igc
INSTITUTE OF GENETICS & CANCER

UKRI Medical Research Council

THE UNIVERSITY of EDINBURGH

CANCER RESEARCH UK

GRADUATE RESEARCH & TRAINING

HANDBOOK 2023

Welcome

Graduate Research and Training Contacts

Staff Student Liaison Committee/Officer

GRADUATE RESEARCH &TRAINING

HANDBOOK 2023

Welcome

We are delighted to welcome you to your postgraduate training programme at the Institute of Genetics and Cancer. On the following pages you will find information relating to the different programmes, timetable for the first 6 months, and the assessment timetable for the next 3 or 4 years.

As you probably know, we have a mixture of students on campus, some of whom are following a four year PhD programme with rotations and others who are starting a three year PhD in a specific lab, whilst others are studying for an MSc or MD. There are some teaching elements of the four year taught course that might be of interest to other students, for example covering different technologies, computer programming, aspects of clinical reserach and research ethics - these are shown in a detailed timetable. This teaching is only compulsory for the 4-year HGU students, but other students (and postdocs) are welcome to sign up and attend any sessions that you find useful; you might want to discuss your choice with your supervisor(s). We hope that the Graduate Research and Training environment will provide a useful framework for your studies. Please feel free to air your views, and to approach us about any issues you have, and help us to make the Institute a huge success!

Graduate Research and Training contacts

The Institute is made up of three centres, the MRC Human Genetics Unit (HGU), the Centre for Genomics and Experimental Medicine (CGEM) and the Cancer Research UK Edinburgh Centre (ECRC), each with their own Graduate Convenor. The Institute falls within the School of Molecular, Genetic and Population Health Sciences (you will need to know this School affiliation when you apply for Transkills courses amongst other things), and the SMGPHS is within the College of Medicine and Veterinary Medicine or CMVM.

In the first instance you will mainly deal with your supervisors, Graduate Convenor or Nick Gilbert (Director of Graduate Research and Training for the Institute of Genetics and Cancer). You will also have a thesis committee (normally setup abour 10 weeks into your PhD) which will be made up of your supervisors, an external advisor and a committee Chair. Formal issues (interruption of studies and so on) are dealt with by the Director of Graduate Research and Training and the College PG Office.

Head of School of MGPHS:
Professor Sarah Cunningham-Burley

Director of Graduate Research and Training, Institute of Genetics and Cancer:
Professor Nick Gilbert

Graduate Convenor, CRUK Edinburgh Centre:
Dr Susan Farrington

Graduate Convenor, MRC Human Genetics Unit: **Professor Ian Adams**

Graduate Convenor, Centre for Genomic & Experimental Medicine: **Dr Kathy Evans**

Director of PG Studies, College of MVM:
Professor Paddy Hadoke

Staff Student Liaison Officer:
Dr Catherine Naughton
Dr Dasa Longman

Graduate Research and Training Administrator:
Pauline McDonald

Graduate Research and Training Assistant:
Alana Johnson

Staff Student Liaison Committee

At the Institute of Genetics and Cancer we are committed to ensuring a high-quality student experience. To ensure we are able to deliver this, and to "maximise our students' potential", we encourage students to communicate their views and suggestions to help influence any required changes to policies and procedures. The Institute Staff Student Liaison Committee (SSLC) meets biannually to discuss matters of mutual concern of staff and students. The SSLC is composed of student and staff representatives, and we strongly encourage students at any stage of their graduate degree to consider joining the SSLC. The current Staff Student Liaison Officers are (SSLO) Dr. Catherine Naughton and Dr. Dasa Longman.

Catherine Naughton

Catherine is a senior research scientist in Professor Nick Gilberts laboratory in the MRC, Human Genetics Unit. She has over 15 years experience as a post-doctoral scientist and has mentored and supervised many PhD students.

Dasa Longman

Dasa is a Senior Scientist in the lab of Professor Javier Caceres, MRC HGU, and has many years experience of formal and informal mentoring of PhD and undergraduate students.

Catherine and Dasa together oversee the POGs induction events held during induction week for new PhD students, coordinate the 1st-year student journal clubs and organise the biannual SSLC meetings.

What to do if things go wrong

If you have a problem with your project and/or supervisor, you should first try to resolve it between yourselves - it is important to keep lines of communication open where possible and not let things degenerate. If there is still a problem, then please seek advice - you should feel free to speak to your second supervisor, your thesis committee Chair, the Directors of the Graduate School or the PG Convenor for your building.

These conversations will be in confidence and a strategy will be devised to try and address any problems. Additional meetings of thesis committees can be arranged (subject to members' availability) if the student and/or supervisors feel that this would help. If you are not happy with the outcome of frontline resolution (and on the rare occasions where a local resolution is not an appropriate early step) the University has procedures in place for dealing with complaints and the Institute of Genetics and Cancer adheres to these procedures rigorously. Details of these can be accessed through the CMVM Postgraduate Wiki which is also accessible from the Institute of Genetics and Cancer Graduate Research and Training web pages.

Meet the Team: PG Directors

Professor Nick Gilbert - Director of Graduate Research & Training MRC HGU/ Institute of Genetics and Cancer

Email Nick.Gilbert@ed.ac.uk
Telephone 0131 651 8551 Location: C3.21

Research Group
www.ed.ac.uk/mrc-human-genetics-unit/research/gilbert-group

Dr Ian Adams - Graduate Convenor, MRC Human Genetics Unit

Email Ian.Adams@ed.ac.uk
Telephone 0131 467 8456

Research Group
https://www.ed.ac.uk/mrc-human-genetics-unit/research/adams-group

Dr Susan M Farrington - Graduate Convenor, CRUK Edinburgh Centre

Email Susan.Farrington@ed.ac.uk
Telephone 0131 651 8632

Research Group
www.ed.ac.uk/cancer-centre/research/farrington-group

Dr Kathy Evans - Graduate Convenor, CGEM

Email Kathy.Evans@ed.ac.uk
Telephone 0131 651 8747 Location: N2.09

Research Group
www.ed.ac.uk/centre-genomic-medicine/research-groups/evans-group

Students and staff should contact their local Centre PG Director for academic support.

Administration Team

Pauline McDonald

Alana Johnson

Email student-admin@igc.ed.ac.uk
Telephone 0131 651 5771 Location: CG.11

Pauline and Alana manage the day-to-day administration of the Graduate Research and Training programme, and are based on the ground floor of the MRC Human Genetics Unit.

For queries related to Postgraduate Research and Training, Pauline and Alana provide support to prospective, on-programme and visiting students, as well as supervisors and academic staff. When appropriate, they will signpost students and staff to key central university services.

Pauline and Alana work closely with Centre PG Directors to enhance the Student Experience and oversee the following areas of work:

- Student Recruitment & Admissions
- Tier 4 Engagement & Monitoring process for international students
- Visiting student admissions
- Manage Graduate Research and Training website in liaison with PG Directors
- Coordinate teaching programme
- Organise student events e.g. Science at the Interface to Industry, Christmas lectures, John Inglis talks etc.
- Organise and minute Staff Student Liaison Committee (SSLC) / Postgraduate Studies Committee (PGSC)
- Manage Student Social Media Platforms

Induction Week
Teaching Timetable

GRADUATE RESEARCH & TRAINING

HANDBOOK 2023

Induction Week

Monday 11th September	
09:30 - 10:00	PGR Director's welcome – Nick, Ian, Susan (Lecture Theatre)
10:00 - 10:30	Head of School welcome – Sarah Cunningham-Burley (Lecture Theatre)
Break for coffee	
11:00 - 11:30	General Admin to Students Q&A - Pauline, Alana (Lecture Theatre)
Break for lunch	
14:00 - 15:00	Good Practice in PhD Research - Grace and Emma (Lecture Theatre)
15:30 - 17:00	POGS social - POGS Team (soft seating area of NUCLEUS)
Tuesday 12th September	
09:00 - 10:00	IT General Familiarisation – Kenny Burns & IT Team (MEC Computing Lab 1)
10:15 - 10:30	Edinburgh Innovations - Farai Munjoma (Lecture Theatre)
10:30 - 11:00	HGU Students only - Intro to 4 year programme - Ian, Pauline (Lecture Theatre)
Break for coffee	
11:30 - 12:00	CMVM Welfare Advice - Sharlotte Patterson, Douglas Beales (Lecture Theatre)
12:00 - 13:00	Student Disability and Learning Service - Jan Gardiner (Lecture Theatre)
Break for lunch	
14:00 - 15:00	Genetics for non-biomedical scientists - Andreanna, Kelsey (E4.07)
Break for tea	
15:30 - 17:00	HGU rotation project talks 1 (E4.07)
Wednesday 13th September	
09:00 - 09:30	Library Services - Marshall Dozier (Lecture Theatre)
09:30 - 10:00	Institute of Academic Services - Louise McKay (Lecture Theatre)
10:00 - 11:00	Public Engagement and Communications - Dee Davison (Lecture Theatre)
Break for lunch	
13:30 - 14:30	Equality and Diversity – Dee Davison and Peter Tennant (Lecture Theatre)
14:30 - 15:00	Bioinformatics Analysis Core and Advanced Computational Training - Alison Meynert (E4.07)
Break for tea	
15:30 - 17:00	HGU rotation project talks 2 (E4.07)
Thursday 14th September	
09:00 - 10:30	HGU rotation project talks 3 (S1.15)
Break for coffee	
11:00 - 12:30	Health and Safety - Iain Kennedy (S1.15)
Break for lunch	

14:30 - 17:00	Good enough practices for scientific computing workshop - Alison Meynert (MEC Computing lab 1)
Friday 15th September	
09:00 - 16:30	Intro to command line for genomics - Graeme Grimes (MEC Computing Lab 1)
Monday 18th September	
09:00 - 10:00	Student Health and Wellbeing - Andy Shanks (E4.07)
10:30 - 12:00	HGU rotation project talks 4 (E4.07)
Break for lunch	
13:00 - 17:00	Intro to the University of Edinburgh's compute cluster Eddie - John Ireland (MEC Computing lab 1)
Tuesday 19th September	
09:30 - 16:30	Project Organization management & data wrangling for genomics 1 - Alison Meynert (MEC Computing lab 1)
Wednesday 20th September	
09:00 - 16:30	Project Organization management & data wrangling for genomics 2 - Alison Meynert (MEC Computing lab 1)
Thursday 21st September	
09:30 - 12:30	Intro to R - Graeme Grimes (MEC Computing lab 1)
Break for lunch	
15:30 - 17:00	HGU roation project talks 5 (S1.15)
16:00 - 19:00	POGS Quiz (Nucleus)
Friday 22nd September	
09:30 - 12:00	RStudio for genomics - Graeme Grimes (MEC Computing lab 2)
Break for lunch	
14:00 - 15:30	HGU rotation project talks 6 (South Seminar room)
Monday 25th September	
09:30 - 16:30	Basics and intermediate statistical skills - Hannes Becher (MEC Computing lab 1)
Tuesday 26th September	
09:30 - 16:30	Basics and intermediate statistical skills - Hannes Becher (MEC Computing lab 1)
Wednesday 27th September	
09:30 - 16:30	Plotting and programming in Python - Murray Wham (MEC Computing lab 1)
Thursday 28th September	
09:30 - 16:30	Intro to Version Control with git and GitLab - Graeme Grimes (MEC Computing lab 1)
Friday 29th September	
09:30 - 16:30	Intro to Genome Browsers and IGV - EBI Team / Gogo (MEC Computing lab 1)

Monday 2nd October HGU Students Start Rotation Project 1	
09:00 - 12:00	Reading and evaluating scientific literature - Craig Anderson / Ian Adams (E4.07)
14:00 -15:30	How to duplicate your genome - Tom Deegan (E4.07)
Monday 9th October	
09:30 - 11:00	Good Research Practice - Helen Nickerson (E4.07)
14:00 - 15:30	Establishing mechanisms underlying genetic associations with complex traits and disease - Veronique Vitart and Chloe Stanton (E4.07)
Thursday 12th October	
16:00 - 18:00	POGS Career Event
Monday 16th October	
14:00 - 15:30	Critical Evalution Skills 1 (E4.07)
Monday 23rd October	
09:00 - 12:00	Scientific Blogging - Lorna Campbell - ONLINE Workshop
14:00 -15:30	Preventing Inherited Aneuploidies in the Mammalian Germline - Ian Adams (E4.07)
Monday 30th October	
09:00 - 12:00	Next Generation Sequencing - Lee Murphy (E4.07)
14:00 -15:30	Critical Evalution Skills 2 (E4.07)
Monday 6th November	
09:30 - 12:00	Biological Imaging - Ann Wheeler & team (S1.14)
14:00 - 15:30	Degron tagging in human disease models: Opportunities and challenges - Andrew Wood (S1.14)
Monday 13th November	
09:30 - 12:00	Analysing Imaging Data - Ann wheeler (MEC Computing Lab 1)
14:00 - 15:30	Critical Evalution Skills 3 (E4.07)
Thursday 16th November	
17:00 - 19:00	POGS Thesis Writing Workshop
Monday 20th November	
09:30 - 12:00	Super resolution imaging - Ann Wheeler & team (E4.07)
14:00 - 15:30	Genome Integrity disorders in the information age - Andrew Jackson (E4.07)
Monday 27th November	
09:00 - 12:00	Advanced Proteomics and Metabolomics - Alex von Kriegsheim / Jair Marques Junior (E4.07)
14:00 - 15:30	Critical Evalution skills 4 (E4.07)
Friday 1st December - Christmas Talks	
Monday 4th December	
09:30 - 10:30	Experimental Model Systems - Cameron Wyatt / Laura Lettice (E4.07)
14:00 - 15:30	Computational Cancer Genomics - Colin Semple (E4.07)

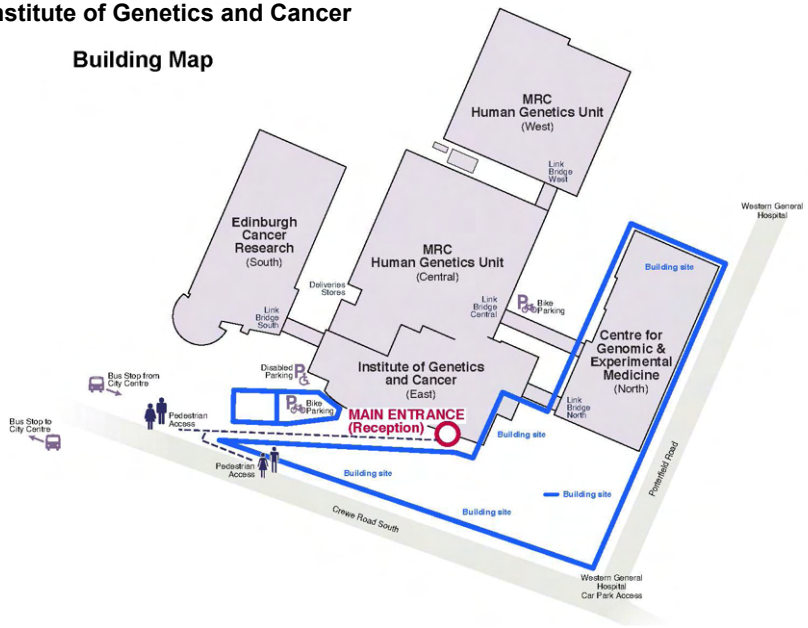
Thursday 7th December - HGU Rotation Talks (Lecture Theatre)	
Monday 15th January	
09:30 - 12:30	Translating your research - Helen Nickerson & Sarah Trewick (E4.07)
14:00 - 15:30	Critical Evalution Skills 5 (E4.07)
Monday 22nd January	
10:30 - 12:00	Drug Development - Neil Carragher / Stefan Symeonides (E4.07)
Monday 29th January	
14:00 - 15:00	Research Data Management Essestials - Helen Nickerson / Simon (E4.07)
14:00 - 15:30	Critical Evalution Skills 6 (E4.07)
Monday 5th February	
09:00 -12:00	Genome Engineering - Andrew Wood / Pleasantine Mill (E4.07)
14:00 -15:30	Allele-aware functional genomics - Chris Ponting & Breeshey Roskams-Hieter - (MEC computing lab 1)
Monday 12th February	
09:00 - 10:30	3D genome organisation. How to analyse it and determine its function? - Wendy Bickmore (E4.07)
14:00 - 15:30	Critical Evalution Skills 7 (E4.07)
Monday 19th February	
09:00 - 10:30	Mechanisms of long-range gene regulation in development and disease - Hannah Long (E4.07)
14:00 -15:30	RNA processing and gene regulation - Javier Caceres (E4.07)
Monday 26th February	
09:00 - 10:30	Protein Variant Interpretation - Joe Marsh (E4.07)
10:30 - 12:30	Scientific Graphics - Craig Nicol (E4.07)
14:00 -15:30	Critical Evalution Skills 8 (E4.07)
Monday 4th March	
09:00 - 10:30	The role of epigenetics in human disease - Duncan Sproul (E4.07)
14:00 - 15:30	Innate immune signalling of self-nucleic acid in human disease - Yanick Crow (E4.07)
Monday 11th March	
14:00 - 15:30	Critical Evalution Skills 9 (E4.07)
Monday 18th March	
14:00 - 15:30	Critical Evalution Skills 10 (E4.07)
Monday 25th March	
09:00 - 10:30	Non-coding mutations disrupt gene regulation and cause congenital defects - Laura Lettice (E4.07)
Friday 29th March	
HGU Rotation student project write-up deadline	
Monday 1st April - HGU PhD Starts	

HGU Rotation Project Talks

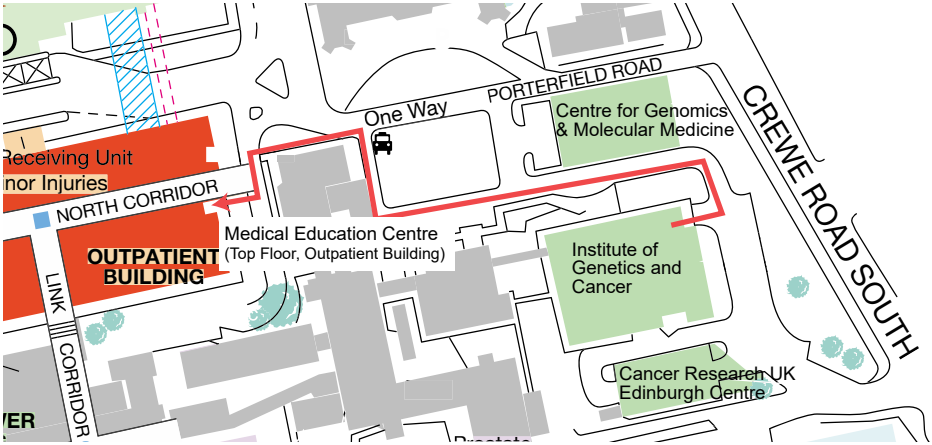
Tuesday 12th September	
15:30 - 16:00	Pleasantine Mill - Defining molecular principles of tubulin isotype diversity in human health and disease (E4.07)
16:00 - 16:30	Javier Caceres - Regulation and function of the nonsense-mediated decay (NMD) pathway (E4.07)
16:30 - 17:00	Duncan Sproul - Using single molecule approaches to understand DNA methylation maintenance (E4.07)
Wednesday 13th September	
15:30 - 16:00	Wendy Bickmore - Mechanisms of long-range enhancer function (E4.07)
16:00 - 16:30	Yanick Crow - Leveraging rare-disease modelling to identify fundamental biological mechanisms that contribute to human disease (E4.07)
16:30 - 17:00	Tom Deegan - Molecular mechanisms of genome replication in humans (E4.07)
Thursday 14th September	
09:00 - 09:30	Hannah Long - Investigating long-range enhancers and 3D genome topology at a human craniofacial disease locus (S1.15)
09:30 - 10:00	Ian Adams - How do mammalian germ cells pass on the correct number of chromosomes to the next generation? (S1.15)
10:00 - 10:30	Liz Patton - Targeting melanoma cellular heterogeneity (S1.15)
Monday 18th September	
11:00 - 11:30	Andrew Wood - Targeted protein degradation in human disease models (E4.07)
11:30 - 12:00	Greg Kudla - High-throughput discovery of disease mutations by in vivo deep mutational scanning (E4.07)
Thursday 21st September	
15:30 - 16:00	Joe Marsh - In silico mutational scanning to understand and predict protein function and genetic disease (S1.15)
16:00 - 16:30	Catherine Naughton (Nick Gilbert Group) - Understanding chromosome structure in health and disease (S1.15)
16:30 - 17:00	Martin Taylor - Dissecting clonal heterogeneity with cellular lineage tracing in cancer and development (S1.15)
Friday 22nd September	
14:00 - 14:30	Luke Boulter - How do tissue mechanics affect cell state? (South Seminar Room)

Institute of Genetics and Cancer

Building Map

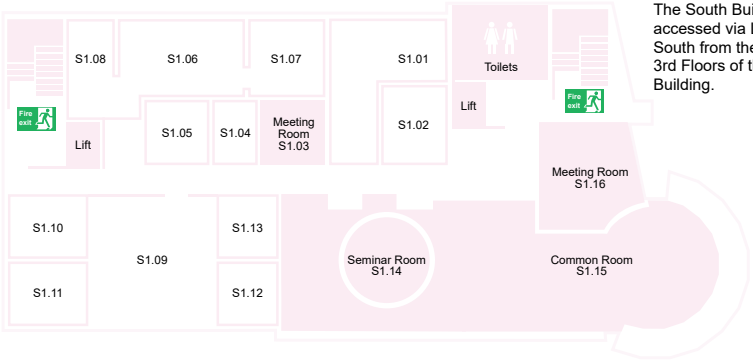


NHS Outpatients Building Computing Suite 1
Medical Education Centre, 3rd Floor



Institute of Genetics and Cancer
Cancer Research UK Edinburgh Centre South Seminar Room S1.14

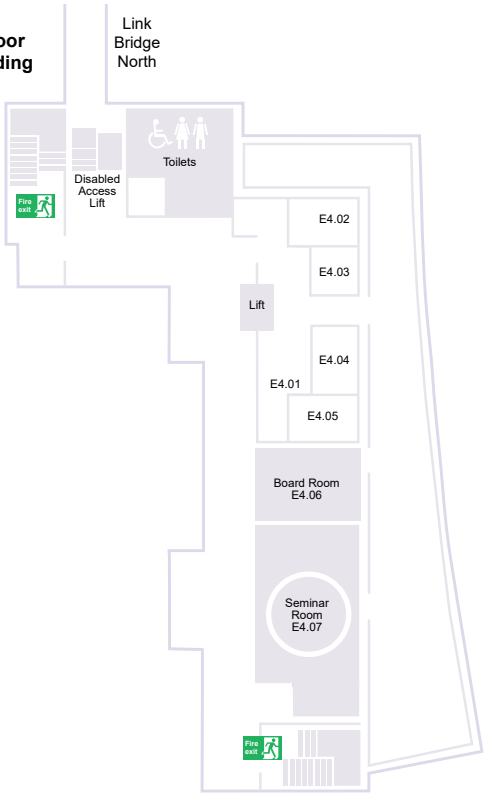
First Floor
South Building



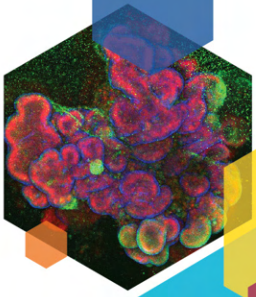
The South Building can be accessed via Link Bridge South from the 2nd and 3rd Floors of the Central Building.

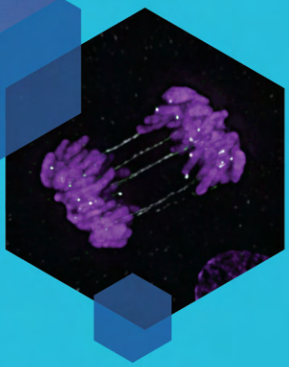
Institute of Genetics and Cancer

Fourth Floor
East Building



Assessment Guidelines
for all students





GRADUATE RESEARCH &TRAINING

HANDBOOK 2023

Assessment Guidelines

PhD, MD, MScR assessment guidelines

During the course of your studies you will regularly be assessed. This will comprise writing reports, attending and presenting at thesis committee meetings and completing an annual review on EUCLID. For part time students assessments should happen every year and follow this format.

In the Institute our assessments are based on the CMVM guidelines and further information can be found on the CMVM wiki (http://edin.ac/2crLMTx)

Assessment reviews on EUCLID

All students need to complete an assessment review on EUCLID which will be signed off by you, your supervisors and postgraduate director. Over the course of your project you will complete an annual review to coincide with your 10-week, first year, second year and every subsequent year until you finish your studies. In some cases your thesis committee will decide that an interim meeting (e.g., half way through your second) or an additional meeting (e.g., at the end of the third year of a three year funded PhD) would be helpful. Please ensure your reports and feedback are uploaded onto EUCLID for sign-off. The online student portal (EUCLID) can also be used to record other important milestones in your training in Edinburgh and your supervisor may log individual meetings with you on this system.

Student reports

As a guide these are the reports required for different programmes.

	MSc by Research	3 year PhD	4 year PhD	MD
10 week report	✓	✓	✓	✓
6 month report	✓			
1st year report		✓	✓	✓
2nd year report		✓	✓	
3rd year report			✓	

We will send out the hand-in dates of these assessments to all MSc/PhD students when they commence their studies.

10 week report assessment

This report should be concise (1000 words excluding title, references, abstract or figure legends). As this report is being written at the beginning of your studies, we are most interested in what you plan to investigate over the next year. The report should include:

- Title, and the names of you and your supervisor.
- An abstract of less than 100 words.
- Introduction that provides sufficient background information for the reader to understand the proposal and that puts the scientific question(s) into context.
- A section that states the scientific question(s) that are being asked and the aims of the project.

- A short section on any progress made to date.
- A section describing your proposal for the next year's work.
- Figures can be added in any section to help describe the project or to show any data that you have obtained in the first few weeks of your project. Figure legends should provide succinct description of the figure.
- Reference List.

On completion, the report should be uploaded onto EUCLID and submitted to the Graduate Research and Training team: student-admin@igc.ed.ac.uk. Following submission you will be given feedback in the form of an email and/or meeting (depends on programme). This is also a good time to plan the composition of your thesis committee (see below).

First Year Review:

- **submitted at 9 month stage for PhD students**
- **submitted at 6 months for MScR students**

The next assessment stage is the first-year review. This rigorous review is your opportunity to demonstrate your suitability to progress and will consist of three elements:

- a written report from the student
- a meeting with the student and thesis committee
- a written report by the thesis committee

Student's written report: The report should adopt a logical format and be of a high standard. It should be typed and free of typographical and grammatical errors. A clear statement of the aims of the project should be included in addition to a brief account of methods and their validation. Whilst it is recognised that at this stage students may not have substantial data, preliminary results should be documented and interpreted with a clear statement of intent as to immediate future studies (these might be expected to form the basis of discussion at interview). The text should be referenced as for a scientific paper and references listed at the end of the report. It is expected that the report should be around 5000 words. It should incorporate diagrams, figures and tables as necessary. Preliminary drafts of the report should be discussed with supervisors. It is often useful to ask your supervisor for an example report from a previous student. The student's report should be available to members of the thesis committee at least one week before the thesis committee meeting, allowing time for adequate consideration of the reports, and reports should be uploaded onto EUCLID.

Thesis Committee Meeting: This meeting will involve the student and thesis committee. The meeting is normally expected to include a short (10-15 minute) presentation by the student introducing the project, describing methodology and any preliminary results and identifying future studies. Students are strongly encouraged to rehearse with supervisors before the interview. You should expect the thesis committee to discuss specific points of content and organisation arising from the written report during the course of interview. You will have an opportunity to initiate a dialogue and, if necessary, raise matters of concern with the committee.

Feedback: The thesis committee should make an assessment of the student's written report, performance at interview and overall progress. The student should be informed of the committee's opinion during the meeting, they will then write a report, normally within one week of the meeting, summarising the assessment. Good and very good progress should be credited; any unsatisfactory aspects of performance should be clearly defined with an attempt to identify underlying reasons. It should make clear recommendations as to subsequent progress and action and be signed by all members of the committee. The student will have an opportunity to see the report, and be able to discuss strengths, weaknesses and any issues of concern with the chair in the absence of his/her supervisor(s). The student can also add comments before

signing the report. An unsatisfactory report may be used for future discussions or as the basis for re-registering students for a different degree or in very rare cases discontinuing studies (see outcomes). It is therefore essential that clear details of remedial action or the reasons for change in registration are documented. The signed thesis committee assessment should be uploaded onto EUCLID.

Outcomes: An initial recommendation will be made as to whether student progress is satisfactory or is inadequate in one or more aspects. In the case of inadequate performances a further recommendation from the thesis committee will be needed in terms of whether the student is (i) re-assessed or (ii) re-registered for a different degree, change in period of study or discontinued. In these cases it would be expected that students are totally unsatisfactory or severely deficient in several areas of their study.

Second Year Review

The second-year report does not need to be as long as the first year report but should contain a clear indication of achievable plans for the following year and an outline plan for the thesis. As for the first year review the student should organise a meeting with the thesis committee who will also write a report. Your second-year report and assessment from the thesis committee should be uploaded onto EUCLID.

Subsequent Reviews

For four year and continuing students there will be reviews every year until submission. Sometimes these will require a thesis committee meeting and this should be discussed with your supervisor.

Final Year Talk

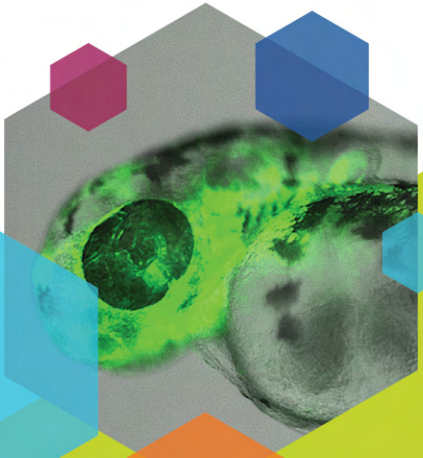
Students in their final year will be scheduled to give a talk to their centre. These are a fun opportunity to present to your friends and colleagues and should be seen as an opportunity to showcase your work. These will be organised by student admin and your graduate director.

Thesis committee

The composition of the thesis committee will vary depending on your programme of study. It will comprise of your supervisors including a day to-day lab supervisor where appropriate, an external committee member and a Chair. The external may be from the same building, but should be independent of the supervisors. The Chair should be someone with experience of student supervision of at least Senior Lecturer level. For MScR and MD the roles of the chair and external are often combined.

General Information

- Postgraduate transferable skills programme
- Social media
- POGS
- Social committee
- Annual/sick leave
- Health and Wellbeing
- Pastoral Support Committees
- Annual Student / Supervisor Structured Discussion



GRADUATE RESEARCH &TRAINING

HANDBOOK 2023

Postgraduate transferable skills programme - Institute of Academic Development (IAD)

www.ed.ac.uk/institute-academic-development

The acquisition and development of generic research and transferable skills is an important part of postgraduate training. Courses covering a wide range of skills are available to postgraduate research students in the Graduate School of Medicine & Veterinary Medicine through the transferable skills programme. This programme concentrates on the professional development of postgraduates, providing courses directly linked to postgraduate study (e.g. Thesis Workshop, Good Practice and Academic Paper Writing) and future careers (e.g. Successful Career Strategies for PhD Students, Local GRADschools). The programme also provides information on other training opportunities for postgraduates.

Courses are free of charge to postgraduate students in the College of Medicine and Veterinary Medicine. The programme has been designed to be as flexible as possible so that each student can tailor the content and timing of the programme to their own requirements. Most courses are run several times each year and last for between half a day and a day.

Workshops for postgraduate researchers by theme

The following workshops make up the core programme open to all postgraduate researchers, and are displayed by theme.

Research Planning and Management

- Managing your Research Project
- Practical Project Management for Research Students
- Viva Survivor
- Innovation School
- Managing your Research Data

Communication and Impact

- Designing Effective Slides
- Public Speaking, Networking and Engaging
- Poster Production
- Presenting made Easy – Presentation Techniques
- Presenting Made Easy – Delivering Presentations
- Presenting your Poster Pitch
- Research, Researchers and the Media, a hands on approach to communicating your research

Writing and Publishing

- Academic writing peer review
- Beating Writers Block
- Developing a Writing and Publishing Strategy in the Internet Age
- Effective Writing: Grammar
- How to be your own best editor
- Is my writing ‘Academic’ Enough?
- Just Write
- Proof Reading
- Text, Coherence, Structure and Argumentation
- The Writing Process: Getting Started
- Writing a Literature Review
- Writing Abstracts
- Writing Clinic
- Writing for Publication
- Writing Retreat
- Writing Well: Language and Style
- Academic Writer – Creative Writer
- An Introduction to Copyright and Publishing
- This is what I do… and this is why it matters

Digital and Library Skills

- Beginners Guide to Imaging
- Searching Literature and Managing Bibliographies
- Managing a Bibliography in Endnote
- Finding Academic Literature
- Social media for impact: strategy, connecting & metrics

Statistics

- Statistical Consultancy 1:1 Session
- Introductory Statistics for Life Scientists

Personal Effectiveness

- Conference and Events Organising
- Creating Effective Collaboration
- Creative Problem Solving for Researchers
- Imposter Syndrome: Why Successful people often feel like frauds
- Ease the Load – Feel good about your busy life
- How to be an Effective Researcher
- Mapping your Mind
- Seven Secrets of a Highly Successful Research Student
- Simply Assertive
- Speed Reading
- Teambuilding and Leadership Fundamentals
- Think Strategically Respond Rapidly
- Managing your Work, your Goals and Yourself

Public Engagement

- Communications Toolkit for a Public Audience
- Dialogue: Public Engagement Beyond Public Lectures!
- Storytelling Techniques for Effective Communication
- Voice and Presentation Skills Workshop
- How to Design a Public Engagement Process
- Facilitation skills for public engagement
- An Introduction to Public Engagement

Online learning

PhD student online training courses (topics include statistics; imaging; academic writing; and data management). Some you can do any time, and others run at specific times of the year.

- Statistics courses
- Imaging for scientists
- Academic writing
- Research Ethics and Integrity - an introduction
- Data management training
- Ready to research

The Edinburgh Local GRADschool is open to all PhD students in their final or penultimate year of study:

www.ed.ac.uk/institute-academic-development/postgraduate/doctoral

Advice on using social media networks & confidentiality of information

Facebook, Twitter and other social media networks have changed the way we interact with each other and like them or not, they are a part of our society.

As some of you will carry out research where animals are involved, please ensure that you follow procedures to ensure our work continues to be ethical, credible and professional. Sharing images/discussions of animal work outside of the context of academic discourse is not appropriate. This not only applies to posts on social network sites but to informal discussions in the pub or on the bus.

Please remember you must not post the following information:

- Scientific research information, analysis, results or any other information and /or images relating to your work.
- Location details of research buildings where animal work is carried out.

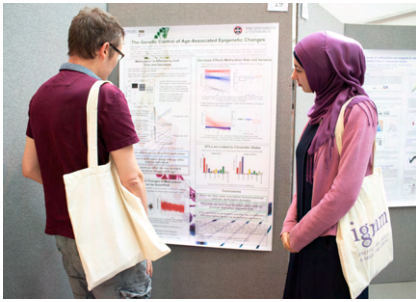
Be mindful of your responsibilities

- Data Protection legislation - do not disclose other people's personal information without prior permission.
- Be aware that any posts you make in a professional capacity (even private posts) are subject to data protection and freedom of information and may need to be disclosed.
- University policies apply: Students must not post materials about their work and locations if doing so would carry a risk to themselves and especially to others, including the University as an organisation (see section 5 University policies).

www.ed.ac.uk/website-programme/ training-support/guidelines/social-media

POGS

The Postgraduate Society (POGS) is a student-run committee open to the Institute students from all years and centres. Our aim is to improve the student experience, promote collaboration, provide support and have fun! By organising events throughout the year we bring students together, helping them develop skills and career perspectives. Our most popular events include the annual student retreat, thesis writing workshop, pub quiz, poster evening, and careers event. All students are welcome to take part so don't hesitate to come say hi!



POGS is jointly funded by the Institute and the Deanery, which means (almost) all of our events are completely free! Joining the POGS committee is a great way to get involved with the Institute community, and have your say on how events are run. Meetings are held approximately once a month, and we are always looking for new committee members. To get involved, contact us at: pogs@igc.ed.ac.uk.

Best wishes, POGS

Vacation Leave

Students can take up to eight weeks' vacation time in a year, with agreement from their supervisor. There is no need to apply for an interruption of study when taking vacation leave.

Sick Leave

The policies on sick leave are evolving and depend on your funder. Please check information from your funding organisation or contact your programme director or Student Admin for advice.

Pastoral Support Committees

From September 2021 all students will be assigned a Pastoral Support Committee. This is completely independent of your thesis committee and will comprise two postdoctoral 'mentors' who will be based in different research teams and centres from you. The Pastoral Support Committee is there for to ask for advice, help, anything that you feel is not best addressed to your supervisor or thesis committee. The committee can meet as often as you like but at least once per year. Minutes won't be taken from the meetings but we will ask the committee to let us know when they have met.

Further information can be found on the IGC Graduate Research and Training website: https://www.ed.ac.uk/institute-genetics-cancer/igc-graduate-research-and-training/information/student-pastoral-support-committees

Student Support

The Institute of Genetics and Cancer is a family, looking out for each other. We are excited that you are becoming part of our family. If you need any local support a good place to start is with you supervisor. They will understand your situation and will want to look out for you. Alternatively please contact student admin (student-admin@igc.ed.ac.uk) or one of the postgraduate directors (Nick Gilbert, Val Brunton, Kathy Evans) and more information about different types of support is available at the back of this handbook.

Edinburgh university has lots of expertise in looking after students and a good place to start is the student Health and Wellbeing webpage: https://www.ed.ac.uk/students/health-wellbeing.

Code of Practice

https://www.ed.ac.uk/student-disability-service/staff/supporting-students/help-distressed-students

https://www.ed.ac.uk/files/atoms/files/copsupervisorsresearchstudents.pdf

Annual Student / Supervisor Structured Discussion

Many factors are important for a successful PhD. One of them is a good relationship between supervisor and student. To help this relationship it is important to be open and honest with each other and to manage each other's expectations. This is particularly important as the project progresses when there might be changes either due to the project or external factors. In our experience many problems can be avoided by having a dialogue, however this can be difficult for both parties, with neither wanting to put the other on the spot.

To overcome this problem, we would like all students and supervisors to have a "structured discussion" at the start of the PhD, and every year afterwards. In the first instance we will not monitor the results of the discussion, but instead ask students to let us know when you have had the meeting with your supervisor. In some cases, meetings will be online, in other cases face to face. Likewise for some PhD projects it might be relevant for all supervisors to participate, in other cases just the lead supervisor. Similarly, some topics will be relevant for different stages of your PhD.

https://www.ed.ac.uk/institute-genetics-cancer/igc-graduate-research-and-training/information/annual-student-supervisor-structured-discussion

Register with a GP/doctor

It is important to make sure that you look after yourself whilst studying, both physically and mentally, and that you know how to get medical assistance if you need it.

The University has provided information about registering with your nearest doctor, known as a General Practitioner (GP).

Further information can be found on the New Students website here:

https://www.ed.ac.uk/students/new-students/ready-university/top-6-tasks/register-doctor

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Student Health and Wellbeing

Feeling Good App

The Foundation for Positive Mental Health is Working with the University of Edinburgh to provide free access to the Feeling Good App.

www.ed.ac.uk/student-counselling/self-help/apps-podcasts-ted-talks-relaxation-recordings/feeling-good-app

Membership to the Consent Collective

Online support materials on consent, sex, gender, sexual harassment and relationships.

www.consentcollective.com/edinburgh

Student Disability and Learning Support Service

Supports students with a range of health conditions, learning differences, disabilities and some temporary injuries.

www.ed.ac.uk/student-disability-service

Student Counselling Service

Supports the mental health of all students at the University through short term counselling and referral to other support.

www.ed.ac.uk/student-counselling

Advice Place

Professional, impartial and inclusive service for all students at the University of Edinburgh.

www.eusa.ed.ac.uk/support_and_advice/the_advice_place/

University Health Centre

NHS General Practitioners who rent premises from the University and offer full G.P. services to patients.

Chaplaincy

The Chaplaincy is a safe and welcoming space for people of all faiths and none. Chaplaincy offers a range of support including Mindfulness, Yoga and the Listening Service.

www.ed.ac.uk/chaplaincy

EUSA Mental Health and Wellbeing Society

Provides an informal and friendly space where students can learn more about the importance of mental wellbeing.

https://www.eusa.ed.ac.uk/

SilverCloud

Online cognitive behavioural therapy.

www.ed.ac.uk/student-counselling/what-is-silvercloud

Togetherall

An online service offering self-help programmes, creative outlets and a peer support community monitored by mental health professionals.

www.togetherall.com/en-gb/

If you would like to discuss student health and wellbeing or any of the resources above, please contact: student-admin@igc.ed.ac.uk

MENTAL HEALTH DURING YOUR PhD

AN OPINION PIECE BASED ON SOME RESEARCH I DID IN MY LUNCH HOURS AND MY ENTIRELY UNQUALIFED EXPERIENCE*

47%

A study by the University of California, Berkeley, found nearly half of postgraduate students met criteria to classify them as depressed.[1]

WHAT YOU MAY BE EXPERIENCING/FEELING (YOU ARE NOT ALONE, I PROMISE)

IMPOSTER SYNDROME

7 in 10 people experience imposter syndrome throughout their careers[2]

Someone is going to figure out you don't belong here soon. You look good on paper, but passing that exam was a fluke. I don't have what it takes to [do these experiments, write a thesis, succeed in academia]. These are all classic signs of imposter syndrome. **TIp: reframe your thinking. Aim for progress not perfection.**

NO MORE TICK BOXES

You got pretty good at doing essay and lab reports - they were all short term tasks. You also got good at figuring out what questions might be asked in exams. Now you have an open ended project, with the end no where in sight. You no longer have grades to tell you if you are doing a good job. Transitioning from this undergraduate mentality can be particularly tough. **Tip: break down your research into small, manageable goals.**

FIRST TIME FAILING

You've always been the best student at school, and you did pretty well at university too. Now your science isn't working and everyone around you seems to be getting on just fine. These feelings can come about as at undergraduate level, experiments (believe it or not) are designed to work. **Tip: remember, you are at the forefront of scientific research - if it was easy it would already have been done!**

ISOLATION / GUILT

Writing your thesis can be a particularly lonely, isolating task. This can also be coupled with feelings of guilt when going about your daily life as "you should be writing". Tips to manage this include still attending research group meetings/departmental seminars whilst writing. This can also be coupled with 'writer's block'. **Tip: when writing, start by making figures - it is far easier to write about what a figure means.**

COMPETITIVE LANDSCAPE

Unfortunately, academia often fosters competition over collaboration, when it should be the other way around. This is made worse by the fact that often the only way to gauge how well you are doing is to compare yourself against others. **Tip: no two PhD projects are the same. so avoid comparing them.**

THE WORK | LIFE STRUGGLE

55% of PhD students are concerned about work-life balance[3]

There is an inherent culture of acceptance in academia of long work hours. In fact, 40% of academics report working more than 50 hours a week.[4] This is a fault with the system. Presenteeism is a common trait observed in academia, where peole work long hours due to anxiety/stress, but are not being efficient in these long hours. **Tip: aim to be efficient inside normal working hours then focus on "you" time.**

A hard truth is only 7 in 200 PhD graduates become full professors.[5] During your PhD, make sure to work on other "soft skills" as well as doing your research. Like making a poster for an online Twitter competition for example...

ARE THOSE AROUND YOU STRUGGLING? HERE ARE SOME POSSIBLE WARNING SIGNS

INCREASED DRINKING | INCREASED EATING | DECREASED EATING | WORKING LONG HOURS | BEING ABSENT | JOKING ABOUT SUICIDE | LOOKING DISHEVELLED

SELF-HARMING?
SUICIDAL THOUGHTS?
CALL SAMARITANS NOW
ON 116-123
OR EMAIL JO@SAMARITANS.ORG

SOME WAYS TO HELP MANAGE YOUR MENTAL HEALTH AND WELLBEING

SEEK MEDICAL ADVICE

Speak to a medical professional about how you are feeling. This may lead to intervention such as medication or counselling to help you manage your mental health.

TAKE SOME TIME OUT

Taking a break can actually improve efficiency when you return to work. If you cannot justify taking a couple of weeks off, take a series of long weekends to get some time away.

FOCUS ON YOU

It is a proven fact that lack of sleep can add to feelings of stress. Exercise can also work to alleviate stress. It may feel like you don't have time, but going for a walk at lunchtime (for example) may be a positive change you can make.

REQUEST COUNSELLING

Universities have counselling services that are available for you to use. This can be useful to help talk through your problems and also make sure appropriate coping strategies are in place.

TALK TO YOUR SUPERVISOR

It is not always possible, but if you feel you can approach your supervisor, discuss your mental health concerns with them. Other options include discussions to reduce workload temporarily or take time out.

TALK TO YOUR PEERS / POSTDOCS

It is highly likely that people around you have also experienced the stressful nature of a PhD. Reach out, if you feel able. Remember, postdocs have survived their PhD so may have some useful tips / coping strategies.

CREATE MANAGEABLE CHUNKS

If everything is overwhelming, try to break down your research into manageable tasks. It may help to do this in consultation with your supervisor. A good tip is to aim to get into the lab first thing in your day, before looking at other tasks like emails.

READ LITERATURE

There are a large amount of online resources available to help manage mental health and wellbeing. For example, the charity Mind, have a range of booklets available, from how to manage stress, to how to support others with mental health problems.

As a final note, if your PhD is heavily affecting your mental health and wellbeing, there is absolutely no shame in quitting and starting a new chapter in your life. There are plenty of successful people that quit their PhD! Put it this way - you might put up with an ill-fitting t-shirt for a while, but you wouldn't wear it for 4 years!

REFERENCES

1. Graduate Student Happiness & Well-Being Report, 2014, University of California, Berkeley.
2. Sakulku, J. The Impostor Phenomenon. The Journal of Behavioral Science, 6(1), 75-97.
3. Graduate survey: A love–hurt relationship, Nature 550, 549–552
4. Guthrie, Susan, et.al. Understanding mental health in the research environment: A Rapid Evidence Assessment. Santa Monica, CA: RAND Corporation, 2017.
5. The Scientific Century: Securing our future prosperity, The Royal Society, 2010.

#TIMETOTALK
#RSCPOSTER

*ALTHOUGH I DID SURVIVE A PhD

A poster by Dr Zoe Ayres (not a medical professional). Free to distribute.

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Mental Health Portal

Do you want to learn about mental health and improve your resistance to stress, anxiety and other pressures?

Visit the IGC Mental Health Portal

- Tips to improve Resilience
- Free resources for EVERYONE
- Access at your own pace, in your own time, with no pressure or deadlines
- Can be used to support others as well as yourself

IGC Mental Health Portal: https://edin.ac/mental-health-portal

igc INSTITUTE OF GENETICS & CANCER

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Mental Health First Aiders

Are you concerned about your mental health or need someone to talk to?

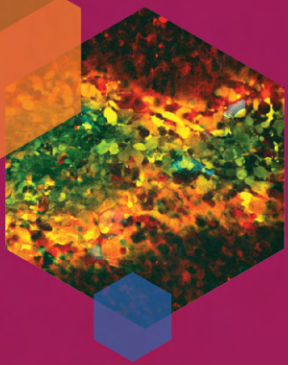
The IGC Mental Health First Aid team are here to help!

The team are:

- Trained to provide a confidential listening service for ALL staff and students
- Able to signpost to a range of different free resources, proven to help

For a full list of the IGC Mental Health First Aid Team visit:
https://edin.ac/mental-health-first-aiders

Useful Links



GRADUATE RESEARCH & TRAINING

HANDBOOK 2023

Useful links

General

College PG Office contacts
https://www.ed.ac.uk/medicine-vet-medicine/postgraduate/contact-us/

College PG research wiki (includes PG handbook, software available to students etc.)
http://edin.ac/2crLMTx

Code of Practice
https://www.ed.ac.uk/institute-academic-development/postgraduate/doctoral/advice-support/regulations

Assessment regulations
https://www.ed.ac.uk/files/atoms/files/2019-postgraduateresearch.pdf

Transferable skills training and support
www.ed.ac.uk/schools-departments/institute-academic-development/postgraduate/doctoral

Searching the literature/ bibliographic management

A tool for running daily searches
http://pubcrawler.gen.tcd.ie/

A free online alternative to Endnote and Reference Manager
www.zotero.org/

(note also that many journals have free apps for browsing abstracts).

Research Ethics

General
www.pnas.org/content/86/23/9053.full.pdf

Image manipulation
www.jci.org/articles/view/21717/pdf

www.cell.com/abstract/S0092-8674(06)00676-3

http://jcb.rupress.org/content/166/1/11.full

Writing papers, giving talks

Advice on writing papers
www.nature.com/nature/journal/v467/n7317/full/nj7317-873a

How to give a good talk
www.sciencedirect.com/science/article/pii/S1097276509007424

How to give a bad talk
www.sciencedirect.com/science/article/pii/S0960982299802929

Useful advice ranging from lab techniques to giving talks and posters
http://bitesizebio.com

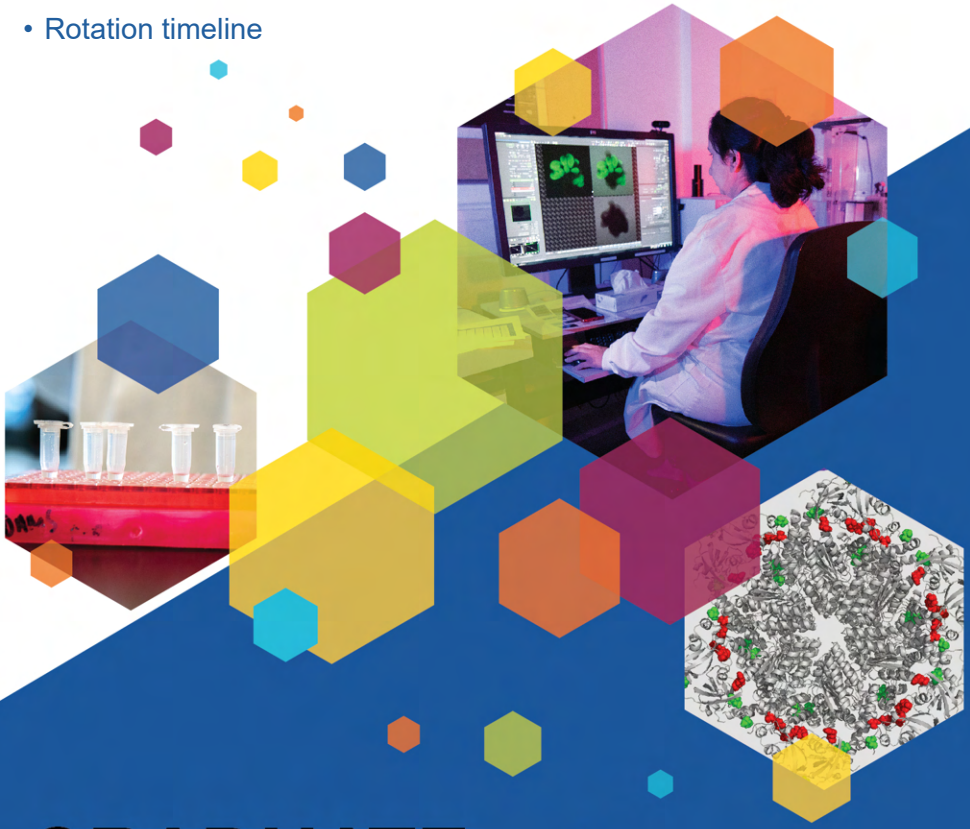
The Advice Place, Potterrow Reception, EUSA
5/2 Bristo Square, Edinburgh EH8 9AJ
Tel: 0131 650 2656
https://www.eusa.ed.ac.uk/

Advice Guides and Resources

Here you can read all of our advice guides. If you would like them in an alternative format, please contact us and we will do our utmost to accommodate this.

MRC Human Genetics Unit 4 Year Programme

- Introduction to programme
- Projects available
- Rotation timeline



GRADUATE RESEARCH & TRAINING

HANDBOOK 2023

The first six months

The HGU PhD program is following an exciting and innovative format. You will spend the first 6 months on an intensive training period leading up to your final choice of PhD project. This period comprises taught courses, talks from individual group leaders about their work, teaching sessions on a variety of topics from technology to clinical research, journal club sessions which will give you a chance to hone your analytic and presentation skills, and 2 rotation projects. The detailed timetable can be found in the handbook.

The choice of rotation projects is up to you (available projects are listed at the end of this section) and you can approach any relevant group leader to discuss the projects. You will see that there is some time between rotations, giving you a chance to look around and choose a new lab. The only formal constraint is that you must spend time in 2 different labs. You may find, of course, that another student has already been accepted and that the PI is only willing to take on one student (as is normally expected of PIs). If this happens then try again in the next rotation period; if there is a real clash then Ian Adams will help but do please try and resolve things between yourselves in the first instance. Bear in mind that there is no formal requirement for you to choose a PhD project in a lab in which you have done a rotation project, the rotations are just a chance for you to try different labs and projects out.

Many of the group leaders welcome students coming to their lab meetings which is a good way of seeing life in labs other than the ones where you are doing rotation projects, but please be sure to make contact with the appropriate PI in advance.

The PhD

After 2 rotations you will choose a PhD project. We will have individual meetings with you to discuss your choices in the event of any clashes. No supervisor will be able to take on more than one student, HGU students must choose projects within the HGU, but apart from this you can go to any lab within the available project section. It is up to you to discuss possible projects with PIs you are interested in; this is a dynamic process in which you should be fully engaged. Note that supervisors are not obliged to take you on, you need to ask whether they are willing, or whether they have other interested students and so on. If your research project involves the use of animals or human participants, work must not commence until the relevant Home Office project and personal licences have been awarded, and appropriate Local Ethical Approval Committee has been granted. We will not be producing PhD project outlines from supervisors. Rather, at the PhD 10 week stage (June) you will have to produce a short report that outlines the project that you will pursue. This will then be discussed and refined if necessary by your supervisors (more detailed guidelines are given under Assessment Procedures). You will then spend 3 years in the lab, winding up by April of your final year. You will then have a further 6 months to write up your thesis but remember it is imperative that you submit your thesis by the final university deadline of September of year 4!

We hope that this novel structure for PhD study will be as exciting for you as it has been for us to develop it. We will be asking for your feedback at several stages of the course - please feel free to air your views, and approach us about any issues you have, and help us to make the HGU PhD programme a huge success!

Nick Gilbert

Lab Rotations

Each student will do 2 rotation projects of around 3 months. Contact details and summaries of research interests of eligible supervisors are all given in this booklet (note there are some people unable to take students for rotations, please check), and during the first week you will be hearing research talks by some of these PIs.

The choice of rotation projects is up to you - you are responsible for approaching potential supervisors to discuss their willingness to take you on and to jointly come up with a plan of work. Remember the project won't be formally assessed as part of your PhD, so make the most of your time to experience different techniques, and get a feel for life in different labs.

The only formal constraint is that you must spend time in 2 different labs. You may find, of course, that another student has already been accepted and that the PI is only willing to take on one student (as is normally expected of PIs). If this happens then try again in the next rotation period; if there is a real clash then one of us will intervene but do please try and resolve things between yourselves in the first instance. Bear in mind that there is no formal requirement for you to choose a PhD project in a lab in which you have done a rotation project, the rotations are just a chance for you to try labs out.

At the end of each rotation you have to write a report about your project, to be handed in by the end of the week after you finish in that lab. This should be in the format used by journals such as those on Biomedcentral, i.e. divided up into brief sections of background, results and conclusions and no longer than two sides of A4 (excluding figures).

This abstract should be submitted to the Institute of Genetics and Cancer PGSC by emailing:

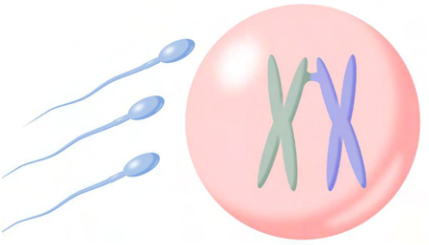
student.admin@igc.ed.ac.uk

Supervisors will ask to meet up with you if there are any concerns.

How do mammalian germ cells pass on the correct number of chromosomes to the next generation?

Supervisor: Dr Ian Adams

Rotation Oct-Dec
Rotation Jan-March

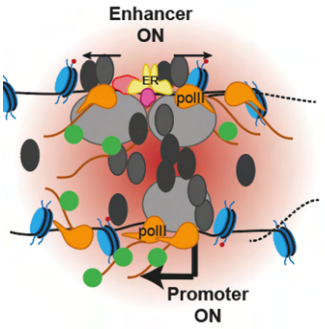


Inheriting the wrong number of chromosomes is one of the most common types of human genetic disease. Inherited aneuploidies typically arise from errors in meiotic chromosome segregation in developing eggs. These meiotic chromosome mis-segregation events are strongly affected by maternal age and contribute to the high rates of miscarriage and Down syndrome births in older mothers. This project will use embryonic stem cell models to investigate a novel mechanism that we have identified that promotes sister chromatid cohesion and prevents meiotic chromosome mis-segregation in oocytes with a view to reducing or preventing oocyte aneuploidy.

Mechanisms of long-range enhancer function

Supervisor: Prof Wendy Bickmore

Rotation Oct-Dec
Rotation Jan-March



The 100s of thousands of enhancers that drive mammalian gene expression are encoded in the non-coding genome, often a large genomic distance from their target genes. We still do not understand how enhancers exert this regulation in the context of 3D chromatin organization.

By combining controlled protein degradation with synthetic transcription factors, we have previously shown (Kane et al., 2022, PMID: 36097291) that enhancers located far (several hundreds of kb) from their target genes require the cohesin complex to function, whereas enhancers located close to the target gene do not. Each rotation project will follow upon this exciting discovery, combining genome engineering, FACs, fluorescence in situ hybridisation, chromosome conformation capture and a CRISPR activation screen by investigating one of the following questions;

1) Is there a precise cut-off for this distance dependant requirement for cohesin?

2) Does the distance dependence depend on the strength of the activation signal at the enhancer?

3) Does the same distance dependence occur at different types of enhancers?

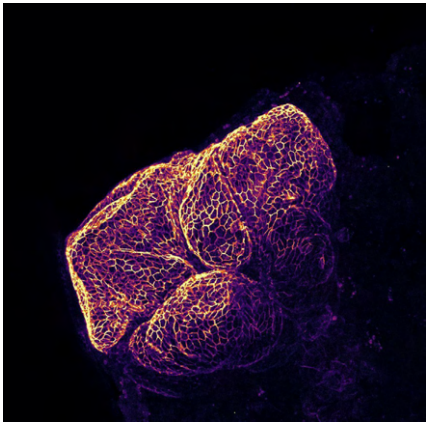
4) What is the role of the protein NIPBL in the cohesin-dependance for enhancer activation?

How do tissue mechanics affect cell state?

Supervisor: Dr Luke Boulter

Rotation Oct-Dec
Rotation Jan-March

Tumour initiation (the process by which a cancer starts) is a black box, where mutant cells must overcome the physical constraints of a tissue in order to start proliferating and forming a tumour. In this rotation you will analyse tissue from a new transgenic mouse of tumour initiation and ask whether malignant transformation changes the physical nature of the cells using confocal imaging and high content image analysis. The project will then begin to address which mechanosensory signalling pathways are altered during tumour initiation with the expectation that the final PhD project will explore how physical, mechanical changes affect cell state using a combination of sophisticated animal models, human organoids and –omic technologies.



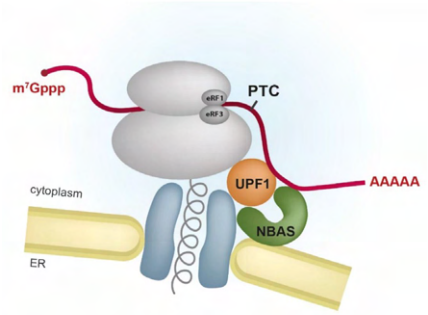
1- Regulation and function of the nonsense-mediated decay (NMD) pathway

Supervisor: Prof Javier F. Caceres

Rotation Oct-Dec
Rotation Jan-March

The Nonsense-mediated decay (NMD) pathway selectively degrades mRNAs harboring premature termination codons (PTCs), preventing the synthesis of truncated proteins. We study the mechanism and physiological relevance of NMD. We have identified an NMD pathway at the Endoplasmic Reticulum (ER) that provides quality control of ER-translated mRNAs1. We will focus on the mechanism and physiological role of the ER-NMD pathway, as well as on the biological consequences of manipulating its activity.

1- Longman et al. (2020) Identification of a localized nonsense-mediated decay pathway at the endoplasmic reticulum. Genes Dev 34: 1075-1088



The ER-localized NMD factor NBAS recruits the core NMD factor UPF1 to the membrane of the ER and activates an ER-dedicated NMD pathway

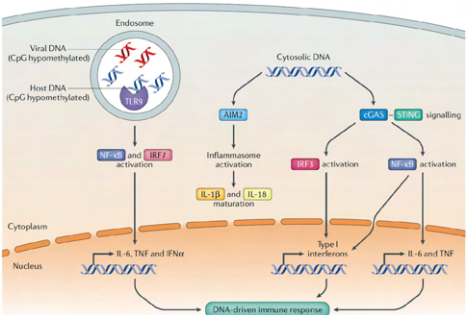
Professor Javier F. Caceres: https://www.ed.ac.uk/mrc-human-genetics-unit/research/caceres-group

Cross-talk between TLR and cytosolic nucleic acid signalling pathways

Supervisor: Prof Yanick Crow

Rotation Oct-Dec
Rotation Jan-March

As exemplified by the type I interferonopathies, Mendelian diseases associated with chronically enhanced type I interferon signalling, while essential in protection against infection, inappropriate activation of interferon signalling can be pathogenic. To date, characterisation of the type I interferonopathies has emphasised cytosolic nucleic acid sensing pathways in disease pathogenesis. However, we have recently implicated Toll-like receptor (TLR) endosomal signalling as central to the pathogenesis of three novel type I interferonopathies. Notably, our unpublished



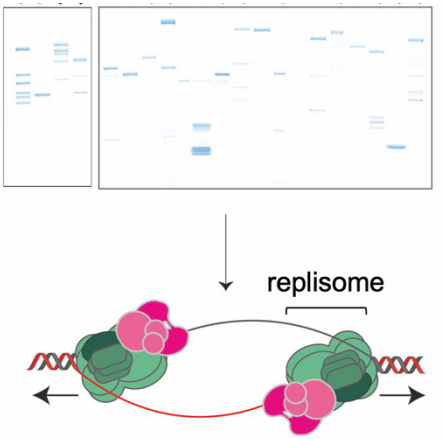
data indicate an unexpected degree of cross-talk between the TLR and cytosolic nucleic acid sensing pathways. The current PhD proposal is designed to explore these observations in detail.

Molecular mechanisms of genome replication in humans

Supervisor: Dr Tom Deegan

Rotation Oct-Dec
Rotation Jan-March

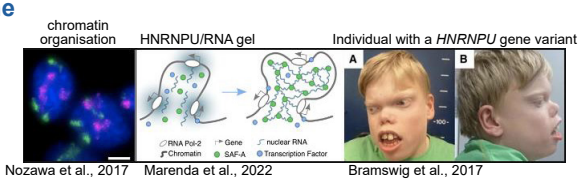
Accurate DNA replication is essential for our genomes to be propagated when our cells divide. Errors in this process cause mutations, and are central to the development of cancer and a range of neuro-developmental disorders. Whilst decades of research have advanced our understanding of DNA replication in simple model systems, we still understand relatively little about the molecular mechanisms of DNA replication in human cells. This project will employ experimental systems that recapitulate DNA replication in a test tube, as well as artificial intelligence tools and cryo-electron microscopy, to dissect a new pathway we have recently identified that is critical for the first steps of DNA replication in human cells.



How does a HNRNPU/RNA matrix regulate chromosome structure in health and disease?

Supervisor: Prof Nick Gilbert & Catherine Naughton

Rotation Oct-Dec
Rotation Jan-March



Chromatin is organised non-randomly in the nucleus. Subnuclear structures like the nucleolus, nuclear envelope, and other nuclear bodies, together with chromatin-associated protein complexes and chromatin-associated RNAs (caRNA) control the spatial organisation of chromosomes in three-dimensional (3D) space of the nucleus. Newly transcribed RNA interacts with HNRNPU (also called Scaffold-Attachment-Factor-A) to form a nucleoprotein gel that maintains structural stability of the genome. Through this process the HNRNPU/RNA gel decompacts chromatin and in its absence there is a radical change in chromosome structure. Abnormal spatial organisation of DNA is linked to many diseases like cancer, Huntington's disease, progeria, and metabolic syndromes. Recently, mutations in HNRNPU have been linked to diseases with phenotypes including intellectual disability, autism spectrum disorder, and seizures. Interstingly, the effect of genome organisation and other nuclear processes in these diseases is not yet understood. Our hypothesis suggests that chromatin 3D mis-regulation disrupts normal nuclear processes such as gene expression and RNA export, leading to the disease phenotype.

To test this hypothesis we will make HNRNPU separation of function mutants in cell models to understand how HNRNPU/RNA can regulate chromosome structure. We will then make informative mutations in a transgenic mouse model using CRISPR editing to understand how these mutations function in a developmental context. This project will combine fundamental biology research with the translational potential of correcting HNRNPU function in human disease.

Insights into ageing from microcephalic dwarfism

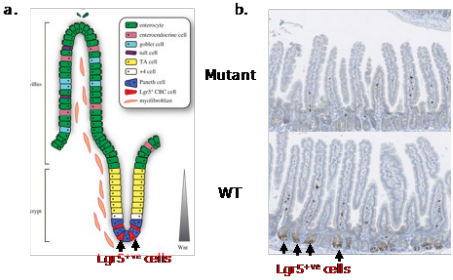
Supervisor: Prof Andrew P Jackson

Rotation Jan-March

Microcephalic dwarfism is an extreme growth phenotype, occurring in the smallest people in the world. It is due to fewer cells being made during development, leading to a smaller person. Identifying primordial dwarfism genes helps diagnose and manage these rare conditions. It also gives insights into how the body regulates growth, perhaps shedding light into why humans are bigger than mice and how our brains evolved to be so large.

We have identified over 20 genes that can cause this condition over the last 10 years and have been investigating the underlying its mechanistic basis at the biochemical, cellular and organism level. Recently, we have also surprisingly found links to ageing, finding severely impaired adult stem cell function in a microcephalic mouse model, and this rotation project will investigate how and when intestinal stem cells are lost.

The rotation project will be in collaboration with Kevin Myant's lab, and we will establish when LGR5+ve intestinal stem cells are lost postnatally, and then examine how this impacts on transient amplifying progenitors and mature cell types in intestinal crypts (Fig 1). Techniques to be used will include immunohistochemistry, immunofluorescence with confocal microscopy, RT-PCR, and intestinal organoid culture to assess stem cell function. Methods assessing cell proliferation and apoptosis will also be employed. In the longer term we'd plan to investigate stem cell dynamics in this system, and how these cells are rewired at the transcriptional and epigenetic level, using live imaging, lineage tracing, scRNAseq and Chip-seq approaches.



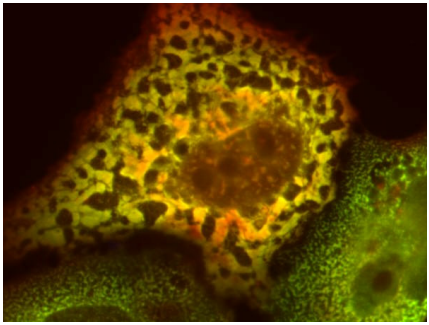
As I am currently away on sabbatical until late October this project is available only as a second rotation. I will provide further background on this project as part of my teaching session in November. As well, a project studying the cell biology of Donson (Lim et al. Science 2023), that complements the Deegan lab's reconstitution and investigation of the human replisome will also be available as a second project rotation.

Figure 1. Intestinal stem cell loss in microcephalic dwarfism mouse
a. Schematic of intestinal crypt. Lgr5+ve stem cells, red, at bottom of crypt. b. loss of lgr5+ cells in mutant small intestine at 3 months of age. Panel a. reproduced from doi.org/10.1098/rsob.180120.

High-throughput discovery of disease mutations by in vivo deep mutational scanning

Supervisor: Dr Grzegorz Kudla

Rotation Oct-Dec
Rotation Jan-March

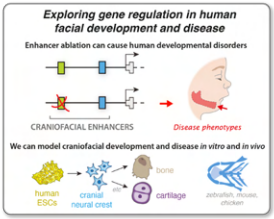


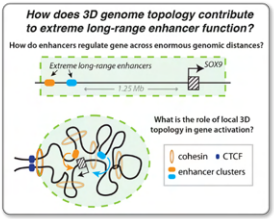
Understanding which mutations lead to disease is a central goal of modern biology and medicine. Deep mutational scanning is a new approach that combines synthetic biology, next generation sequencing and computational analysis to systematically measure the effects of all possible mutations in a selected gene. So far, deep mutational scanning experiments were typically conducted in tissue culture. In collaboration with the Boulter and Khamseh labs, we will perform deep mutational scanning of tumour suppressor genes in an animal model of carcinogenesis, to explore the mechanisms of cancer formation in a physiological setting.

Investigating long-range enhancers and 3D genome topology at a human craniofacial disease locus

Supervisor: Dr Hannah Long

Rotation Oct-Dec
Rotation Jan-March



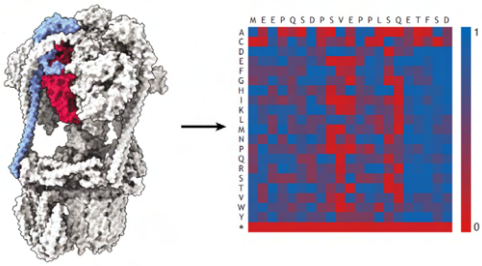


Perturbation of gene regulation is central to many human genetic developmental disorders. In our lab, we study human facial development motivated by the wide diversity in facial appearance between individuals and the high frequency of birth malformations impacting the face. As our model, we focus on the SOX9 regulatory domain where non-coding mutations have been associated with facial dysmorphology. To explore mechanisms of disease, we leverage in vitro differentiation of facial progenitor (cranial neural crest) cells and have previously demonstrated that loss of extreme long-range enhancers (Long et al, 2020) and perturbation of 3D genome topology (Chen*, Long* et al, in preparation) can be implicated in human disease. There are a number of exciting projects available in the lab. In one project, we will further explore the role of local 3D chromosomal structure in gene regulation. To do so, we will leverage human embryonic stem cells coupled with genetic engineering, reporter assays, genomics, and chromosomal imaging to explore the role of novel structural features in gene regulation across craniofacial development at loci implicated in craniofacial disease.

In silico mutational scanning to understand and predict protein function and genetic disease

Supervisor: Dr Joe Marsh

Rotation Oct-Dec
Rotation Jan-March



Recent advances in machine learning and the development of high-throughput deep mutational scanning strategies are revolutionising our ability to interpret human genetic variation. This project will use state-of-the-art variant effect predictors and protein structural models to perform in silico saturation mutagenesis on a variety of proteins implicated in human genetic disease. This will enable us to better understand protein function and its relationship to disease, and establish optimal strategies for computationally predicting the effects and molecular disease mechanisms of novel variants, thus ultimately improving the diagnosis and treatment of human genetic disorders.

Gerasimavicius L, Livesey BJ & Marsh JA (2022) Loss-of-function, gain-of-function and dominant-negative mutations have profoundly different effects on protein structure. Nature Communications 13:3895

Defining molecular principles of tubulin isotype diversity in human health and disease

Supervisor: Dr Pleasantine Mill
Day to Day supervisor: Emma Hall

Rotation Jan-March

Tubulin, the essential building block of cytoskeletal microtubule structures, exhibits extensive isotype diversity in metazoans. This raises the question, are all tubulins functionally interchangeable? Our recent work (Mechaussier et al medRXiv 2022) on the TUBB4B isotype has provided concrete evidence to support that tubulin isotypes play unique and essential roles in constructing specific sub-cellular populations of microtubule structures such as the centrioles and cilia studied within our lab. This PhD project will use genome engineering, cell biology, genetics and advanced imaging to examine how different isotypes are spatially organized within cells in order to better understand the 'tubulin code' in human health and disease. The student will also test whether different tubulin isotypes are functionally interchangeable in vivo to better understand unique and overlapping biological functions and physical properties of different tubulins. For the rotation project, the student will learn ultra-expansion microscopy (UExM) to study cytoskeletal architecture at near-nanoscale resolution using conventional microscopes, and how this is changed in human disease models.

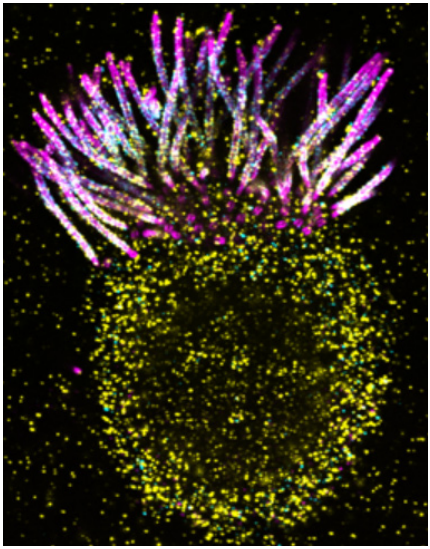
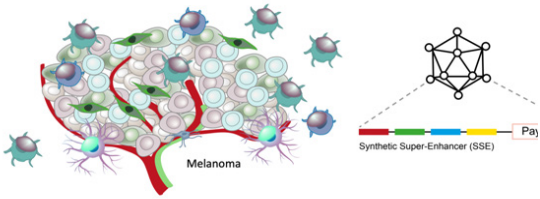


Image: Mouse multiciliated mouse airway cell stained for DNAH11 (yellow), DNAH5 (cyan) and acetylated tubulin (magenta) using UExM. Note regular arrays (24 nm) of dynein arms (DNAH5+ foci) can be resolved on a regular spinning disc confocal.

Targeting melanoma cellular heterogeneity with viral super-enhancer gene therapy

Supervisor: Prof Liz Patton
Collaborator: Prof Steve Pollard

Rotation Oct-Dec
Rotation Jan-March

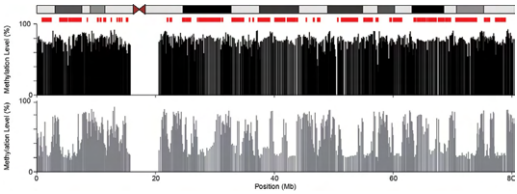


Despite improvements in both targeted and immune-based therapies for melanoma, most patients with metastatic disease succumb to the disease. We have found that melanoma cells that escape therapy are enriched for specific gene expression signatures related to the melanocyte stem cell and neural crest progenitors. Here, we will design, build, and test melanoma cell-specific enhancers and apply these in a novel viral anti-cancer gene therapy approach. Specifically, we will use the selectivity of the virus and regulatory elements (promoters and enhancers) to deliver combination therapeutic payloads to melanoma cells (cytotoxic and immune modulators). Using our unique access to both mammalian and zebrafish melanoma models we will first identify key functional enhancers that are shared between melanomas, melanocyte stem cells and neural crest progenitor cells. These will be fragmented and then combined in mulitpart arrays to create synthetic super-enhancers (SSEs), which have ideal properties for use in adeno-associated virus (AAV) vectors and tested in mouse models of melanoma for both in vitro and in vivo proof of concept.

Using single molecule approaches to understand DNA methylation maintenance

Supervisor: Dr Duncan Sproul

Rotation Oct-Dec
Rotation Jan-March

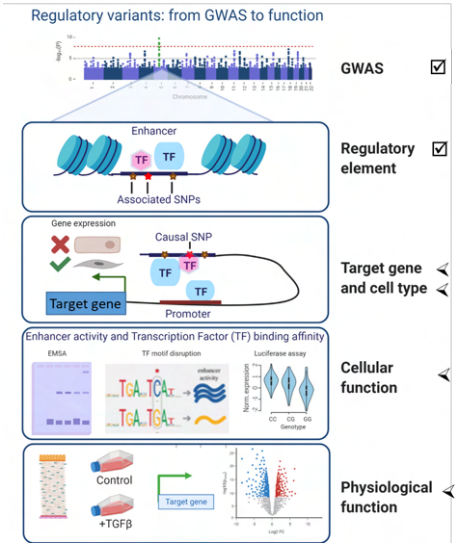


The failure to maintain developmentally established patterns of the epigenetic mark DNA methylation is a hallmark of cancer and aging. Our current understanding of the impact this failure is hindered by our lack of knowledge regarding the fundamental molecular mechanisms underpinning DNA methylation maintenance. We have developed single-molecule methods to measure DNA methylation patterns and techniques to introduce synthetic epi-alleles into cells. Together, these allow us to quantitatively track the evolution of DNA methylation patterns over time. This PhD project seeks to use these approaches to dissect why DNA methylation patterns are not maintained in cancer and aging and can be approached from a laboratory or computational perspective.

Functional analysis of a genetic association with the corneal disease Keratoconus within the SMAD3 gene

Supervisor: Dr Veronique Vitart

Rotation Oct-Dec
Rotation Jan-March

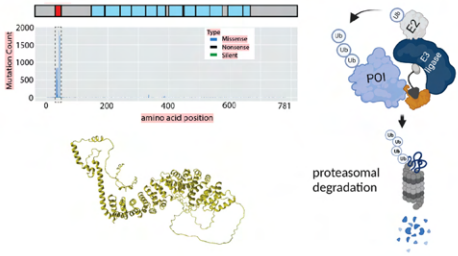


Keratoconus is a multifactorial complex eye disease characterised by progressive weakening of the collagen-rich extra-cellular matrix in the cornea. A genetic risk locus of interest lies within an intronic regulatory region in SMAD3, a gene implicated in a rare systemic connective tissue disorder. Using cell type and allele specific assays, you will investigate how candidate causal variants might exert their effect. Hypothesised mechanism will be compared with that published for an independent regulatory locus affecting SMAD3, associated with coronary artery disease, as well as with that studied in the lab for another keratoconus risk loci. Spatio-temporal function for the regulatory region implicated could be also examined using animal models. This project has the scope to establish functional link with other risk loci implicated in keratoconus as well as to shed light on ECM regulatory pathway

How do human disease mutations affect targeted protein degradation?

Supervisor: Dr Andrew Wood

Rotation Oct-Dec
Rotation Jan-March

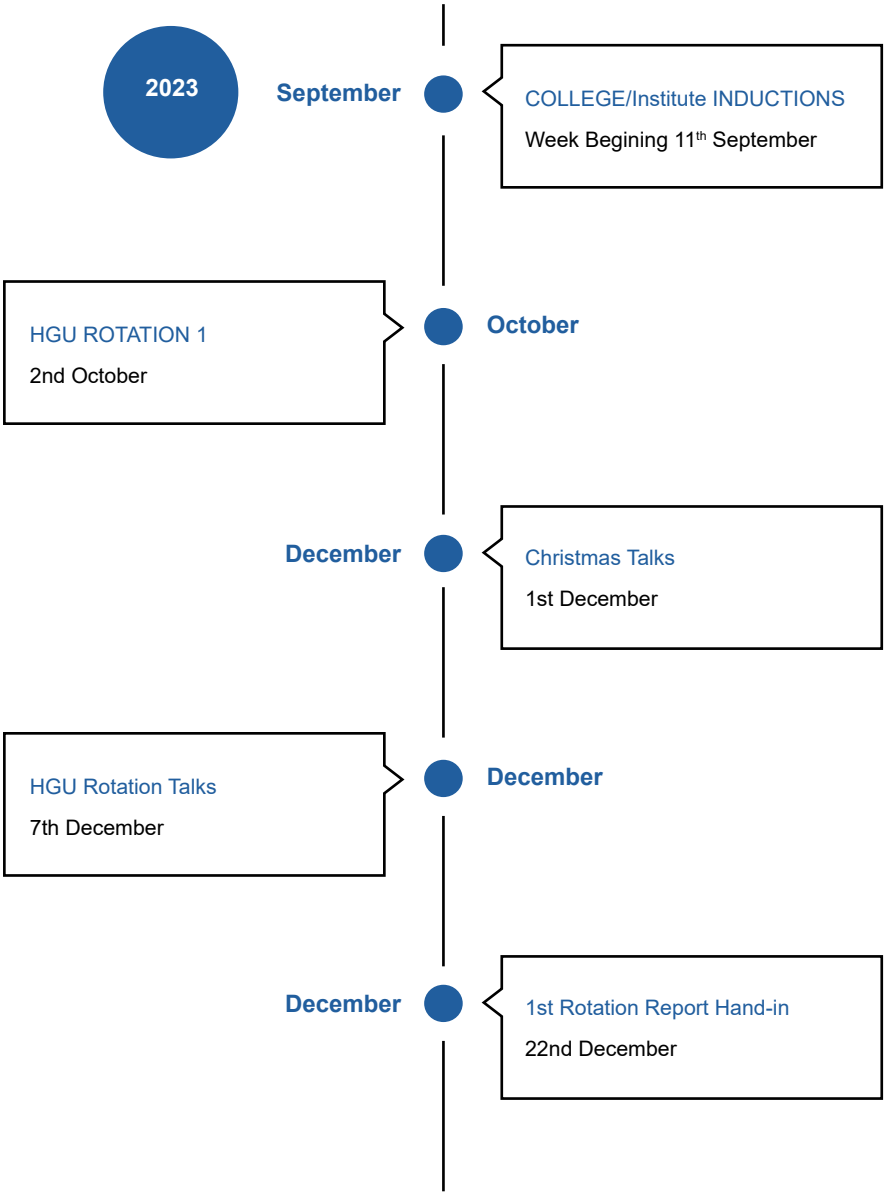


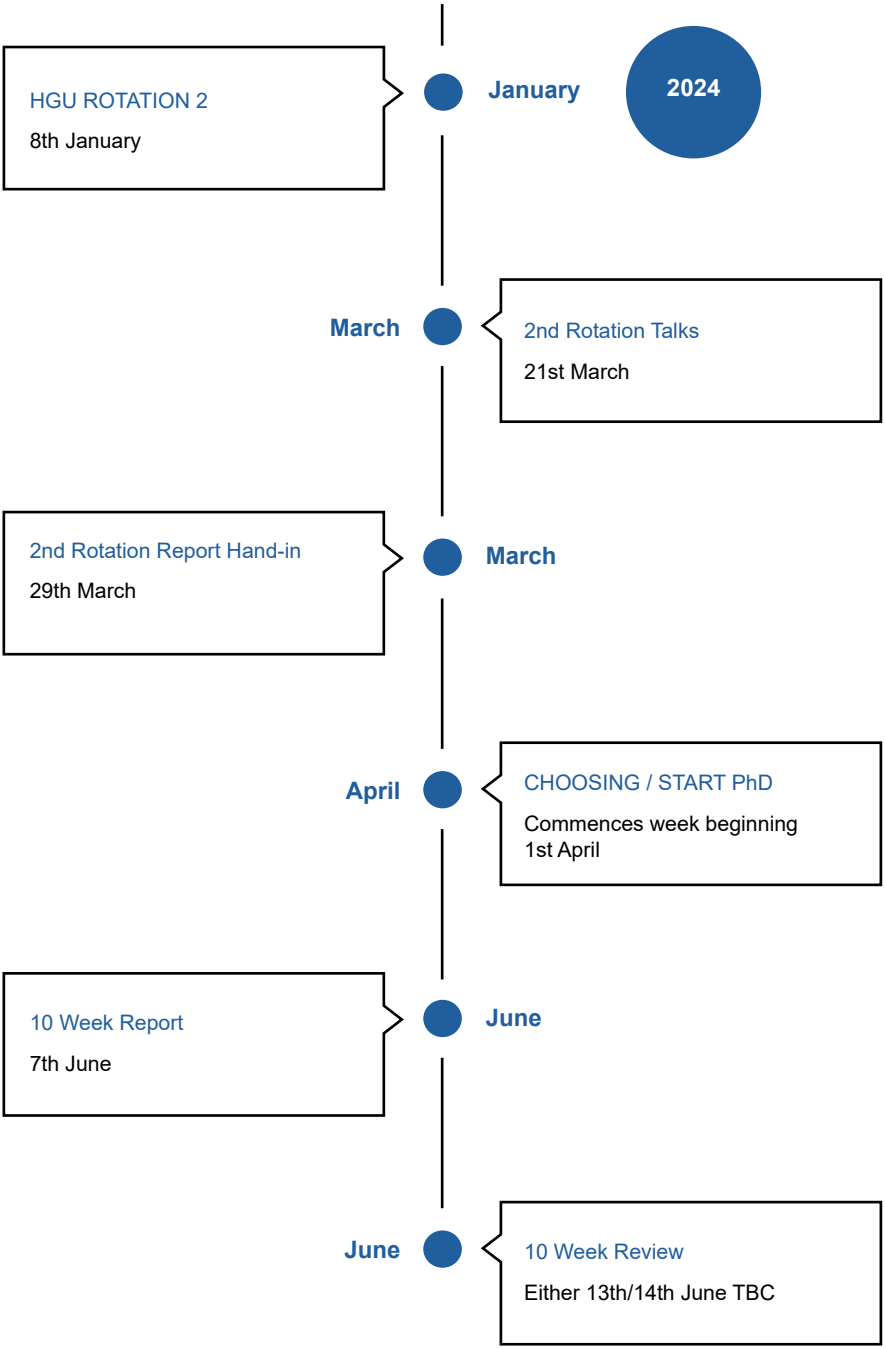
Targeted protein degradation (TPD) is an emerging drug development strategy which allows chemically-induced destruction of disease proteins that were previously considered 'undruggable'. TPD drugs such as PROTACs and molecular glues work by inducing physical proximity between target proteins and E3 ubiquitin ligase complexes, which leads to their ubiquitination and rapid degradation via the proteasome. This approach has been shown to work on a range of targets, but some proteins appear to be more amenable than others. The properties that make proteins more or less suitable for a TPD strategy remain unclear.

The development of new protein degrader compounds is challenging and time consuming, but the degradation of specific protein targets can be modelled using 'degron tagging'. This combines CRISPR genome editing with protein engineering and chemical biology to add small peptide tags to proteins of interest, which allow them to interact with generic degrader molecules to model their degradability.

In this project, we will test the consequences of mutations that affect the basal stability of proteins involved in oncogenic signalling cascades. Our hypothesis is that stabilising mutations should make proteins easier to degrade via TPD, meaning that patients who carry these mutations could be better candidates for TPD-based therapy.

Training Timeline 2023 - 2024




HGU ROTATION 2
8th January
January
2024
March
2nd Rotation Talks
21st March
2nd Rotation Report Hand-in
29th March
March
April
CHOOSING / START PhD
Commences week beginning
1st April
10 Week Report
7th June
June
June
10 Week Review
Either 13th/14th June TBC

INSTITUTE OF GENETICS & CANCER

Student at the Institute?

You have a new Facebook Group!

A closed group for announcements, course materials, discussions and a place to get to know your friends and colleagues.

Join by searching Facebook for OFFICIAL IGC Students or scan the QR code.

student-admin@igc.ed.ac.uk
www.facebook.com/groups/OFFICIALIGCStudents

Find us on

A new Facebook Group has been created for current on-programme students at the institute. This online space is a closed group and has been created specifically for students (not staff) for announcements, course materials, discussions and a place to get to know each other.

Join by searching Facebook for OFFICIAL IGC Students or visiting: www.facebook.com/groups/OFFICIALIGCStudents

Do I have to join the group?

Yes. We hope the group will make life easier for everyone by having all the right information and people in the same place, reducing email traffic and providing a place for resources, questions and answers.

What if I'm not on Facebook or don't want to use my personal profile to join?

That's ok – contact us and we can help you set up a new profile, just for life at the Institute.

What is a closed group?

Only approved members of the group can see who the current members are and view posts in the group.

Anyone on Facebook can see the group's name and description, find it through search and request to join (requests are approved or declined by Administrators), but they can't see any of the content or members.

Who will be in the group and who moderates it?

All postgraduate students on programme at the Institute.

Pauline and Alana are the Group Administrators with the Communications Manager as Moderator. Look out for group announcements from the Administrators – these flag key information. Join requests are approved by the Administrators, so no 'outsiders' will be able to join the group.

Can we say what we want?

Although this is your group, remember that the group represents the Institute and we expect members to behave as professionally as they would in person on campus. Inappropriate posts will be moderated and removed.