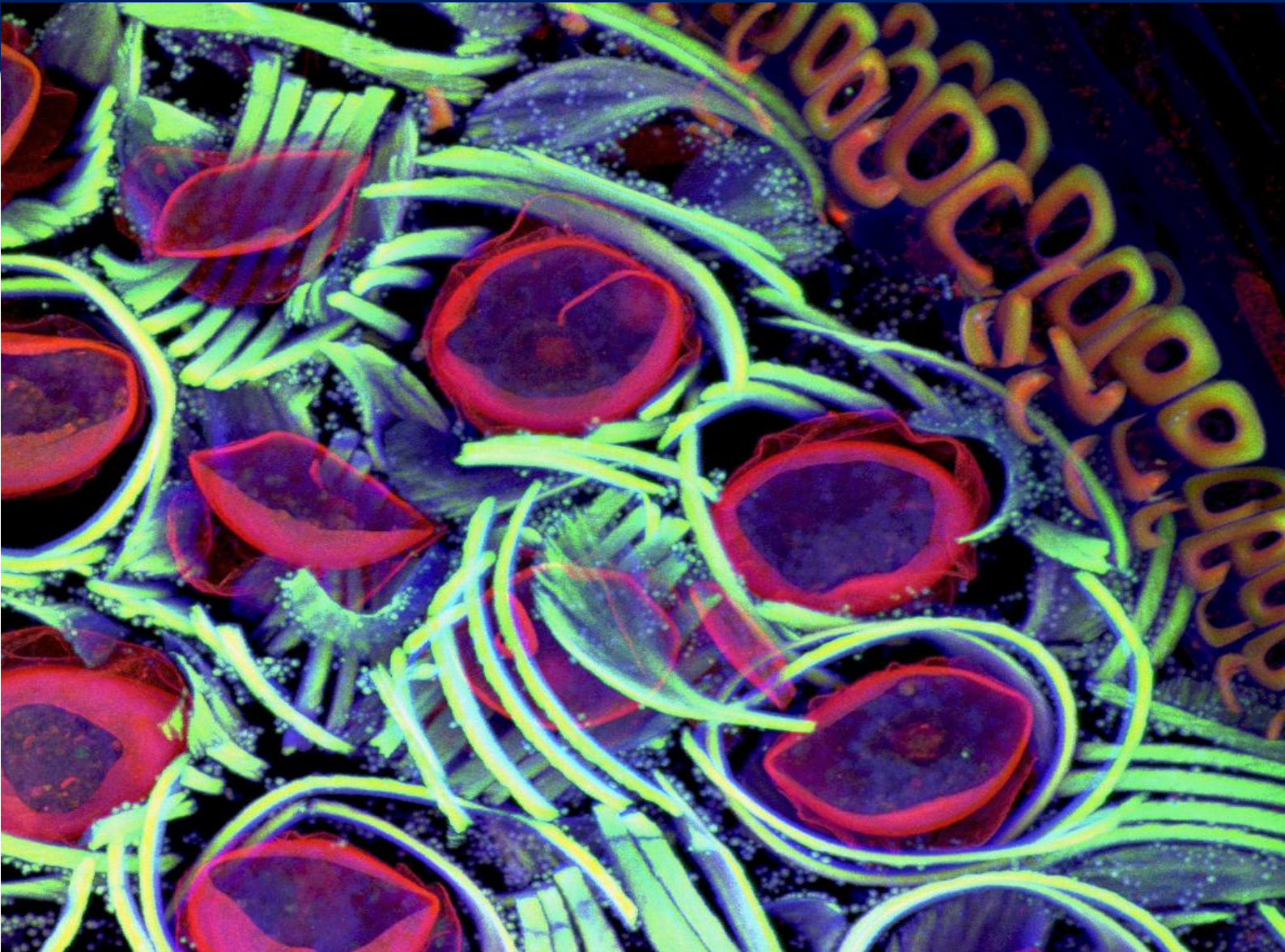


NST PART IB CELL & DEVELOPMENTAL BIOLOGY



COURSE GUIDE 2021-22

**Departments of Biochemistry, Genetics,
Plant Sciences, & Zoology**



NST Part IB Cell & Developmental Biology

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NST Part IB Cell & Developmental Biology

Course Information and Welcome!

Welcome to Part IB Cell and Developmental Biology. We hope that you enjoy the course and find some exciting new topics to learn about. This handbook contains the key information about the course, but if you have any other queries, please contact us – if you are unsure who to contact regarding a particular issue, please email our course administrator Amy Bains at: undergrad.admin@gen.cam.ac.uk

We are looking forward to year with much more in person teaching than last year. We anticipate that most lectures and wet lab practicals will be delivered in person, depending of course on any changes in University policy and safety advice. Lecture recordings or videos with the same material will be available online for those unable to attend. Over the coming year we must continue to prioritise the safety of our students and instructors, so we ask you please to follow any requests from staff regarding Covid safety. We have assessed and adjusted occupancy of lecture and practical rooms to ensure spacing of individuals. Please don't attend any lecture or practical if you feel at all unwell, and wear a mask if you are able to.

We are committed to doing our best to deliver an enjoyable and intellectually stimulating course. We value your feedback, and encourage you to let us know any suggestions for improvement via your course representatives or by contacting us directly.

Professor Paul Dupree
Part IB CDB Course Organiser



NST Part IB Cell & Developmental Biology

Learning Outcomes

Aims

The Cell and Developmental Biology course is taught by the Departments of Biochemistry, Genetics, Plant Sciences and Zoology. It can be taken in combination with any other subject in Part IB of the Natural Sciences Tripos, except Materials Science with which it clashes in the Lecture Timetable. The CDB course is a natural follow up to IA Biology of Cells, building as it does on the knowledge of elementary cell biology provided by the first year course. CDB goes much further into the topic, introducing you to the major ideas and current experimental approaches to cell and developmental biology, and in the process will illustrate how molecular approaches complement classical cell biology in finding out the details of how cells carry out their basic processes. The course aims to consolidate and extend your basic knowledge of how cells work, how they interact and how they differentiate. Cell and developmental biology is a rapidly advancing field, and the course will illustrate the excitement of these advances.

CDB provides a framework for further specialised study of molecular, cellular and developmental biology in the third year, including Part II Genetics, Plant Sciences, Zoology, Biochemistry (for which it is a qualifying course as an alternative to IB BMB), and Physiology Neuroscience & Behaviour (PNB). It is an excellent foundation for the majority of Part II biological subjects.

Objectives

By the end of the course, you should have a knowledge of:

- the cell biology of all major groups of organisms, including microorganisms, plants and animals;
- the structure function and interactions of cellular organelles including nuclei, endomembrane system, mitochondria and chloroplasts;
- how the cytoskeleton is organised and its role in cellular function.

- how genome organisation, variation, evolution and engineering reveal how cells and organisms function
- the complex interactions between nucleus and cytoplasm that determine how cells function;
- the main concepts of how cells become specialised into different types in complex organisms;

You should also have an understanding of:

- the main experimental approaches used for the study of cell structure and function;
- how these approaches can be applied to specific problems in cell biology;
- how to carry out and interpret simple experiments in cell biology.

The course syllabus is defined by the lecture content, but you are encouraged to explore the lecture topics in more depth by reading at least some of the references provided in lecture handouts. You won't have time to read all of these, but the additional reading introduces you to how science is done before it makes it to the textbooks. It provides useful material for discussion in College supervisions, and help in writing supervision essays and in the examinations at the end of the year.

At the end of Part IB Cell and Developmental Biology, you should have developed a knowledge of the major ideas and current experimental approaches in cell biology and developmental biology and should be able to progress to Part II courses in Biological Sciences, including Biochemistry, Genetics, Physiology Neuroscience

& Behaviour (PNB), Pathology, Plant Sciences and Zoology. Further course information is provided at the Faculty of Biology web site: <https://www.biology.cam.ac.uk/undergrads/nst/courses/cdb>



NST Part IB Cell & Developmental Biology

Student Support and Communications

It is very important to the staff that students feel they have appropriate methods of support and communications whilst studying the CDB course. Past students have fed back that lecturers and staff are friendly and approachable, allowing students to engage in discussions, raise questions and work together to improve the course for future years. We wish to continue this good working relationship between staff and students.

Below are some of the methods that the staff support and communicate with the class.

Students Support Documents (SSDs)

SSDs are treated confidentially, stored securely, and are only shared with staff that will have contact with the student to ensure that any additional learning needs or requests are provided. Students are asked that if they have an SSD from the DRC (Disability Resource Centre), they please forward this to the Course Administrator, Amy Bains at undergrad.admin@gen.cam.ac.uk.

Student Reps

At the start of the academic year, we encourage any students interested, to put themselves forward to become a CDB Student Rep. As a Student Rep, you will become the voice of the class and represent your peers at Consultative Committee meetings once a term, feedback comments or concerns from the class to staff throughout the year and work with the Course Administrator, Amy Bains, to help communicate with the rest of the class. You are also welcomed and supported to organise social events for the CDB class. Being a Student Rep can help you build essential career soft skills such as team working, communication and time management skills.

Communications

Email Mailing List – cdb@gen.cam.ac.uk

At the start of the Michaelmas Term, students will be added onto a CDB Student Class email list. This will be one of the main methods of class-wide communications with between the class and staff. Amy Bains, Course Administrator, is responsible for this mailing list. If you have any questions regarding this, please contact her. Students are also welcomed to use this email to contact the rest of the class.

Moodle – ‘Announcements for All’

Important information will be put on the Moodle ‘Announcements for All’ section. Both students and staff can use this to communicate with all enrolled users on the CDB Moodle site. When an announcement is made, an email will also be sent to all enrolled on the site, to alert them of the new post.

Online Forms and Scheduling platforms such as Google Forms and Doodle Poll

Last year (2020/21), online forms and scheduling platforms such as Google Forms and Doodle Poll were used to find out student information and to assess availability. Going forward, staff may wish to continue using these platforms as an efficient method of collecting information and scheduling events.

Online Video Meeting platforms such as Zoom and Microsoft Teams

Last year (2020/21), Zoom was used for hosting online lecture Q&A sessions, Committee Meetings and Live Practical sessions. Going forward, staff may wish to continue using aspects of Zoom, or Microsoft Teams, for elements of teaching or practical sessions – or may need to do so if the pandemic conditions require it. Each student will have a Microsoft Teams account and a separate Teams channel can be set up for the CDB class to use for work or social reasons, if the class desires.



NST Part IB Cell & Developmental Biology

Lecture & Practical Timetables 2021/22

Lectures are scheduled for Tue, Thu and Sat at 10am, normally held in the Biffen Lecture Theatre, Department of Genetics. **Practicals** are scheduled for Fri or Tues, normally held in the CDB wing, Elementary laboratory, Department of Zoology. However, due to coronavirus precautions, alternative arrangements are being put in place for **online and/or physically distanced lectures and practicals**. Students should check on the CDB Moodle site for up-to-date information. You can subscribe in your diary to the scheduled lecture and practical times on the online University timetable:

Lecture Timetable: Michaelmas Term 2021

(NB: lectures begin on the first Thursday of Full Term)

Weeks 1-2 (Lectures 1 - 6) 7, 9, 12, 14, 16, 19 Oct	Dr T Krude	Molecular Biology of the Cell Nucleus
Week 3 - 4 (Lectures 7 - 11) 21, 23, 26, 28, 30 Oct	Prof E Miska	Genes, gene expression and cell decisions
Week 4 - 5 (Lectures 12 - 14) 2, 4, 6 Nov	Dr D Summers	Genetic systems of Prokaryotes
Week 5 'Breather' 9 Nov	No Lecture	No Lecture
Weeks 6- 7 (Lectures 15 - 19) 11, 13, 16, 18, 20 Nov	Dr C O'Kane	Genome Organisation and Function
Weeks 7-8 (Lectures 20 - 23) 23, 25, 27, 30 Nov	Dr Juan Mata	Yeast as a Model Organism

Practical Timetable: Michaelmas Term 2021

Weeks 1 - 4 8, 12, 15, 19, 24, 26, 29 Oct, 2 Nov	Dr T Krude	Molecular Biology of the Cell Nucleus
Weeks 5 - 6 5, 9, 12 & 16 Nov	Dr C O'Kane	1. Use of transposable elements for mutagenesis and targeted GFP expression in <i>Drosophila</i> 2. Optimising acquisition of fluorescence microscopy images
Weeks 7 - 8 19, 23, 26, 30 Nov Plus additional online sessions TBA	Dr N Zhang	Analysis of Yeast Transformation

Lecture Timetable: Lent Term 2022

(NB: lectures begin on the first Tuesday of Full Term)

Weeks 1-2 (Lectures 24 - 27) 18, 20, 22, 25 Jan	Dr P Mordaka	Chloroplasts and Mitochondria
Weeks 2-3 (Lectures 28-31) 27, 29 Jan, 1, 3 Feb	Dr M Segal	Cytoskeleton & Mitotic Cell Division
Weeks 3-4 (Lectures 32 - 35) 5, 8, 10, 12 Feb	Prof P Dupree	Membrane Trafficking
Weeks 4-5 (Lectures 36 - 37) 15, 17 Feb	Dr C O’Kane	Coordination of organelle and cellular function
Weeks 5-6 (Lectures 38 - 39) 19, 22 Feb	Prof A Webb	Intercellular Communication I
Week 6 (Lectures 40 - 41) 24, 26 Feb	Dr H Baylis	Intercellular Communication II
Weeks 7-8 (Lectures 42 - 47) 1, 3, 5, 8, 10, 12 Mar	Dr T Weil	Invertebrate Development

Practical Timetable: Lent Term 2022

Week 1 21, 25 Jan	Prof J Haseloff	Tools for problem-solving in genomics
Week 2 28 Jan, 1 Feb	Dr P Mordaka	Organelle Inheritance in Chlamydomonas
Week 3 4, 8 Feb	Dr M Segal	Cytoskeleton - data analysis
Week 4 11, 15 Feb	Dr C O’Kane	Approaches to critical review
Week 5 18, 22 Feb	Prof P Dupree	Membrane Trafficking in Eukaryotic Cells
Week 6 25 Feb, 1 Mar	Dr H Baylis	Second Messenger Systems and Signalling in Real Time (Demonstration)
Week 7 4, 8 Mar	Dr T Weil & Dr M Landgraf	Early Patterning in the Drosophila Embryos (I)
Week 8 11, 15 Mar	Dr M Landgraf & Dr T Weil	Early Patterning in the Drosophila Embryos (II)

Lecture Timetable: Easter Term 2022

(NB: lectures begin on the first Tuesday of Full Term)

Weeks 1-2 (Lectures 48 - 51) 26, 28, 31 April, 3 May	Prof J Haseloff	Plant Development
Weeks 2-3 (Lectures 52 - 54) 5, 7, 10 May	Dr B Steventon	Xenopus and Zebrafish Development
Weeks 3-4 (Lectures 55 - 57) 12, 14, 17 May	Dr N Moris	Mammalian Development

Practical Timetable: Easter Term 2022

Weeks 1-2 29 Apr, 3, 6, 10 May	Prof J Haseloff	Self-organisation and of morphogens in plants
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NST Part IB Cell & Developmental Biology

Course Content and Resources

Lectures and Practicals

Where it is deemed sufficiently safe in the ongoing Covid-19 pandemic, lectures and practical sessions will take place in-person.

Lectures take place Tuesdays, Thursdays, and Saturdays at 10am, and practicals take place on Tuesdays and Fridays. Accompanying documents such as worksheets, handouts and slides will be available to download from the Moodle Site. Students will be asked to submit their preferences of days for practical working groups at the start of the year. You will then stay in these groups for the whole year.

You will also have College supervisions, and staff encourage you to use the tools available via Microsoft Teams chat and channels and other social media platforms to build working relationships with your classmates. Please speak with Amy Bains to discuss these and how we can set these up for the class.

Finding the right level of detail

We all suffer from information overload - and the CDB course covers a lot of ground too. But try not to lose sight of the wood because of all the detail in trees - and this advice goes for supervisors too. Understanding how cellular processes work is more important than memorising the names of all the relevant genes or proteins – the latter are only a means to the end of making sense of complex reality. And understanding *how* we know what we do is at least as important than just remembering what we know (or think we know).

Lecture notes

The Management Committee is not prescriptive about the style of Lecture Notes used by Lecturers. However, we do expect good practice: this can involve a variety of styles of lecture notes integrated with the overall learning strategy used for each lecture block. Most slides should appear in handouts, with enough context to explain their significance; sources of original material should be referenced. However, the level of detail in the text will vary.

Note-taking

Regardless of handouts, students should aim to take detailed notes from lectures, recorded or live. This is an important skill to learn, and even with detailed handouts, note-taking reinforces your understanding and organisation of the material. We recognise that some students may have difficulties in taking notes for an entire lecture, and normally, students with a Student Support Document from the Disability Resource Centre are welcome to record the lectures for their own personal study. With the full provision of recorded lectures, this may not be necessary, but please let us know if further materials might be helpful.

Practicals

The coronavirus pandemic has had a major impact on the scheduling of practical sessions. We are endeavouring to maintain in-person laboratory practicals as much as possible, but these will be unavoidably impacted by the wider needs for physical distancing and availability of laboratory resources. At the beginning of the year, students will be assigned to different groups for the practical sessions which are nominally scheduled for Tuesday and Fridays. Some practicals will be provided in the form of online video and problem-

solving activities. Where in-person laboratory work or demonstrations are feasible, the sessions will be broken down into shorter sessions with smaller group sizes. As different practical sessions need to adopt different scheduling and procedures, the arrangements for the different practicals will be listed on the Moodle site. Be sure to check the arrangements ahead of each practical session. Zoom may be used for class wrap-up sessions.

Course Feedback

Student feedback is vital for continuous improvement of the course, so we want to get as much feedback from you as we can.

- Please consider volunteering as a Class Rep when volunteers are invited at the start of the year.
- Please volunteer your views on any or all parts of the course either to the Course Organiser, Course Instructors, or your Class Reps.
- Please fill in the feedback forms. CDB now uses Qualtrics Student Feedback Forms, which are accessible via mobile phone platforms as well as computer/internet platforms. Links to the Feedback Forms can be found on the Moodle site.

The use of online tools will continue to be important to your learning this year.

Moodle

You will automatically be subscribed to the Moodle site as part of the NST subject choice procedures but if you join the course after the start of term (or have other problems accessing the site), please send an email to Amy Bains, the CDB course administrator (undergrad.admin@gen.cam.ac.uk), requesting that you are added to the course. You will need to use your Raven ID and password to log onto Moodle, which you will also be able to access during the vacation.

You will find a collection of online resources on the Moodle site that include:

- **Introductory materials**, including this handbook.
- **Announcements for All**, where important announcements about the course can be made to all users on the Moodle site. These will include update and reminders about deadlines, arrangements for practical sessions, and scheduling of online Zoom sessions.
- **Lecture and practical content**. Lectures and practical elements, if pre-recorded, will be available on Moodle. When lectures take place in person, audio recordings will also be available on Moodle. . Additional materials such as hand-outs and slides will become available on a rolling basis, as the course progresses
- **Past examination papers**. These are provided for reference, and can be useful to guide learning and revision.
- **Consultative Committees**. We will request student volunteers as representatives who will participate in termly consultative committee meetings, and in addition, we will circulate calls for feedback from all students, as we seek comments and ideas for improvement of the course. The minutes from previous consultative meetings are provided for reference, with summarised discussions about the course content and structure.



NST Part IB Cell & Developmental Biology

Teaching Staff



Torsten Krude Lecturer and Practical Organiser

Torsten is Research Group Leader at the Department of Zoology. The group is interested in the control of chromosomal DNA replication in human cells. Current research in his group focuses on the initiation step of DNA replication, and, how it is regulated by the function of small non-coding Y RNAs. He began to establish his own research group in Cambridge from 1997 onwards as a Royal Society University Research Fellow and became a University Lecturer in 2000.

Web: <https://www.zoo.cam.ac.uk/directory/dr-torsten-krude>



Eric Miska Lecturer and Examiner for 2021/22

Eric's research group studies all aspects of gene regulation by non-coding RNA. Current research themes include miRNA biology and pathology, miRNA mechanism, piRNA biology and the germline, endo-siRNAs in epigenetic inheritance and environmental conditioning, small RNA evolution and the role of RNAi in host pathogen interaction.

Web: <https://www.gurdon.cam.ac.uk/research/miska>



David Summers Lecturer

Research in the Summers laboratory focused for many years on *E. coli* plasmids and the mechanisms by which they achieved stable inheritance. A significant discovery emerging from this work was that the multicopy plasmid ColE1, when damaged by dimerization, prevents the division of its bacterial host. Indole production was central to this cell cycle checkpoint and the many roles of indole in bacterial signalling have become the main focus of the group.

Web: <https://www.gen.cam.ac.uk/research-groups/research-groups/summers>
<https://www.gen.cam.ac.uk/directory/david-summers>



Juan Mata Lecturer

Juan Mata is a Senior Lecturer in the Department of Biochemistry. He is interested in the regulation of gene expression at the posttranscriptional level, especially RNA decay and translation. He uses the fission yeast *Schizosaccharomyces pombe* to address these questions, employing genetic and genomic approaches.

Web: <https://www.bioc.cam.ac.uk/research/mata>



Nianshu Zhang Practical Organiser

Based in the Department of Biochemistry, Nianshu Zhang is the Fermentation Facility manager and the group leader of stress response and chronological aging. The Zhang Group intends to understand how starvation-induced stress response and metabolic reprogramming are integratively regulated, and how this regulation impacts on chronological lifespan.

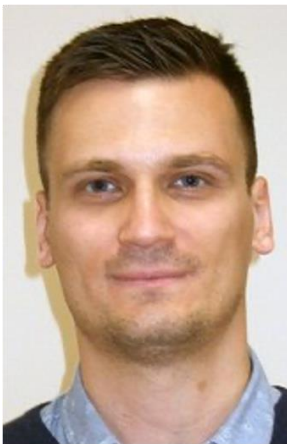
Web: <https://www.bioc.cam.ac.uk/research/zhang>



Cahir O'Kane Lecturer and Practical Organiser

I studied Genetics as an undergraduate in Cambridge, did a PhD in bacterial genetics in Trinity College Dublin, and as a postdoc in the University of Basel developed the tool of enhancer trapping. We use *Drosophila* to understand how neurons function and go wrong, in ways that are informative about neurodegenerative disease. Our main interest is axonal endoplasmic reticulum - how it is assembled and shaped; how it acquires features like a tiny diameter and physical continuity over distances that are enormous on a subcellular scale; its physiological roles in regulating calcium, lipids and other organelles like mitochondria; and the pathophysiological consequences when its shape is disrupted.

Web: <https://www.gen.cam.ac.uk/research-groups/research-groups/okane>



Pawel Mordaka Lecturer

Dr Pawel Mordaka works as a Research Associate in algal synthetic biology in the Plant Metabolism research group at the Department of Plant Sciences. He obtained his PhD in Chemical Engineering at the University of Nottingham and then worked as a postdoctoral scientist in microbial strain engineering for production of bulk and high-value products at Imperial College London. His current research focuses on designing and construction of synthetic biological systems for both fundamental and applied research. He is developing genetic tools for engineering and reprogramming of the chloroplast genome in a green alga *Chlamydomonas reinhardtii*. He is also interested in using microalgae as a platform for production of high-value compounds.



Marisa Segal Lecturer and Practical Organiser

Marisa's Research group investigates spindle morphogenesis in yeast, which is regulated by cyclin-dependent kinases (CDKs) and monitored by checkpoints to enforce accurate chromosomal segregation and spatial coupling between the axis of the mitotic spindle and the division plane. These controls safeguard genetic integrity over cell divisions. Furthermore, regulated orientation of the mitotic spindle during development can produce asymmetric divisions with progeny cells differing in their developmental fate.

Web: <https://www.gen.cam.ac.uk/research-groups/research-groups/segal>
<https://www.gen.cam.ac.uk/directory/marisa-segal>



Matthias Landgraf Practical Organiser

Based in the Department of Zoology, Matthias is a Reader in Neurobiology and works with the *Drosophila* Connectomics and Neural Network Development Groups. His research is interested in understanding how neural networks are specified and assembled.

Web: <https://www.zoo.cam.ac.uk/directory/dr-matthias-landgraf>



Paul Dupree Lecturer, Practical Organiser and Course Organiser for 2021/22

Prof Paul Dupree studied NST at Fitzwilliam College. After completing his PhD thesis in the Department of Plant Sciences in Cambridge, he moved to Heidelberg as a Royal Society Research Fellow at the European Molecular Biology Laboratory. There, he studied membrane trafficking in animal cells. He returned after three years to Cambridge to start a new project on the subcellular organisation of plant cells and was appointed as a University Lecturer in the Department of Biochemistry. He was made Professor of Biochemistry in 2010. Paul leads a Research team which is interested in understanding the Golgi localised biosynthesis and the function of polysaccharide components of the plant cell wall. He is interested in plant fibre applications from plastic replacements to development of a healthy diet.

Web: <https://www.bioc.cam.ac.uk/dupree>



Alex Webb Lecturer and Senior Examiner for 2021/22

Alex's group investigates how plants measure time by studying a biological 24 h timing device called the circadian clock. We have discovered that the circadian clock improves plant growth, sugars regulate the circadian clock to set a "metabolic dawn", there is a calcium signalling pathway at the heart of the circadian clock and that circadian clocks are dynamically plastic to allow synchronisation with the external environment of the Earth and to regulate the internal environment of the cell.

Web: <https://www.plantsci.cam.ac.uk/directory/webb-alex>



Howard Baylis Lecturer and Practical Organiser

Howard Baylis is Head of the Zoology Department. Howard and his team aim to understand how signalling within and between cells is used to regulate the physiology and development of animals. In particular we are studying how signalling networks that use the second messengers calcium and inositol 1,4,5-trisphosphate (IP3) are used to control the biology of *C. elegans* function in development, rhythmic process and behaviour. In addition to our work on cell signalling we have also identified new functions for the rather enigmatic membrane transport proteins, caveolins. We have an ongoing interest in using *C. elegans* as a model and tool in human disease research.

Web: <https://www.zoo.cam.ac.uk/directory/dr-howard-baylis>



Tim Weil Lecturer and Practical Organiser

Based in the Department of Zoology, Tim heads up a Research group that are interested in localised translation and translational regulation. This conserved mechanism for the spatial control of gene expression enables cells to target protein function in space and time and is especially relevant in the patterning of embryonic axes, formation of neuronal networks and movement of cells. To understand this fundamental process, they use *Drosophila* as a model system since imaging, biochemistry and genetic approaches can be readily combined to examine molecular mechanisms.

Web: <https://www.zoo.cam.ac.uk/directory/dr-timothy-weil>



Jim Haseloff Lecturer and Practical Organiser

Jim's area of research is synthetic biology and reprogramming of plant systems at the Department of Plant Science. He is also the Director of the Open Plant initiative for the development of shared tools for plant synthetic biology, and helps to manage the Interdisciplinary Research Centre for synthetic biology in Cambridge. Engineering approaches offer the prospect of rationally reprogramming of plant genetic systems, which would have a major impact on agriculture and sustainable bioproduction. He and his colleagues in OpenPlant believe that it is crucial that this technology be globally accessible, and are establishing technical frameworks for (i) open standards for plant synthetic biology, and (ii) simple model systems for analysis of whole plant growth and metabolic engineering, and (iii) frugal technologies for international training and capacity building. The last aim has led to the establishment of Biomaker and the development of interdisciplinary project-based learning in bioinstrumentation projects.

Web: <https://haseloff.plantsci.cam.ac.uk/>
<https://www.openplant.org>
<https://www.biomaker.org>



Ben Steventon Lecturer

Ben's research group is interested in the development of a bipotent population of stem cells called neuromesodermal progenitors. This essential cell population continues to provide progenitors for both the spinal cord and mesodermal during elongation of the posterior body axis. The lab applies a combination of quantitative imaging, experimental embryology and computational modelling approaches to explore how gene expression patterns emerge in the context of complex morphogenesis.

Web: <https://www.gen.cam.ac.uk/research-groups/research-groups/steventon-group>
<https://steventonlab.wordpress.com/>



Naomi Moris Lecturer

Naomi studied Biological Science at Imperial College London as an undergraduate, and found herself particularly interested in developmental biology and epigenetics. After some time spent researching at Cancer Research UK London, she came to Cambridge to do a PhD between the departments of Genetics and Haematology, before becoming a Junior Research Fellow with Alfonso Martinez-Arias' group. She is now a Group Leader at the Francis Crick Institute.

Web: <https://www.newn.cam.ac.uk/person/dr-naomi-moris/>
<https://www.crick.ac.uk/research/labs/naomi-moris>



Amy Bains Teaching and Examinations Administrator

Amy has been working at the University for just over 3 years and has 8 years' experience in the Culture, Heritage and Education sectors. Amy is based in the Department of Genetics as an Undergraduate Teaching Administrator. Contact Amy for anything related to the Moodle site and course administration.

Email: undergrad.admin@gen.cam.ac.uk



NST Part IB Cell & Developmental Biology

Libraries and Booklist

Using textbooks. Four major textbooks are listed below. These cover the course material at about the right level - sometimes higher and sometimes lower. You should as a matter of course read any relevant chapters in these textbooks.

College libraries should hold most of your needs for books, and you should use these as your first resource. The booklists below are recommended content for all college libraries.

Departmental libraries. The four departments that contribute to this course all have libraries, with special collections of books for Part I courses. All the libraries allow you to read and work there, but some have restrictions on what you may borrow and for how long. To use these libraries, the proper course is to introduce yourself to the Librarian, who will explain the rules to you and show you where to find the relevant books.

Booklist

1. Books that cover most areas of the course:

Molecular Biology of the Cell. **Alberts, B., et al.** 6th Rev ed. Taylor & Francis; 2014 ISBN 978-0-8153-4432-2 (hard), 978-0-8153-4524-4

Essential Cell Biology. **Alberts, B., et al.** 5th Rev ed. Garland; 2019 ISBN 9780393680393

Lewin's Genes XII. **Krebs, J.E. et al.** Jones & Bartlett; 2018 ISBN 9781284104493

Molecular Cell Biology. **Lodish H. et al.** 9th ed. W.H. Freeman and Company; 2021 ISBN 9781319208523

2. Books recommended for specific areas of the course and for further reading:

A Genetic Switch. **Ptashne, M.** 3rd ed. Cold Spring Harbor Lab Press; 2004 ISBN 0879697164

Molecular and Genome Evolution. **Graur, D.** MacMillan Palgrave; 2015 ISBN 9781605354699

The Art of Genes. **Coen, E.** Oxford: Oxford University Press; 2000 ISBN 0192862081

Principles of Development. **Lewis Wolpert, Cheryl Tickell, Alfonso Martinez Arias, et al.** 5th edn., Oxford University Press 2015; ISBN 0199678146

Developmental Biology. **Gilbert, S. F.** 11th ed. Sunderland, MA: Sinauer Associates Inc.; 2016 ISBN 9781605354705

Essential Developmental Biology. **Slack, J. 3rd ed.** Oxford: Wiley-Blackwell; 2012; ISBN 0470923512

The Making of a Fly. **Lawrence, P. A.** Oxford: Blackwell Science; 1992 ISBN 0632030488, pbk. Now out of print, but used copies are currently available.

The Biology of Plasmids. (1996) **D. Summers.** Blackwell Science

Using references to articles. Lecturers will also refer you to journal articles. These contain much relevant material that can improve your understanding of the material taught. The aim of this reading is to improve your understanding of the material, not to add further large amounts of factual information.

We encourage you to read as many of these articles as possible, but they often contain much more material than you need, or cover it at a level higher than you need to know. It is worth learning how to identify and select the most useful material – a worthwhile skill in its own right, and we encourage you to tackle the primary literature. Your supervisors will be able to help you in this.

Information about the Examination

You will be assessed by examination in the Easter Term. Two papers each count for 50% of the total marks. All papers are designed for completion in 3 hours (plus any pre-agreed individual adjustment). The actual examination arrangements will be subject to coronavirus-related restrictions in place at the time, but we anticipate that the papers will be taken remotely.

The final formats of the examination papers will be confirmed later in the year, but it is likely that they will conform broadly to the following:

Paper 1 is an essay paper based directly on the lecture material. There are three sections:

- Section A: Genes and the Nucleus.
- Section B: Cell Function on Organelle Biogenesis, Cytoskeleton, Membrane Traffic, Intercellular Communication.
- Section C: Development.

Candidates would be required to answer four questions, including at least one from each section. Each essay will carry equal weight.

Paper 2 is a paper consisting of two sections.

- Section A: More general integrative essay questions, or essay questions that explicitly require material from more than one block of lectures. Candidates would answer two questions out of at least five set.
- Section B: Questions relating to the practical part of the course. These might require analysis and interpretation of experimental data, and understanding of the methods used to obtain them, based on the experiments performed and information presented in the practical course, including the demonstration practicals.

What the examiners are looking for

We are looking for evidence of a good, intellectually critical understanding of the course material, based on experimental evidence. Ways in which you can convince the examiners that you have acquired this include the following:

- Some detailed factual information is a minimal requirement, but good answers will integrate information in a way that builds up a critical and intellectually coherent view of the question asked. It is not enough just to reproduce facts or models that you have learned.
- Cell and Developmental Biology is an experimental subject. You are therefore **expected to base any models or assertions you present on the experimental logic that supports them**, as far as is possible, using knowledge acquired from lectures and recommended reading.
- Where elements may require hand written or hand drawn aspects, write legibly.
- Make sure you understand the question asked, and answer it, not the question you would like to have been asked. Organise your time so that you do justice to all the areas of knowledge you write about. In data analysis or problem questions, explain your logic - even if you don't get the right answer, you will get credit for using the right logic.

Faculty of Biology criteria on classing of essay answers:

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

Past Examination Papers

Electronic copies of the papers can be accessed on the CDB Moodle site.

Supervisors can also access solutions to analytical or problem-type answers to recent years' practical problem sets, via the Supervisors' site. These solutions are not confidential and supervisors may share them with students. However, we do not provide solutions directly to students, to allow supervisors to set these questions for supervisions, without their supervisees having access to the solutions beforehand.

Previous Senior Examiner Reports

Recent Senior Examiner's reports on the CDB exam and the quality of its answers can give you additional insights into what Examiners are looking for:

<https://www.biology.cam.ac.uk/exams/nst-exams/senior-exam-reports/senior-examiner>

Avoiding plagiarism

In general, plagiarism can be defined as: **The unacknowledged use of the work of others as if this were your own original work.** In the context of an examination, this amounts to: **Passing off the work of others as your own to gain unfair advantage.**

This includes:

- **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.

As a result of COVID-19 measures, The University has moved away from invigilated, in-person examinations, to remote sittings and online provision and return of examination papers. This provides a greater opportunity for the copying of other sources in exam answers. This can sometimes be unintentional if personal notes or essays contain verbatim quoted material. Please be aware that examination scripts will be scanned through Turnitin software (<https://www.turnitin.com>), which will detect **any** text matches with potential source material in **all** published literature, including all text that has been previously scanned by the software, i.e. other submitted student essays across the planet. Each Turnitin scan produces a report that identifies all matching text and the possible original source for any copied material. While allowances are made for reuse of technical terms and unavoidable phraseology, extensive use of directly copied or poorly paraphrased material **will** be detected.

Such use of unfair means in examinations or dissertations is not tolerated by the University; if detected, this may lead to disciplinary proceedings, and the penalties for plagiarism can be severe. So please be scrupulous in noting any primary sources that you use for any essays or notes, and be careful to use your own wording for examination questions.

For more details, see: <https://www.biology.cam.ac.uk/exams/AllExams/plagiarism>



NST Part IB Cell & Developmental Biology

Course Management

The course is overseen by a Management Committee, consisting of those who teach, examine or directly support the course, and the Teaching Coordinators of participating departments or their nominated deputies. The committee decides broadly on the content of lectures and practicals, and has the responsibility for organising and delivering these. The day-to-day running of the course is devolved to a small Core Committee, who act as course organisers (see below). This group meets with student representatives (chosen by you) and lecturers at the end of every term (the Consultative Committee) to look at the results of questionnaire returns and find out your views about the course.

The course is revised on a yearly basis in the light of comments made by you in questionnaires (distributed with lecture handouts) and by your representatives on the Consultative Committee which meets each Term.

Meetings are held on Mondays of the last week of the academic term and start at 4pm. Students are encouraged to pass along comments, feedback and suggestions to be raised by their Students Reps or staff at these meetings.

The minutes of Consultative Committee meetings and analysis of student questionnaires can be accessed from the Cell and Developmental Biology Moodle site.

Course Core Committee Members 2021 – 2022

Prof Paul Dupree (Biochemistry); Chair of Management Committee and Course Organiser

Dr Cahir O’Kane (Genetics)

Prof Jim Haseloff (Plant Sciences)

Dr Torsten Krude (Zoology)

Dr Juan Mata (Biochemistry)

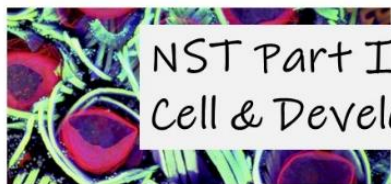
The Course Organisers for CDB and for Part IB Biochemistry and Molecular Biology also attend each other’s Core or Management Committee meetings.

Examiners 2021/22

Prof Alex Webb (Senior Examiner) (Plant Sciences)

Prof Eric Miska (Genetics)

Phil Zegerman (Biochemistry)



NST Part IB Cell & Developmental Biology

Contact Information

Contact	Name	Email	Role/Additional Comments
Chair of Management Committee and Course Organiser	Prof Paul Dupree	pd101@cam.ac.uk	Academic issues relating to the course, e.g. the organisation/timetabling of lectures and practicals.
Senior Examiner	Prof Alex Webb	aarw2@cam.ac.uk	Examination issues
CDB Teaching Administrator and Committee Secretary	Mrs Amy Bains	undergrad.admin@gen.cam.ac.uk	Organisation of meetings of the Consultative & Management Committees, Moodle site, Mailing Lists, Other day to day subject tasks.
Core Committee Member – Zoology	Dr Torsten Krude	tk218@cam.ac.uk	Core Committee Member, Lecturer and Practical Organiser
Committee Member – Plants Sciences	Prof Jim Haseloff	jh295@cam.ac.uk	Core Committee Member, Lecturer and Practical Organiser
Committee Member – Genetics	Dr Cahir O’Kane	cjo1003@cam.ac.uk	Core Committee Member, Lecturer and Practical Organiser
Practical Laboratory Technician	Jacek Zalewski, Zoology	jz328@cam.ac.uk	Organisation of the practical laboratory (but not practical teaching or content)
CDB Student Class Email List	All 2021/22 CDB students.	cdb@gen.cam.ac.uk	Group communications mailing list open to all to use. Supervised and managed by Amy Bains.