.
- (iii) How well the outcomes (generated/anticipated) of the research are discussed and put into perspective. For example, consideration of alternative models or alternative approaches, showing some insight into the implications of the research, considering future directions.

Think about these issues during the year and how you will address them in your dissertation (See also Section 11.3).

We strongly advise you to seek guidance and advice from your project supervisor and fellow research workers during the preparation of your dissertation. They will be able to help point out where you are not being clear; often you become so familiar with the topic that you fail to explain the objectives and outcome clearly.

We recommend that you do relevant background reading from the start and make notes for the introduction to your dissertation as early as possible. This will help you focus on the project, help you in preparing your dissertation and will reduce the workload in preparing a final version during the Easter vacation. Remember, though, that the precise focus of your project may shift as you progress. So, writing a complete draft of your Introduction early in the year may not be a sensible use of your time, if

some of it ends up not being as relevant. When you come to the final write-up, one approach is to write the Results section first, so you have a clear idea of what you need to introduce, and what you need to discuss.

As this is a component of the exam, we ask that your project supervisor ONLY read one full draft of your dissertation. If major changes are advised, then you can of course consult your project supervisor again on the affected parts.

11.2 Guidance for literature-based projects

The objectives of the literature-based dissertation are to:

- (i) Give you the opportunity to work independently at problem solving.
- (ii) Explore in depth a problem or topic of relevance to the course and to produce a clear, concise well-argued summary of your findings and conclusions. Literature-based projects may generate new data or consist of a critical evaluation of existing data and ideas that displays an understanding of the value and limitations of different types of evidence. It is important that literature-based projects are NOT simply in the form of a review. You should work with your supervisor to develop a strategy to achieve this.
- (iii) Encourage you to gain the skills required to discover, explore and learn from the various resources within and around you, be they people, libraries, specialist organisations etc.
- (iv) Encourage you to learn about **the process** of discovery and enquiry: how do you **formulate a question** and what are the different ways of getting the information you need to address it (reading, interviewing, surveys etc), what are the relative advantages and disadvantages of each, what difficulties do you meet and overcome and how?
- (v) Learn to express your arguments and information clearly and succinctly in the dissertation.

The role of project supervisors

To help you with the dissertation work you **must** have a named project supervisor. The role of the project supervisor is NOT to tell you what to do, but to help you to make decisions for yourself. Thus, the role of the project supervisor is to 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. The project supervisor is often a sounding board to encourage you to come up with your own solutions, rather than a provider of solutions for you. The project supervisor need not be an expert in the question under study. You should seek out and use expertise yourselves under the project supervisor's guidance. Your project supervisor will:

- (i) Have a preliminary meeting at which you will discuss the general nature of the dissertation, the directions in which you might go, the various ways in which you might start working to define the **nature** and **extent** of the dissertation more clearly, and the sorts of approaches and materials you might explore.

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- (ii) Have occasional discussions at mutually agreed intervals once you are underway, for you to use as a sounding board to bounce ideas off, help focus your thoughts and formulate a question that can realistically be addressed in the time available, and on whom to try out different possible ways of doing things. It is important that you are not too ambitious or broad. It may be necessary to define an area or problem, within the topic that you are studying, to go into in some detail - although by all means set that discussion within a general background framework. These are matters to discuss with your project supervisor.
- (iii) When you start writing your dissertation, to go through a sample piece of writing doing a fairly thorough and detailed criticism on your approach and style - the idea here is to help you develop your writing skills; thereafter, your project supervisor will read a whole draft but offer only more generalised comments for you to adopt or otherwise as you decide.

Remember that 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 whether and/or when they are going to be absent from Cambridge or very busy. It is your responsibility to organise your project supervisor adequately not the responsibility of your project supervisor to organise you!

Having a project supervisor does not mean that you should not discuss your dissertation with anyone else; quite the contrary, we want you to take the initiative in exploring as widely as you need.

Researching and preparing your dissertation

The purpose of the dissertation is to give you an opportunity to produce a substantial piece of work, which complements the essays you will write during the examination. It is an extended account of a topic or question that is relevant to the course itself. Before you begin it, you should spend a considerable amount of time defining your topic, discussing this with your supervisor and/ or other members of the staff. If you can define your objectives clearly, you will find that the rest of the process is much easier. 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.

The sources of your material can be various. Reading the relevant literature is essential, and you must provide a list of references you have quoted at the end of your text. This is to enable others to follow up your data. You might also want to interview selected people, both to get their views and help you clarify your own views of the important outstanding questions to be considered. You will need to justify your choice of such people in your text and assess whether and in what way they helped. Another way of obtaining viewpoints is by asking written questions. Take great care with these, both to ensure that your correspondents have time to answer them and that, having done so, they give you what you want.

Be aware of sources of bias in your source material, for example reading papers published in only certain journals whose content may reflect editorial policy, interviewing only people who hold similar points of view to your own or internet sources

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with particular affiliations. If you are unable to eradicate bias at source then you must discuss what impact it may have on your findings/conclusions.

Your dissertation is also the place to demonstrate what you have learnt about the **process** of preparing a dissertation: what skills have you developed and how? What would you do differently next time, why and how? What difference does methodology make to outcome?

The final product should form 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, 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; not all the real world is politically correct (nor, perhaps, should it be).

A good critical assessment is a creative process. Prune the first version of your dissertation mercilessly.

Research costs

You may incur some costs when performing essential research for your dissertation, such as for inter-library loans and travel to meet people. You should discuss these with your project supervisor **before** committing yourself to the expenditure. If they agree that the expenses are essential for your work, then you will be reimbursed. **Photocopying expenses will not be reimbursed.**

Questionnaires and interviews

In the past, a few students have used a questionnaire as part of their dissertation. Whilst questionnaires can be very useful, they are difficult to construct well, involve much more work than you may at first think and necessitate a lot of computer and statistical processing. It is usually unrealistic to construct and use a questionnaire within a 6-month period and to get anything useful from it. **For these reasons, questionnaires are no longer allowed as part of a dissertation.**

Interviews can be very helpful in providing greater insight into problems, and local experience. They can also provide “colour” and useful on the ground experience. However, their use as primary evidence is more problematic and they need to be carefully structured and conducted, and the interviewees carefully selected in order to avoid sources of bias. *Unless your supervisor is highly experienced in this field and is able to offer you the necessary guidance, it is best not to rely on interviews to obtain primary source data.*

11.3 Dissertation requirements and deadlines (PDN project students only).

In Lent Term, the Part II administrator will collect your provisional dissertation title via an online form: **the deadline will be at 5pm on 5th March 2024**. This title should accurately reflect the project as it will be used to select the two examiners for your dissertation.

PDN project dissertations

Maximum length **8,500 words**, including a Summary of not more than 500 words and the main text, e.g., Introduction, Results, Discussion, Methods sections. The word count includes all words in the main text, including in-text citations (see section 11.4).

Everything else is excluded from the word count, e.g., the title page, Statement of Originality, words in figures, figure titles/captions/legends (i.e., the concise text accompanying the figure enabling the reader to understand it without having to refer to the main text), tables and their titles/captions/legends, bibliography, acknowledgements and appendices.

Exceeding the word limit *will* disadvantage you.

To keep track of the word count, we recommend that you prepare the Summary and main text in a separate document, and insert figures and tables, etc, only at the end.

The examination of your dissertation, which includes a *viva voce* examination, will contribute 36% of your final mark.

Obligatory statement of originality for PDN dissertations

The following statement **must** be included in the front of each dissertation and **must** be signed (e.g. insert a scan or photo of your signature) and dated in each copy.

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

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

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

Signature

Name Date”

Dissertation submission

You should submit two electronic versions of your dissertation by **12.30pm on Tuesday 23rd April 2024***. Submission Assignments are in the PDN Project Dissertation Submission section of the common course Moodle page.

You must submit one complete version of your dissertation in **pdf format** and one that can be opened in Microsoft Word for the Turnitin assignment. If you do not use Word, your application should offer the choice of "Save As: .rtf or .txt". This will be sufficient to confirm the word count and check for plagiarism. The file size limit for the Word submission is 100MB as this is the Turnitin restriction. The file name for the 2 electronic copies should be your unique identifier (this will be given to you in late Lent term). The examiners may deduct marks for late submission other than in exceptional circumstances. All dissertations will be checked for plagiarism (see section 16) and word count. Dissertations are retained for viewing by future students. Please email part2@pdn.cam.ac.uk to opt out if you wish.

*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 via email and Moodle by the end of Lent term.

11.4 Guide to writing your dissertation

General advice

Focusing on the essential argument or evidence is an important skill. Separate the trivial from the revealing and give a clear logical structure to your writing. Be to the point and clear. Short sentences, each conveying a single piece of information, are most useful. Use plain English with simple words to encourage good communication. 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. The exact format depends on the type of project, but your dissertation should be appropriately divided into sections. The arguments should be substantiated by quoting qualitative or quantitative data where appropriate, and by references to the literature. The overall objective is a critical assessment of your topic.

(i) General format advice

- Title Page: (include name, academic year; specify whether your project is experimental or literature-based, or a grant proposal.)
- Statement of Originality (**obligatory**)
- Summary (no more than 500 words) (**obligatory**): *From '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."*
- Table of Contents (**not obligatory**)

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- Introduction, Background & 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."
- Observations/Results: This section should provide a narrative overview of your project outcomes, presented 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."
- 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.
- Materials and methods: For theory-based projects and grant proposal projects, this should include information on literature sources, e.g. search engines and key words used. Do not put discursive experimental rationale and explanation in the Methods: this belongs in the Results, to help the reader understand what you did and why without having constantly to refer to the Methods section. The Methods section could be placed after the Introduction, or after the Discussion (the latter order is increasingly used by scientific journals today). Either way, it is essential to explain at least briefly the experimental rationale and approach in the Results section, so that the reader can follow the Results section without having to refer continually to the Methods section.
- Acknowledgments: This section should detail all help received, e.g. from technical staff or other lab members who helped with assays or data analysis.
- Bibliography (see below)

However, it is appreciated that the precise format may vary with individual dissertations.

(ii) 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.

(iii) Style

Use 1.5 line spacing throughout. Do not use exotic fonts. Use a sans-serif font for ease of reading, no smaller than 11-point Arial (**this applies to figure legends as well as the main text**). The default format in Microsoft Word is 12-point Calibri: this would be a good option. Think about the layout: include headings and subheadings to structure the text and make it easy to read - this, rather than aesthetics, should be your primary concern. Finally, 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.

(iv) 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, as can your reading – what criteria have been used in the literature?

(v) Figures and Tables

Figures should be clearly presented with a brief title and a legend, i.e., a concise description enabling the reader to understand the figure without needing to refer to the main text. Legends should only contain information essential to the understanding of the figure. Do not attempt to evade the word count restriction by including material that properly belongs in the main text; it will not advantage you. Make sure that the details of the figure are labelled sufficiently for the reader to identify the important details. Use the full width of the page: whatever you are trying to show should be visible to someone reading a print version. If this would not be possible, consider re-designing the figure, and/or including an inset(s) showing a higher-power view of the key area(s). Figures reproduced from elsewhere should be checked for legibility and be fully attributed. Make intelligent use of scale bars, labels and error bars.

Tables must be concise; they should not contain continuous prose. Do not attempt to evade the word count restriction by the inclusion of material that properly belongs in the main text; it will not advantage you. Tables should have a title, at least, and perhaps a brief legend if necessary to explain the content without referring to the main text.

As a reminder, **the minimum font size (no smaller than 11-point Arial) applies to figure legends and table legends**, as well as the main text. Longer legends can be placed on the facing page if it is not possible to include them on the same page as the figure/table.

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 (i.e., equal red+blue) instead of green and red, provide single-channel images in greyscale, as well as merged images, and use differently styled lines, rather than relying on differently coloured lines, 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/>

Note: It will be possible to submit short 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.

(vi) Abbreviations

If abbreviations are used, the terms should be written in full when first used, the abbreviations then being given in parenthesis. When abbreviations are used, capitals are preferred without full stops, for example HIV, DNA. Use of abbreviations not commonly found in the literature can be more confusing than helpful and is, in general, discouraged. Do not use acronyms for single words, or lab shorthand (e.g. write out paraformaldehyde, not PFA; ethanol, not EtOH).

(vii) 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. Do NOT record every paper you have read, only those you use directly. There is no strict restriction on the length of the Bibliography - if you need to cite a paper, you should cite it! - but 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 like this: (Cowan et al., 1997; Sondheimer and Lindquist, 2000; King, 2003), using 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). Publications with the same year should be ordered alphabetically by the last name of the first author.

References should be cited in 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.

Note: if the number of Authors (N) exceeds 10 authors, you may substitute "et al." for authors 11-N.

References in the bibliography 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).

(viii) 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 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>

Now that many reviews and minireviews are published in fields of current interest, you may have to make special efforts to avoid copying either the organisation or the text of a published review. If you find a recent review article which precisely covers your topic, consult with your project supervisor as to whether you can still write independently, or whether you should adjust the topic. Use of illustrations will vary widely according to your topic. Most or all illustrations should be produced by yourself. You will not need to reproduce many, if any, illustrations from published works; if you do, you must give full acknowledgement in the legend. We recommend that you put a note in each figure legend stating the source, including 'Original figure by [initials]' if it is your own. (Note: If you reproduce a published figure and include any part of its 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. Full details will be given in the General Module session on Writing your Dissertation. The Departmental Turnitin Policy is available on the Part II Moodle site.

(ix) Appendices, etc.

Appendices should be reserved for, for example, raw data, relevant letters, computer programs, etc. 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. Any material not readily included in the dissertation but relevant to it may be made available by you (if so desired) at the discussion with examiners.

(x) Word Processing

Departmental computers can get very busy, especially around dissertation time, and it may be very helpful to use computers in your College or at the Computer centre. **BACK-UP FREQUENTLY; STUDENTS WHO DID NOT HAVE LOST THEIR WHOLE DISSERTATION.**

11.5 Responsibilities of project supervisors

*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 etc at the start of the project.

Suggest appropriate reading material.

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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.

Read one full draft (**and only one!**) of the completed project dissertation and provide constructive comments.

Advise on, and attend, the student's presentation of the project work.

Complete reports on the progress of the students, as requested by course organisers, and discuss this report with the students.

*Apply to research-based projects only.

11.6 Project Dissertation Viva (PDN project students only)

The primary purpose of the project dissertation viva is for the examiners to clarify:

1. any points that were unclear in the dissertation;
2. the depth of your understanding of the project;
3. your contributions to the research described in the dissertation.

You will be marked on your dissertation, not your performance in the viva, but the viva can lead to adjustment of the provisional dissertation mark up or down.

In Easter term (provisionally, the week of May 8-12) you will be allocated a 30-minute slot; the viva should take about 20 minutes within this. The viva will be held online.

You should have a copy of your dissertation open and ready to consult during the viva if needed (e.g., if the examiners refer to a specific page or figure).

In the viva, two examiners will ask you a number of questions about your project and dissertation. These questions will vary widely, depending on the topic of the dissertation, so it is impossible to describe specifically what you will or will not be asked. However, some possible questions might include questions about particular results, specific experiments or approaches, the main findings of your project, the references you cite in your dissertation, models to explain the data, possible future experiments, etc.

You will NOT be asked to give a presentation, although you may be asked to give a brief summary of the main findings of your project.

The only thing that we advise you to do in preparation for your viva is to refresh your memory about what you have written in the dissertation. You may also want to re-read a couple of the references you have cited that are particularly relevant to your project.

11.7 Faculty of Biology Guidelines for marking Part II dissertations

<https://www.biology.cam.ac.uk/exams/AllExams/marketing-part-ii-dissertations>

Very high First: *Keyword:* Excellent. *Content/Argumentation:* 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. *Research/Presentation:* Shows clear evidence of exhaustive background research undertaken, with critical and analytical assessment of the major contributions; presentation and referencing are immaculate.

First: *Keyword:* Very Good. *Content/Argumentation:* 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. *Research/Presentation:* Demonstrates extensive use of available research resources; scientific literature handled judiciously and analytically; polished presentation and referencing.

Subdivision: Upper - Uniformly original and sophisticated.
Lower - Well-crafted and very resourceful.

Upper Second: *Keyword:* Good. *Content/Argumentation:* 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. *Research/Presentation:* Competent use has been made of available text books; account is taken of journal articles, although perhaps not uniformly; satisfactory presentation and referencing.

Subdivision: Upper - Ideas should show increasing cogency and resourcefulness.
Lower - Restricted to a relatively narrow set of routine ideas.

Lower Second: *Keyword:* Fair. *Content/Argumentation:* 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. *Research/Presentation:* 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.

Subdivision: Upper - A number of ideas of interest are discernible.
Lower - Marked tendency towards padding; paucity of own ideas.

Third: *Keyword:* Poor. *Content/Argumentation:* 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. *Research/Presentation:* 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.

Subdivision: Upper - A valid but commonplace underlying argument is discernible.
Lower - Directionless and/or padded.

Fail: *Keyword:* Fail. *Content/Argumentation:* Fails to demonstrate competent knowledge or understanding of the scientific literature. *Research/Presentation:* The use of scientific literature, even if acknowledged, is unscholarly; presentation will show extreme carelessness.

Subdivision: Upper - Allowance for Ordinary (i.e., there is some valid argumentation).
Lower - Outright fail.

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 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

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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

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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 and in *viva voce* examinations!

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 Examiners 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 prior to your viva (project students only).

14. EXAM INFORMATION

14.1 General exam information

Exams will be typed and 'closed-book' (i.e. using a computer in an invigilated room without access to any other resources). The exams will use Inspira – a system that you will already be familiar with from Part IA & IB.

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.

Information about actions to take in the event of technical issues will be provided nearer the time.

There is no word limit for the essays.

Students are expected to type their answers. If they are unable to do so, their scripts will need to be converted into a word-processed document for plagiarism screening.

Where appropriate hand-drawn diagrams/formulae/calculations can be included using the provided sheets. More information on this process will be provided.

Any figures should be explained in the text of your answer or with a legend (both approaches count towards the word limit). Text or labels in the actual figure are acceptable but should not be excessive. If you overload figures with information to get around the word count, that will detract from the quality of your answer.

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 section also provides further information on Turnitin and links to other sources of advice and information about plagiarism.

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: this is inevitable given the complexity of different module combinations, including BBS. Please note that the Department and the Examiners have no influence over the exam timetable, which is scheduled centrally by the University.

The University's normal procedures for handling illness, unexpected impairment, etc. will be followed.

(Note: The NST Part II Regulations state that the use of a *viva voce* is at the discretion of the Examiners. However, PDN does not normally hold any post-exam vivas.)

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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 is no later than **12.30pm on 23rd April 2024**.

Written examination:

Examination of the Module material will be in the form of separate papers for each Module. You will sit four papers in May-June. In each paper you will answer three essay-style questions. 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, demonstration practicals, other lectures, seminars, and any other sources.

Part II BBS

Dissertation: 20%

Major Subject Module material: 64%

Minor Subject Module material: 16%

Deadline for submitting your dissertation is no later than **12.30 pm on 26th April 2024**.

Written examination:

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

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 are available on Moodle via the Past Papers button on the Common Courses page.

14.3 Writing essays in the Part II exam

Students often ask for general advice about approaching essay questions in the final exams. Although we don't want you to focus on exam technique to the detriment of enjoying your studies, we hope that the following notes will be of help.

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Exam essays will be read by two examiners/assessors, who are likely to differ in the extent of their expertise in the field covered by the question. 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, giving appropriate consideration to the significance and historical development of the subject matter.

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. Needless to say, it is more effective if you develop your skills in essay-writing throughout the course, rather than waiting until Easter term: throughout the year, you should practise writing essays, and practise writing under exam conditions.

When writing essays, there are two broad objectives:

(i) Write using a clear, organised, logical and suitably critical (i.e. *scientific*) style to develop a balanced argument that **answers the specific question asked**. Your essay should illustrate your good understanding of key concepts and ideas. You need to cover the topic with adequate breadth, bringing in material from different sources as appropriate, but without diverging from the question, and avoiding superfluous or irrelevant material. General further reading around the subject will improve your ability to grasp and write about it in a scientific style.

(ii) Provide the necessary detail to **illustrate that you appreciate and understand the complexity of the subject**. This will involve going into selected topics in your essay in greater depth than was covered in the lectures, using the suggested reading and your own initiative. You are encouraged to suggest new models or interpretations, provided you can back them up with a strong experimentally-based argument.

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. The best answers in Part II exams present evidence that you understand the subject and can think about it. Questions are not well answered by regurgitating a lecture verbatim, especially when it fails to answer the specific exam question.

(ii) The essay shows a good understanding of the key concepts but includes a poor level of detail and insight. The balance between detail and depth is critical; if you spend too much time providing detail you will not have time to extend your answer beyond what you learned in lectures to provide insights from your own ideas or those from additional reading.

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(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. 'Not answering the question' is a surprisingly common mistake, which will result in a poor mark for the essay. A brief essay that answers the question may be marked higher than a long and detailed essay that fails to answer the question, even if on a related topic.

In writing your essays, here are some **general guidelines to avoid these mistakes**. You should also read the Faculty of Biology criteria used in marking Part II essays (available online and reproduced at the end of this section of the handbook, in section 14.5).

(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. Mentally gather the relevant notes.

(ii) Take time to **make a plan**. This will give you thinking time. In your plan, organise your essay into key topics that address the question, and put them into a sensible, logical order. Consider using these key topics as subheadings to give structure to your essay and to stay on the topic of the question, avoiding waffle and digression. Consider where a diagram would usefully illustrate or summarise key points. Highlight topics of particular importance, so that you give the correct balance. In the exam, you may not have time to cover everything that you think is relevant, so you may want to start with a brief overview of a range of topics and then say that you will focus on one or two of them, to illustrate your answer to the question. Read through your plan - is everything in it strictly relevant? Have you missed out important information? Does it enable you to develop and reach an answer to the essay question that you can use to conclude with, or does it just meander about aimlessly, waffling on about the general topic in a manner unrelated to the question? Now is the time to correct this, not when you are half-way through writing the essay!

(iii) Once you are satisfied with your plan, use it effectively as you work through your essay. An introductory paragraph can be helpful to the reader (and the writer) to show that you have a balanced view of the subject. In the body of your essay, 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.

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. Remember to use clearly drawn, clearly labelled diagrams.

(iv) 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

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question (even if your conclusion is that the question cannot be answered) based upon the evidence you have presented.

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). **You do not have to cite papers by name in an exam essay (though you should do so in a supervision essay, both to acknowledge the source of the information and so you can find it when revising): the important thing is to demonstrate your awareness of and ability to describe the experimental evidence.** 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.

14.4 The assessment procedure

Your essays and dissertations will all be marked by two people, according to criteria from the Faculty of Biology (<https://www.biology.cam.ac.uk/exams>).

Criteria used in Marking Tripos Essays (scroll down to the Part II criteria):

<https://www.biology.cam.ac.uk/exams/AllExams/marketing-tripos-essays>

(These criteria are reproduced in section 14.5 of the handbook.)

Guidance for Marking Part II Dissertations:

<https://www.biology.cam.ac.uk/exams/AllExams/marketing-part-ii-dissertations>

(This guidance is reproduced at the end of section 11 of the handbook.)

Information about the Part II project dissertation viva (for Part II PDN project students only) is in section 11.6 of the handbook.

For the Part II BBS course, your Major Subject, Minor Subject, and Dissertation are marked independently, and the marks are added to determine your final mark and class.

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

The percentage marks assigned to each of the three parts of the examination, together with the aggregate mark, will be communicated to the Office of Student Records. That office has the responsibility of communicating information to your Tutor or Director of Studies.

Formal details about the examination can be found in the Form & Conduct Notice:

<https://www.biology.cam.ac.uk/exams/nst-exams>

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

<https://www.biology.cam.ac.uk/exams/AllExams/markings-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.

15. Part II BBS-SPECIFIC INFORMATION

The coordinator for BBS in the Department is Prof Amanda Sferruzzi-Perri (ans48@cam.ac.uk). She is always willing to answer questions or discuss problems concerning the course.

There is a BBS Welcome Event held for all BBS students on **Thursday 5th October, from 4-6pm**. The BBS administrator will provide details.

15.1 BBS options and modules in PDN

<u>BBS Option</u>	<u>Title</u>	<u>Modules</u>
Major subject		
415	Physiology, Development & Neuroscience	Any 4 of 14 PDN modules*
Minor subjects		
111	Higher Order Brain Function and Dysfunction	N6
137	Surgical and Radiological Anatomy	-
138	Developmental Neurobiology	N1
141	Cellular Physiology	P1
142	Development and Stem Cells	P2
143	Systems and Clinical Physiology	P8
152	Neuroscience: Circuits and Systems	N3
153	Cellular and Molecular Neuroscience	N4

*Part II BBS students in PDN are able to take the same modules as the Part II PDN project students. New for AY2023-24, students may replace one of their four PDN-based module choices for a 'shared neuroscience' module but this is subject to capacity; 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, 'Examinations').

As a Major Subject student, you will be a member of the Department just like the Part II PDN project students, so all the 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

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.

Part II BBS dissertations must be prepared in accordance with the dissertation guidelines issued by the Faculty Board:

<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 Departmental deadline. When approved, 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 Thursday, 9 November 2023**.

You must notify the Course Organisers and the Faculty Office of any subsequent changes to either the title or the subject of your dissertation. In order to change your title, please obtain the permission of your Supervisor and Course Organisers and 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, 15th March 2024**.

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.

An 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 26th April 2024**.

BBS Formatting requirements can be found on the Faculty of Biology website. PDN does not have any 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

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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, 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

The Faculty of Biology has asked all departments to introduce an element of presentation skills training into their course. This is in response to feedback received via the National Student Survey.

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/definition>), 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 Registered Students are unaware that such materials or devices are unauthorised, have no intention of using them, or are 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

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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

It is every student's responsibility to:

1. **Read, and ensure that you understand**, the [University-wide Statement on plagiarism](#) which defines plagiarism and the forms that it can take. The statement follows the Regulations for discipline in Statutes and Ordinances.
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.

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.

16.3 Plagiarism and How to Avoid it

Please work through 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."**

Such use of unfair means will not be tolerated by the University; if detected, the penalty may be severe and may lead to disciplinary proceedings being taken against you.

1. The scope of plagiarism

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. 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 without due acknowledgement of the source;
- **paraphrasing** another person's 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;
- **submitting someone else's work** as part of a candidate's own without identifying clearly who did the work. For example, buying or commissioning work via professional agencies such as 'essay banks' or 'paper mills', or not attributing research contributed by others to a joint project.

Plagiarism might also arise from **colluding** with another person, including another candidate, other than as permitted for joint project work (i.e. where collaboration is concealed or has been forbidden). A candidate should include a general acknowledgement where he or she has received substantial help, for example with the language and style of a piece of written work.

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 other students' work.

Acceptable means of acknowledging the work of others (by referencing, in footnotes, or otherwise) vary according to the subject matter and mode of assessment. Faculties or Departments should issue written guidance on the relevant scholarly conventions for submitted work, and also make it clear to candidates what level of acknowledgement might be expected in written examinations. Candidates are required to familiarize themselves with this guidance, to follow it in all work submitted for assessment, and may be required to sign a declaration to that effect. If a candidate has any outstanding queries, clarification should be sought from her or his Director of Studies, Course Director or Supervisor as appropriate.

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Self-plagiarism is defined as 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.

Examples of self-plagiarism include:

- writing an essay twice or more for a single set of exams;
- writing the same essay, or a substantial part of an essay, twice in the same exam;
- memorising substantial blocks of text and reproducing them more than once as the whole or as parts of an answer in an exam.

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.

2. 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 in the text 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, e.g. 'The elk is of necessity less graceful than the gazelle' (Thompson, 1942, p 46) 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 (eg 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, eg (figure redrawn from Webb, 1976) or (triangles = data 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;

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- if you have been **authorised to work together** with another candidate or other researchers, you must acknowledge their contribution fully in your introductory section. If there is likely to be any doubt as to who contributed which parts of the work, you should make this clear in the text wherever necessary, e.g. 'I am grateful to A. Smith for analysing the sodium content of these samples';
- be especially careful if **cutting and pasting** work from electronic media; do not fail to attribute the work to its source. If authorship of the electronic source is not given, ask yourself whether it is worth copying;
- don't memorise substantial blocks of text in lieu of essay answers;
- tailor your answer to the question being asked.

Please note that in written answers for unseen or time-limited examination papers (e.g. a paper where you are required to write three essays in three hours, as opposed to a piece of course work written over an extended period), you will not be penalised for failures to formally cite sources or to present a bibliography. However, it is important to appreciate that the prohibitions against all other forms of plagiarism described above, and particularly against cutting and pasting, still apply and will be enforced strictly.

3. The Golden Rule

The examiners must be in no doubt as to which parts of your work are your own original work and which are the rightful property of someone else.

Best Practice: 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 - including when you are making revision notes - 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. What Turnitin cannot do is to then interpret this report. The matched text can often include a number of entirely innocent matches, such as entries in the bibliography, the essay title used by all students, or small matches like "the University of Cambridge". Reports will be scrutinised by an academic member of staff, who will review the report to determine whether the matches may indicate wider concerns around 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/definition>

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

As above, Turnitin can only show the extent of matched text; it cannot make any judgement about the seriousness of the matches, and whether these may indicate poor academic practice or an attempt to gain unfair advantage. 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-plagiarism/students-responsibilities>

and the University's 'Good academic practice and avoiding plagiarism' guide:

<https://www.plagiarism.admin.cam.ac.uk/>

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*

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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>

Turnitin FAQs (students):

<https://www.plagiarism.admin.cam.ac.uk/investigating/turnitin/students/faqs>

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 a Qualtrics 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.

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18. Dates for Your Diary

BBS Welcome Event (BBS students only)	Thursday 5 th October 2023
Lectures Commence	Tuesday 3 rd October 2023
PDN Induction Day (all day, compulsory)	Wednesday 4 th October 2023
Project students arrange to meet with Project Supervisor	Week 1, M
Project and BBS major 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	20 th October 2023
Mid-term meeting with Departmental Advisor	Week 5, 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 so will not be recorded.	Wednesday 22 nd November 2023
End of Full term	Friday 1st December 2023
Students arrange to meet with Departmental Advisor	Week 1, L
Poster Presentation Sessions	19 th February & 4 th March 2024
Project students submit Provisional Dissertation Title	5 th March 2024
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	15 th March 2024
End of Full term	Friday 15th March 2024
Project students submit Project Dissertation (Electronic)	12.30pm 23 rd April 2024
BBS students submit BBS Dissertation (Electronic)	12.30pm 26 th April 2024
Vivas	6 th -10 th May 2024
Exams 2024	TBA - usually late May to mid-June
End of Full term	Friday 14th June 2024

19. Research Seminars in Cambridge

There are a large number of research talks in the local and wider Cambridge community. Within the Department there are the Foster Club Talks (on Thursday afternoons) and the Adrian Seminars in Neuroscience (on Monday afternoons). A number of talks by guest speakers are likely to be given during the year. There are also seminars run by the 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 around the Department, and of course most seminars are advertised on the Departmental web site and in the Reporter. They 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.