Welcome
IGMM Graduate Research and Training Contacts
Staff Student Liaison Committee/Officer

GRADUATE RESEARCH & TRAINING
HANDBOOK 2020
Welcome

We are delighted to welcome you to your postgraduate training programme at the Institute of Genetics and Molecular Medicine. 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 research 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 IGMM 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 IGMM a huge success!

Graduate Research and Training contacts

The IGMM 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 IGMM 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 IGMM). You will also have a thesis committee (normally setup about 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, IGMM: Professor Nick Gilbert

Graduate Convenor, CRUK Edinburgh Centre: Professor Val Brunton

Graduate Convenor, MRC Human Genetics Unit: Professor Nick Gilbert

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 IGMM 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 IGMM 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 Gilbert's 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 IGMM 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 IGMM adheres to these procedures rigorously. Details of these can be accessed through the CMVM Postgraduate Wiki which is also accessible from the IGMM Graduate Research and Training web pages.
Meet the Team: PG Directors

Professor Nick Gilbert - Director of Graduate Research & Training HGU/IGMM
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

Professor Valerie Brunton - Graduate Convenor, CRUK Edinburgh Centre
Email  V.Brunton@ed.ac.uk
Telephone  0131 651 8580  Location: S3.10
Research Group
www.ed.ac.uk/cancer-centre/research/brunton-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@igmm.ed.ac.uk
Telephone  0131 651 5771  Location: CG.11

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

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.
Induction Week
Teaching Timetable

HANDBOOK 2020
## Induction Week

### Monday 14th September

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 - 10:30</td>
<td>Nick Gilbert and Val Brunton: Welcome to the IGMM</td>
</tr>
<tr>
<td>10:30 - 11:30</td>
<td>Sarah Cunningham-Burley: Welcome to the University / MGPHS</td>
</tr>
<tr>
<td>11:30 - 12:30</td>
<td>Health &amp; Safety: Eilidh Guild</td>
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<tr>
<td></td>
<td><strong>LUNCH</strong></td>
</tr>
<tr>
<td>13:30 - 14:30</td>
<td>Student Health and Wellbeing: Andy Shanks, Director of Student Wellbeing</td>
</tr>
<tr>
<td>14:30 - 16:30</td>
<td>POGS (POstGraduate Students Society) Buddy Session, current students</td>
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</tbody>
</table>

### Tuesday 15th September

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>09:00 - 10:30</td>
<td>IT General Familiarisation</td>
</tr>
<tr>
<td>11:00 - 11:30</td>
<td>Library Services: Ruth Jenkins</td>
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<tr>
<td>11:30 - 12:00</td>
<td>Institute of Academic Development: Louise McKay</td>
</tr>
<tr>
<td>12:00 - 12:30</td>
<td>Equality &amp; Diversity</td>
</tr>
<tr>
<td></td>
<td><strong>LUNCH</strong></td>
</tr>
<tr>
<td>13:30</td>
<td>Introduction to the HGU 4 year PhD programme</td>
</tr>
<tr>
<td>14:00 - 15:00</td>
<td>CMVM PG Welcome Talk</td>
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### Presentation of HGU rotation projects

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>15.00</td>
<td>Nick Gilbert / Mattia Marenda: Investigating form and function of transcriptional hubs</td>
</tr>
<tr>
<td>15.15</td>
<td>Wendy Bickmore / Shipra Bhatia: Decoding enhancer grammar using regressive evolution</td>
</tr>
<tr>
<td>15.30</td>
<td><strong>BREAK</strong></td>
</tr>
<tr>
<td>15.45</td>
<td>Luke Boulter: Functionally defining the extracellular signals that regulate bile duct morphogenesis and cancer</td>
</tr>
<tr>
<td>16.00</td>
<td>Javier Caceres: RNA quality control at the endoplasmic reticulum</td>
</tr>
<tr>
<td>16.15</td>
<td>Tamir Chandra: Molecular assessment of clonal haematopoiesis and the risk of blood cancer. How does cellular senescence contribute to human ageing and disease?</td>
</tr>
<tr>
<td>16.30</td>
<td>Caroline Hayward: Analysis of urine metabolites in Viking and Generation Scotland</td>
</tr>
<tr>
<td>16.45</td>
<td>Lukas Tamayo / Frauke Liebelt (Andrew Jackson’s lab): A question of size: when and how is cell number determined during development? The enemy within: DNA leaks as a source of inflammation</td>
</tr>
</tbody>
</table>
### Wednesday 16th September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>09:00 - 10:00</td>
<td>Public Engagement: Dee Davison, Sarah Thomas and Cherry Martin</td>
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<tr>
<td>10:30 - 11:30</td>
<td>Disability Service: Jan Gardiner</td>
</tr>
<tr>
<td>11:30 - 13:00</td>
<td>Good Practice in PhD Research: Current students</td>
</tr>
</tbody>
</table>

**LUNCH**

#### Presentation of HGU rotation projects

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker and Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00</td>
<td>Ava Khamseh: Inference of epistatic interactions in complex traits or disease using Targeted Learning. Uncovering recurrent clonal expansion &amp; mutational competition in a model of early oncogenesis</td>
</tr>
<tr>
<td>14.15</td>
<td>Greg Kudla: High-throughput discovery of disease mutations by in vivo deep mutational scanning</td>
</tr>
<tr>
<td>14.30</td>
<td>Joe Marsh: How do mutations in proteins cause genetic disease?</td>
</tr>
<tr>
<td>14.45</td>
<td>Liz Patton: Developmental pathways in melanoma</td>
</tr>
<tr>
<td>15.00</td>
<td>Chris Ponting: Evolutionary pressures on transcription factor binding</td>
</tr>
<tr>
<td>15.15</td>
<td>Colin Semple / Ailith Ewing: Delving deeper: new strategies for structural variant prediction in cancer</td>
</tr>
<tr>
<td>15.30</td>
<td>BREAK</td>
</tr>
<tr>
<td>15.45</td>
<td>Duncan Sproul: Using synthetic biology to understand how the epigenome is programmed in cancer</td>
</tr>
<tr>
<td>16.00</td>
<td>Martin Taylor / Craig Anderson: Unfolding mutation spectra</td>
</tr>
<tr>
<td>16.15</td>
<td>Albert Tenesa: Understanding gene expression in the human cortex</td>
</tr>
<tr>
<td>16.30</td>
<td>Veronique Vitart: Characterisation of a novel enhancer for the SMAD3 gene</td>
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</tbody>
</table>

### Thursday 17th September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>09:00 - 17:00</td>
<td>IT sessions: Introduction to Unix (Bailey Harrington)</td>
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### Friday 18th September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>09:00 - 17:00</td>
<td>IT sessions: Introduction to Eddie (John Ireland)</td>
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### Monday 21st September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>09:00 - 17:00</td>
<td>IT sessions: Introduction to R (Graeme Grimes)</td>
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### Tuesday 22nd September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>09:00 - 17:00</td>
<td>Stats with R (Ailith Ewing)</td>
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</table>

### Wednesday 23rd - Thursday 24th September

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>Wed 10:00 - 16:00</td>
<td>Virtual Meeting - MRC Human Genetics Unit Symposium: Aberrant Cell State Transitions in Human Disease</td>
</tr>
<tr>
<td>Thur 09:30 - 15:30</td>
<td>Aberrant Cell State Transitions in Human Disease</td>
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<tr>
<td>Date</td>
<td>Event</td>
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<tr>
<td>Friday 25th September</td>
<td>IT sessions: ENSEMBL</td>
</tr>
<tr>
<td>Monday 28th September</td>
<td>Introduction Python (Bailey Harrington)</td>
</tr>
<tr>
<td>Tuesday 29th September</td>
<td>Introduction Conda / Snakemake (Graeme Grimes, Lana Talmaine)</td>
</tr>
<tr>
<td>Wednesday 30th September</td>
<td>GIT version control (Edinburgh Carpentries)</td>
</tr>
<tr>
<td>Thursday 1st October</td>
<td>RNA-Seq and Variant calling with Nexflow on EDDIE (Alison Meynert)</td>
</tr>
<tr>
<td>Friday 2nd October</td>
<td>Genome Browsers (Graeme Grimes, Gogo)</td>
</tr>
<tr>
<td>Monday 5th October</td>
<td><strong>HGU Students Start Rotation Project 1</strong></td>
</tr>
<tr>
<td></td>
<td>14:00 - 17:00 Good Research Practice - Helen Nickerson, Kerry Miller &amp; Elvina Gountouna</td>
</tr>
<tr>
<td>Thursday 8th October</td>
<td>Experimental design - Luke Boulter &amp; Kevin Myant</td>
</tr>
<tr>
<td>Monday 12th October</td>
<td>Next Generation Sequencing - Lee Murphy &amp; Nick Gilbert</td>
</tr>
<tr>
<td>Thursday 15th October</td>
<td>Reading and evaluating the scientific literature - Catherine Naughton &amp; Dee Davison</td>
</tr>
<tr>
<td>Monday 19th October</td>
<td><strong>Journal Club 1</strong> - Luciana Gomez Acuna &amp; Yatendra Kumar</td>
</tr>
<tr>
<td>Thursday 22nd October</td>
<td>Scientific blogging - Lorna M Campbell</td>
</tr>
<tr>
<td>Monday 26th October</td>
<td>Experimental design - Luke Boulter &amp; Kevin Myant</td>
</tr>
<tr>
<td>Thursday 29th October</td>
<td>Biological Imaging - Ann Wheeler &amp; Team</td>
</tr>
<tr>
<td>Monday 2nd November</td>
<td><strong>Journal Club 2</strong> - Robert Foster &amp; Ani Skouloudaki</td>
</tr>
<tr>
<td>Thursday 5th November</td>
<td>Advanced Proteomics and Metabolomics (Alex von Kriegsheim)</td>
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<tr>
<td>Date</td>
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<tr>
<td>Monday 9th November</td>
<td>14:00 - 17:00 Experimental Model Systems - Alessandro Brombin, Ian Adams &amp; Malcolm Dunlop</td>
</tr>
<tr>
<td>Thursday 12th November</td>
<td>14:00 - 17:00 Translating your research - Andrea Taylor &amp; Helen Nickerson</td>
</tr>
<tr>
<td>Monday 16th November</td>
<td>14:00 - 15:00 Journal Club 3 - James Liley &amp; Tracy Ballinger</td>
</tr>
<tr>
<td>Thursday 19th November</td>
<td>10:00 - 12:00 Analysing Imaging data - Laura Murphy</td>
</tr>
<tr>
<td>Monday 23rd November</td>
<td>13:00 - 15:00 Genome Engineering - Pleasantine Mill &amp; Andrew Wood</td>
</tr>
<tr>
<td>Thursday 26th November</td>
<td>9:00 - 12:00 Super resolution imaging - Ann Wheeler &amp; Team</td>
</tr>
<tr>
<td>Monday 30th November</td>
<td>14:00 - 15:00 Journal Club 4 - Emily Webb &amp; Natalia Jimenez Moreno</td>
</tr>
<tr>
<td>Thursday 3rd December</td>
<td>HGU Student Christmas talks</td>
</tr>
<tr>
<td>Monday 7th December</td>
<td>14:00 - 15:00 Drug Development - Stefan Symeonides &amp; Neil Carragher</td>
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<tr>
<td>Thursday 10th December</td>
<td>HGU Rotation 1 talks</td>
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<tr>
<td>Monday 21st December</td>
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<tr>
<td>HGU Rotation Student Project Write-Up deadline</td>
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<tr>
<td>Tuesday 5th January</td>
<td>10:00 Health &amp; Safety Inductions for students starting work on-site - Zoom</td>
</tr>
<tr>
<td>Monday 11th January</td>
<td>HGU Students Start Rotation Project 2</td>
</tr>
<tr>
<td>09:00 - 12:00</td>
<td>Molecular ageing and senescence - Tamir Chandra</td>
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<tr>
<td>14:00 - 17:00</td>
<td>The evolutionary genomics of cancer - Colin Semple</td>
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<tr>
<td>Monday 18th January</td>
<td>09:00 - 12:00 Biomedical Data Science - Catalina Vallejos</td>
</tr>
<tr>
<td>14:00 - 15:00</td>
<td>Journal Club 5 - Pragya Mittal &amp; Iiya Flaymer</td>
</tr>
<tr>
<td>Monday 25th January</td>
<td>09:00 - 12:00 Causality in Biomedicine - Ava Khamseh</td>
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<tr>
<td>14:00 - 17:00</td>
<td>Chris Ponting - Transcription factors modify traits?</td>
</tr>
<tr>
<td>Monday 1st February</td>
<td>09:00 - 12:00</td>
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<td></td>
<td>14:00 - 15:00</td>
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<tr>
<td>Monday 8th February</td>
<td>09:00 - 12:00</td>
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<td></td>
<td>14:00 - 17:00</td>
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<tr>
<td>Monday 15th February</td>
<td>09:00 - 12:00</td>
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<td></td>
<td>14:00 - 15:00</td>
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<tr>
<td>Monday 22nd February</td>
<td>09:00 - 12:00</td>
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<td>14:00 - 17:00</td>
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<tr>
<td>Monday 1st March</td>
<td>09:00 - 12:00</td>
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<td>14:00 - 15:00</td>
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<td>Monday 8th March</td>
<td>09:30 - 12:00</td>
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<td>14:00 - 17:00</td>
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<tr>
<td>Monday 15th March</td>
<td>09:00 - 12:00</td>
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<td></td>
<td>14:00 - 15:00</td>
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<tr>
<td>Monday 22nd March</td>
<td>09:00 - 12:00</td>
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<td></td>
<td>14:00 - 17:00</td>
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<tr>
<td>Monday 29th March</td>
<td>09:00 - 12:00</td>
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<tr>
<td><strong>Thursday 1st April</strong></td>
<td><strong>HGU Rotation 2 talks</strong></td>
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<td></td>
<td><strong>HGU Rotation Student Project Write-Up deadline</strong></td>
</tr>
<tr>
<td>Monday 5th April</td>
<td><strong>HGU PhD Starts</strong></td>
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</table>
MRC Institute of Genetics & Molecular Medicine

NHS Outpatients Building Computing Suite 1
Medical Education Centre, 3rd Floor
MRC Institute of Genetics & Molecular Medicine
Cancer Research UK Edinburgh Centre

First Floor
IGMM South

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

MRC Institute of Genetics & Molecular Medicine
East Seminar Room E4.07
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 (https://edin.ac/2OVdkDJ). For part time students assessments should happen every year and follow this format.

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

Annual reviews on EUCLID
All students need to complete an annual 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

<table>
<thead>
<tr>
<th></th>
<th>MSc by Research</th>
<th>3 year PhD</th>
<th>4 year PhD</th>
<th>MD</th>
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</thead>
<tbody>
<tr>
<td>10 week report</td>
<td>✔</td>
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<tr>
<td>6 month report</td>
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<tr>
<td>1st year report</td>
<td>✔</td>
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<tr>
<td>2nd year report</td>
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<tr>
<td>3rd year report</td>
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</table>

10 week report
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@igmm.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 (6 months for MScR)

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 1 week of the interview 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

HANDBOOK 2020
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/courses/gradschool
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 IGMM Postgraduate Society (POGS) is a student-run committee open to IGMM students from all years and centres. Our aim is to improve the student experience at the IGMM, 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, Burns Night ceilidh, 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 IGMM 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 IGMM 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: igmm.pogs@ed.ac.uk.

Buddy Session by POGs
The buddy session is to provide new students with a pair of buddies who are in the final years of their PhD. The buddies are there to answer any IGMM-related questions the new students have and provide help with any problems that might arise. At the buddy session small groups of students will be assigned to two buddies who will have your academic email address. The buddies will introduce themselves and get to know their students, share with them their email address and their offices so you will be able to find them anytime you want to speak to them. Follow up sessions will be organised by the buddies later in the year to catch up on students progress settling into the IGMM.

Best wishes, POGS
The IGMM Social Committee

We are a group of students, research assistants and post-docs from across the IGMM who enjoy organising social events that are open to all at the institute. Our aim is to get everyone from the IGMM community together to unwind and have fun after work. We run many events, including the monthly TGIFs where we provide snacks and drinks in the nucleus on the last Friday of every month. Other highlights of the year include the IGMM Quiz, Christmas Party, Burns Night Ceilidh, and many more... We meet roughly once a month on an informal basis and you can be flexible with which events you help with. We are always looking for new members and being on the committee gives you an opportunity to work on your organisational and volunteering skills?

great for your CV! If you have an idea for an event or you just want to help run our calendar, look out for our ?Join Social Committee? meeting coming soon. Alternatively, you could send us an email at social-comm@igmm.ed.ac.uk, or get in touch with one of our members.

You can find us and our current events schedule on the IGMM intranet.

We look forward to hearing from you!
Useful Links
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**


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

Ten simple rules collection- lots of extremely useful advice here in an easily digestible form, covering everything from being a graduate student to getting grants
www.ploscollections.org/article/browse/issue/info%3Adoi%2F10.1371%2Fissue.pcol.v03.i01

**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

www.nature.com/ncb/journal/v6/n4/full/ncb0404-275.html

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.
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 Nick Gilbert 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 IGMM PGSC by emailing:
student.admin@igmm.ed.ac.uk

Supervisors will be asked for feedback on your performance in the lab and we will ask to meet up with you if there are any concerns. Towards the end of each rotation you will give a short assessed talk about your mini-project.
Decoding enhancer grammar using regressive evolution

Supervisors: Professor Wendy Bickmore and Dr Shipra Bhatia

Tissue-specific DNA-binding transcription factors are recruited to noncoding regulatory regions of the genome called enhancers to ensure precise spatial and temporal activation of promoters of their target gene. Understanding this ‘regulatory code’ is extremely challenging as most transcription factor binding sites have diverged from predicted consensus motifs to achieve a reduced affinity of binding. These rotation projects will use a combination of bioinformatics and transgenic approaches to identify the transcription factors with vital roles in the early stages of human eye development. We will use a reductionist approach, utilizing information from regressive evolution of the eye in mammals which have adapted to life in the dark in subterranean habitats. Their eyes have been reduced to highly rudimentary organs.

Project 1: Dry (computational genomics) project

Rotation Oct-Dec
Rotation Jan-March

We will analyse the genomes of these mammals in the regions surrounding genes known to be important in human eye development, to identify regions of accelerated evolution and to use these data to identify the transcription factors and their binding sites that are important for regulating expression of genes such as PAX6 - a master regulator of the developing eye.

Project 2: Wet-lab project

Rotation Jan-March

We will assess the functional impact of accelerated enhancer evolution using our dual reporter transgenic assay in zebrafish. The spatial and temporal regulatory capacity of enhancers from human and naked mole rat genomes will be compared during zebrafish embryonic development using live cell imaging. The candidate transcription factors predicted to binding these enhancers will be tested.

References: Partha et al., 2017 eLife. 6:e25884; Bhatia et al., 2015 PLoS Genetics 1(6):e1005193
Functionally defining the extracellular signals that regulate bile duct morphogenesis and cancer

Supervisor: Dr Luke Boulter

Rotation Jan-March

The bile duct is a complex network of tubes in the mammalian liver. Following injury, the bile duct can regenerate, but how it does this is poorly understood. Our lab is interested in how tubular structures grow in the mammalian adult in response to injury and how, if left unchecked, these tubular (re)growths develop into aggressive and often lethal cancers. This PhD project will use a combination of 3D cell culture, mouse models and human patient tissue to functionally investigate the changes that occur in the extracellular matrix during bile duct injury. We will ask how these changes promote ductular regeneration and branching during repair and then determine whether these processes are deregulated to promote tumour growth.

RNA quality control at the Endoplasmic reticulum

Supervisor: Prof Javier Caceres

Rotation Jan-March

Nonsense-mediated decay (NMD) is a translation-dependent RNA quality control mechanism that occurs in the cytoplasm. We have recently identified an NMD pathway at the Endoplasmic Reticulum (ER) that provides quality control of ER-translated mRNAs (1). We propose that this ER-NMD pathway is instrumental to control the cellular stress response that is misregulated during ageing and neurodegeneration. We will focus on the mechanism and physiological role of this novel ER-NMD pathway, as well as on the biological consequences of manipulating its activity.


(also see bioRxiv preprint doi: https://doi.org/10.1101/2020.02.24.954453)
Molecular assessment of clonal haematopoiesis and the risk of blood cancer

Supervisor: Dr Tamir Chandra

Rotation Oct-Dec
Rotation Jan-March

No prior experience needed. This project is pure dry lab or a mix between dry (2/3) and wet lab (1/3).

This multidisciplinary project will allow the student to interact with a number of collaborating labs: Marsh lab (Functional annotation of new mutations), Schumacher lab (Modelling), Kirschner lab (Glasgow, Stem cell assays), Marioni lab (Phenomics).

Age is the single biggest factor underlying the onset of many haematological malignancies. Age-dependent myeloid bias and the onset of clonal haematopoiesis (CHIP) predispose to leukemias. CHIP is apparent in the general population from age 60 with a steady increase in prevalence to 18-20% (2% variant allele frequency (VAF)). CHIP is driven by somatic mutations in leukemic driver genes.

Our group has previously studied CHIP in the Lothian Birth Cohort, and shown that the affected participants exhibited significantly accelerated ageing characterised by several published human epigenetic clocks (Robertson et al, 2019).

Whilst some of the key genetic drivers of CHIP have been well characterised, we still lack a comprehensive understanding of its pathogenesis: including understanding the co-drivers and subsequent biological contexts that allow its development; to the mechanisms that allow it to confound distal disease pathologies. The student will work on newly described mutations and their consequences as well as extending our analysis to the Generation Scotland dataset – containing the genotypes and phenotypes of thousands of Scots - to improve our understanding of CHIP in this large prospective cohort.

The Marsh lab will guide the student with annotating the effects of unknown/newly discovered mutations. Functional follow-up with the help of modelling stem cell kinetics (Schumacher) and in vitro stem cell assays (Kirschner). The student will use the breadth of available phenotypic data to conduct a comprehensive understanding of the drivers of CHIP. The correlation to phenomics data will be in collaboration with the Marioni lab.
How does cellular senescence contribute to human ageing and disease?

Supervisor: Dr Tamir Chandra

Rotation Oct-Dec
Rotation Jan-March

Some prior experience in data analysis is an advantage here. This project is pure dry lab or a mix between dry (1/2) and wet lab (1/2), and will allow the student to interact with collaborating labs: Vallejos lab (Bayesian approaches, statistical learning), Marioni lab (Epi-/Genetic epidemiology), Crow (Translational medicine).

Replicative senescence is the finite capability of cells to proliferate and offers a cellular model with which to study organismal ageing. Additional cellular models of ageing exist, such as cells from either progeroid syndromes or old individuals, and cells in which senescence has been induced by oncogene activation or high levels of DNA damage.

The area of senescence has recently been energised by observations, in mouse, that clearance of senescent cells (senolysis) leads to improved health outcomes and an extension of healthy lifespan. Early results of senolytic studies of premature ageing phenotypes were promising, leading to investigations of acute pancreatitis, lung fibrosis and type-2 diabetes.

Nevertheless, directly implicating senescence in human disease has proved a major challenge, because to date most evidence has emerged from cell culture or mouse models. As a dry-lab project, the student will use in-lab generated senescence-specific signatures to identify senescence driven human traits by integrating large cohort and molecular data. As a wet-lab project the student will investigate the functional role in senescence of mutated genes discovered by the Crow lab in the clinic.

Aims

Dry: A) Determining the contribution of senescence to human diseases so as to prioritise those for further research and senolytic intervention. B) Estimating the senescence burden across human tissues and ageing, and assessing its associations with predispositions, risk factors and human phenotypes (PheWAS).

Wet: A) Why and how do gene mutations disorders associated leading to enhanced type I interferon signalling modulate the senescence response?
Investigating form and function of transcriptional hubs  
**Supervisor:** Nick Gilbert and Mattia Marenda  

**Rotation Oct-Dec**  
**Rotation Jan-March**

HnRNP-U (or SAF-A) is an abundant nuclear protein involved in RNA metabolism and chromatin organization [1,2]. Recently, it has been shown that SAF-A forms a gel-like mesh inside the nucleus of healthy cells by interacting with newly synthesised RNA. This RNA-protein gel is crucial for maintaining the active regions of chromatin in an open and accessible state. In fact, knocking down SAF-A protein or inhibiting transcription results in the collapse of active gene loci [2]. As a consequence, we hypothesise that SAF-A/RNA gel plays a major role in regulating transcription complexes formed in the proximity of genomic loci.

In this project the student will learn and use Single Molecule Localisation Microscopy (SMLM) techniques to explore how SAF-A knockdown or mutations affect properties of transcriptionally related proteins, such as co-activators CBP/P300 or splicing factor SC35. Both spatial distribution and diffusion properties will be investigated with specific SMLM experiments, such as dSTORM [3] or Single-Particle Tracking [4]. The student will also learn how to analyse the outcome data by using either advanced public available software or algorithms developed in the lab.


Analysis of urine metabolites in Viking and Generation Scotland  
**Supervisor:** Professor Caroline Hayward  

**Rotation Oct-Dec**  
**Rotation Jan-March**

This project involves the analysis of urine metabolite data for 55 phenotypes on two independent cohorts (VIKING and Generation Scotland) produced using the Nightingale platform. The data is ready for analysis. The project will initially require a genome-wide association (GWAS) of the two cohorts separately using FastGWAS and TopMED imputed data followed by a meta-analysis using METAL. Annotation of the significant results will use FUMA and other appropriate data interpretation platforms. The impact of the significant results will then be further investigated using Mendelian Randomisation methods to establish the effect of these findings on clinically important phenotypes relating to kidney function, hypertension and blood pressure. This project will enable the development of skills in the use of various R packages as well as Bioinformatic databases.
A question of size: when and how is cell number determined during development?

**Supervisor: Professor Andrew Jackson**

**Rotation Jan-March**

The greatest difference between mammals is size, determined by cell number. Underlying this are developmental decisions to proliferate or differentiate and exit cell cycle, with mammals intermingling proliferation and differentiation(1). Having identified many genes that cause extreme growth failure in humans(2) we want to understand how they determine size.

The project will investigate the effect of DNA replication proteins on cell fate decisions using both cell and developmental biology approaches. Initially, live-imaging during mES differentiation and in zebrafish, employing Fucci and Cdk2 sensors will be used to determine when cell cycle is altered and G0 exit events occur(3).


The enemy within: DNA leaks as a source of inflammation

**Supervisor: Prof Andrew Jackson**

**Rotation Jan-March**

As a first line of immune defence, cells contain key sensors recognizing pathogen-derived nucleic acids to protect against infections. They are also triggered by our own DNA inadvertently leaking into the cytoplasm. We have found micronuclei to be an important source of such DNA (Mackenzie et al., Nature, 2017). Investigating other self-sources for these immuno-stimulatory nucleic acids would form the basis of a PhD employing biochemical, cellular and immunological techniques. For the miniproject you would investigate DNA leakage from endolysosomes arising from mitophagy, autophagy or phagocytosis, using live-cell microscopy, cellular and biochemical assays.
Inference of epistatic interactions in complex traits or disease using Targeted Learning

Supervisor: Dr Ava Khamseh

Rotation Oct-Dec
Rotation Jan-March

The goal of Genome-Wide Association Studies is to find candidate genomic variants/genes that could potentially increase the risk of a certain disease. One of the main aims of this field of study is to move away from associational to causal variant-trait relations. For accurate causal inference, one is required to model epistatic interactions amongst variants, as well as environmental factors. In this project, we do this by not just using a single parametric model but by developing an ensemble of non-parametric and semi-parametric models, which is made possible using the statistical framework of Targeted Learning.

Uncovering recurrent clonal expansion & mutational competition in a model of very early oncogenesis

Supervisor: Dr Ava Khamseh

Rotation Oct-Dec
Rotation Jan-March

Advances in high-throughput DNA- and RNA-sequencing have substantially increased our understanding of late-stage cancer. Yet we still lack a quantitative understanding of the necessary and sufficient early conditions for the evolution of normal cells into cancer cells. In this project, we use a tractable somatic mouse model of primary liver cancer, to trace clonal evolution at cellular resolution. The experiments involve generating temporal sequencing data, in order to jointly quantify (i) mutational interactions, and (ii) transcriptional trajectories, during cancer initiation.

This project is done in collaboration with Chris Ponting’s lab and is best suited for students with quantitative backgrounds (mathematics, statistics, physics, computer science). As this is an exciting new avenue of research, considerable conceptual and numerical training will be provided.

This project is done in close collaboration with Luke Boulter’s lab and can lead to a wet-lab or a hybrid wet & dry lab PhD. Appropriate training to analyse single-cell DNA and RNA data will be provided.
High-throughput discovery of disease mutations by in vivo deep mutational scanning

Supervisor: Dr Greg 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.

How do mutations in proteins cause genetic disease?

Supervisor: Dr Joe Marsh
Rotation Oct-Dec
Rotation Jan-March

This project will use computational techniques to study how mutations in a specific protein or protein family can be associated with different disease phenotypes. Specifically, the student will use structural bioinformatics and molecular modelling in order to understand the effects of mutations at a molecular level, and computational variant effect predictors to assess mutations for their likely severity. Ultimately, the goal is to determine the best tools and strategies for identifying novel pathogenic mutations in the protein of interest. Note that this project can be tailored to the student’s level of computational experience.
Developmental pathways in melanoma
Supervisor: Professor Liz Patton

Rotation Oct-Dec
Rotation Jan-March

Melanoma is the most lethal form of skin cancer, yet despite progress for melanoma therapy in the past decade, most patients with metastatic melanoma still die from the disease. Using zebrafish models of melanoma, our lab has recently discovered that melanocyte developmental pathways are critical for melanoma progression and survival, and that sub-populations of cells exist in melanoma that are characterised by expression of early neural crest genes (Travnickova, Wojciechowska et al., Cancer Research 2019; Johansson, Marie et al., Dev Cell 2020). PhD projects in our lab will use zebrafish genetics, live imaging and single-cell RNA-sequencing to identify and target novel cell populations in development and in melanoma models, and directly relate these to human melanoma datasets and tissues. Rotation projects are available for dry-lab (e.g. analysis of new scRNA-seq datasets) and for wet-lab science.

Evolutionary pressures on transcription factor binding
Supervisor: Prof Chris Ponting

Rotation Oct-Dec
Rotation Jan-March

Most DNA variants affecting complex diseases and traits fall within non-coding sequence. Furthermore, the actual causal variant is most likely to alter DNA-binding of a transcription factor. We have already collated tens of thousands of DNA variants lying within the DNA-binding site of at least one of 364 transcription factors in 45 cell lines. In this computational rotation project we are seeking to understand the evolution and function of DNA binding sites. For each factor in turn we will use human population and cross-species measures of evolutionary constraint to determine the selective pressures on transcription factor binding sites.

Genetic variation modulating VDR binding affinity within the canonical RXR:VDR heterodimeric binding motif.
Delving deeper: new strategies for structural variant prediction in cancer

Supervisor: Prof Colin Semple and Dr Ailith Ewing

Rotation Oct-Dec
Rotation Jan-March

Figure - Structural variant detection in cancer.

a) Many cancers have highly rearranged genomes which on sequencing reveals a plethora of structural variants of different types. The lines in this circos plot of one tumour each represent a structural variant.

b) Average structural variant burden per tumour across different cancer types in the International Cancer Genome Consortium (ICGC) coloured by SV type.

c) Types of SV and the read anomalies associated with them.

Structural variation is known to play important roles in cancer but accurate automated detection of the full range of structural variant (SV) classes in tumours from short read sequencing continues to elude us (Ewing and Semple, 2018). All existing algorithms for SV detection produce erroneous predictions and also miss real variants, so there is a pressing need for new approaches. Read mapping anomalies (RMAs), simple counts of short reads mapping anomalously to a locus, can provide a probability of the presence and type of SV at this locus (Imprialou et al, 2017), but this approach is unexplored in cancer genomics. This computational project aims to use RMAs to quantify the uncertainty in current gold standards of SV prediction in large cancer genomics datasets, exploiting the unique tumour sequencing data emerging at the HGU (Ewing et al, 2020).

1. Ewing et al. Structural variants at the BRCA1/2 loci are a common source of homologous repair deficiency in high grade serous ovarian carcinoma. https://www.biorxiv.org/content/10.1101/2020.05.11.088278v1


Using synthetic biology to understand how the epigenome is programmed in cancer

Supervisor: Dr Duncan Sproul

Rotation Oct-Dec
Rotation Jan-March

Epigenetic dysfunction is a fundamental hallmark of cancer that results in altered DNA methylation levels. It is associated with the repression of tumour suppressor genes such as BRCA1 but we don’t understand how these potential epimutations occur. We have recently developed synthetic epialleles, manufactured DNA with defined DNA methylation levels. This project will use these tools to probe how the cancer epigenome is programmed and identify the factors responsible for DNA methylation alterations in cancers. The student will become an expert in cutting-edge laboratory techniques including CRISPR genome editing and gain experience in bioinformatics to analyse the data they generate.
Unfolding mutation spectra

Supervisor: Prof Martin Taylor and Dr Craig Anderson

Rotation Oct-Dec
Rotation Jan-March

Resolving a 96 category mutation signature (left) into a 192 category signature (right) reveals the identity of the damaged nucleotide (T and C rather than A and G in this example) and can be used to identify the damaged DNA strand to better understand mutagenesis and repair processes.

The type of nucleotide change and its sequence context can provide information about the underlying process that generated a mutation (Hellday, Eshtad, and Nik-Zainal 2014). Collectively across a cancer, these patterns of mutation can reveal the genotoxic environmental exposures and cellular defects that contributed to tumour development (Alexandrov et al. 2020) and increasingly are finding utility in the stratification of patients for treatment (Verret et al. 2020). Typically these spectra are considered as 96 channel vectors that treat reverse-complement sequence relationships together. Recently we have shown that DNA lesions from exogenous mutagens segregate into daughter cells in such a way that permits strand specific deconvolution of mutational process (Aitken et al. 2020), allowing us to fully define strand-aware 192-channel mutation spectra. Deriving these from a rich compendium of mutagenised cell lines (Kucab et al. 2019), this computational analysis project working primarily in the R environment will be the first application of this approach to resolve the phasing of adducts for diverse mutagens. It should allow the strand-aware resolution of repair processes such as transcription coupled repair and provide training in R, the unix command-line environment, compute cluster usage and code versioning. Prior computational experience not required.


Understanding gene expression in the human cortex

Supervisor: Professor Albert Tenesa

Rotation Oct-Dec

Rotation Jan-March

Summary: DNA methylation levels is tissue-specific and determined by genetic and environmental factors. We have collected 120 human cortex and measured methylation levels at over 500,000 CpG sites as well as genotyped the samples at over 500,000 SNPs.

Aims: The project will identify cis eQTLs and perform TWAS on brain related conditions in UK Biobank.


Characterisation of a novel enhancer for the SMAD3 gene

Supervisor: Dr Veronique Vitart

Rotation Jan-March

Genome-wide association studies (GWAS) of corneal thickness offer opportunities to understand molecular processes regulating extracellular matrix homeostasis in health and disease. This project aims to characterise a genomic regulatory region associated with SMAD3 transcription levels and cornea thickness. Using cell-type and allele-specific assays of gene expression and transcription factor binding we will assess how candidate causal variants, defined by fine-mapping/bioinformatics, affect activity of key transcription factors. Deciphering cellular and physiological functions of regulatory variation affecting SMAD3, a major mediator of TGF-β signalling in a range of tissue and developmental contexts, will provide insights into tissue homeostasis and disease mechanisms including those underlying Loeys-Dietz syndrome.
Training Timeline 2020 - 2021

- **2020**
  - September: COLLEGE/IGMM INDUCTIONS
    - Week beginning 14th September

- **2021**
  - October: HGU ROTATION 1
    - Commences week beginning 5th October
  - January: CHOOSING / START PhD
    - Commences week beginning 5th April
  - April: ROTATION 2
    - Commences week beginning 11th January
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.

Student Support
The IGMM 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 your supervisor. They will understand your situation and will want to look out for you. Alternatively please contact student admin (student-admin@igmm.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: www.ed.ac.uk/students/health-wellbeing.
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/sport-exercise/healthy-university/feeling-good-app

Student Disability Service
Supports students with a range of health conditions, learning differences, disabilities and some temporary injuries.
www.ed.ac.uk/student-disability-service

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/

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

SilverCloud
Online cognitive behavioural therapy.
www.ed.ac.uk/student-counselling/what-is-silvercloud

Big White Wall
An online service offering self-help programmes, creative outlets and a peer support community monitored by mental health professionals.
www.bigwhitewall.com

EUSA Mental Health and Wellbeing Society
Provides an informal and friendly space where students can learn more about the importance of mental wellbeing.
www.eusa.ed.ac.uk/activities/societies/society/edinburghwellsoc

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/

Student Disability Service
Supports students with a range of health conditions, learning differences, disabilities and some temporary injuries.
www.ed.ac.uk/student-disability-service

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SilverCloud
Online cognitive behavioural therapy.
www.ed.ac.uk/student-counselling/what-is-silvercloud

Big White Wall
An online service offering self-help programmes, creative outlets and a peer support community monitored by mental health professionals.
www.bigwhitewall.com

If you would like to discuss student health and wellbeing or any of the resources above, please contact: student-admin@igmm.ed.ac.uk
**WHAT YOU MAY BE EXPERIENCING/FEELING** (YOU ARE NOT ALONE, I PROMISE)

**IMPOSTER SYNDROME**

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.

**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!

**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 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.

**ISOLATION / GUILT**

Writing your thesis can be a particularly lonely, isolating task. This can also be coupled with feelings of guilt when you go 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.

**THE WORK / LIFE STRUGGLE**

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. This is a fault with the system. Presenteeism is a common trait observed in academia, where people 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.

**NO MORE TICK BOXES**

You got pretty good at doing essays 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 nowhere 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.

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

- **INCREASED DRINKING**
- **INCREASED EATING**
- **DECREASED EATING**
- **WORKING LONG HOURS**
- **BEING ABSENT**
- **JOoking/ABOUT SUICIDE**
- **LOOKING DISHEVELLED**

**SOME WAYS TO HELP MANAGE YOUR MENTAL HEALTH AND WELLBEING**

- **SEEK MEDICAL ADVICE**
  - Some symptoms of stress, anxiety, depression or imposter syndrome may be very difficult to figure out you are feeling. This included information such as medication you are taking to help you manage your mental health.

- **TAKE SOME TIME OUT**
  - Being tired and anxious can sometimes be a result of your work as it is so immersive. Give yourself time to step away from the task at hand. This can be energising, helping you to gain perspective and take a break from work.

- **TALK TO YOUR SUPERVISOR**
  - If it is a hobby then people want you to talk about your progress. Look out, if you feel like it. Remember, sometimes have to invest more time than you can handle. Ask them for advice or a change of focus.

- **TALK TO YOUR PEERS / POSTDOCS**
  - It is highly likely that people want you to talk about the research you are doing. Ask them for feedback. Look at the work of others. Ask them for advice or a change of focus.

- **CREATE MANAGEABLE CHUNKS**
  - It is a proven fact that lack of sleep can add to feelings of stress. Exercise can also work to help you manage your mental health. The Royal Society, 2010.

- **READ LITERATURE**
  - There is a large amount of online resources available to manage emotional wellbeing. For example, the charity Mind, have a range of literature available. You can manage your mental health by talking to someone about your experience. They can encourage self-care activities, and a good professional is more than willing to help you.

**REFERENCES**


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

47% of PhD students have survived their PhD so may have some available to help manage mental health and wellbeing, even if 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.

A hard truth is only 7 in 200 PhD graduates become full professors. 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...

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

**A poster by Dr Zoe Ayres (not a medical professional) Free to distribute.**
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 IGMM Students or scan the QR code.

student-admin@igmm.ed.ac.uk
www.facebook.com/groups/OFFICIALIGMMStudents

A new Facebook Group has been created for current on-programme students at IGMM. 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 IGMM Students or visiting: www.facebook.com/groups/OFFICIALIGMMStudents

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 IGMM.

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 IGMM.

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.