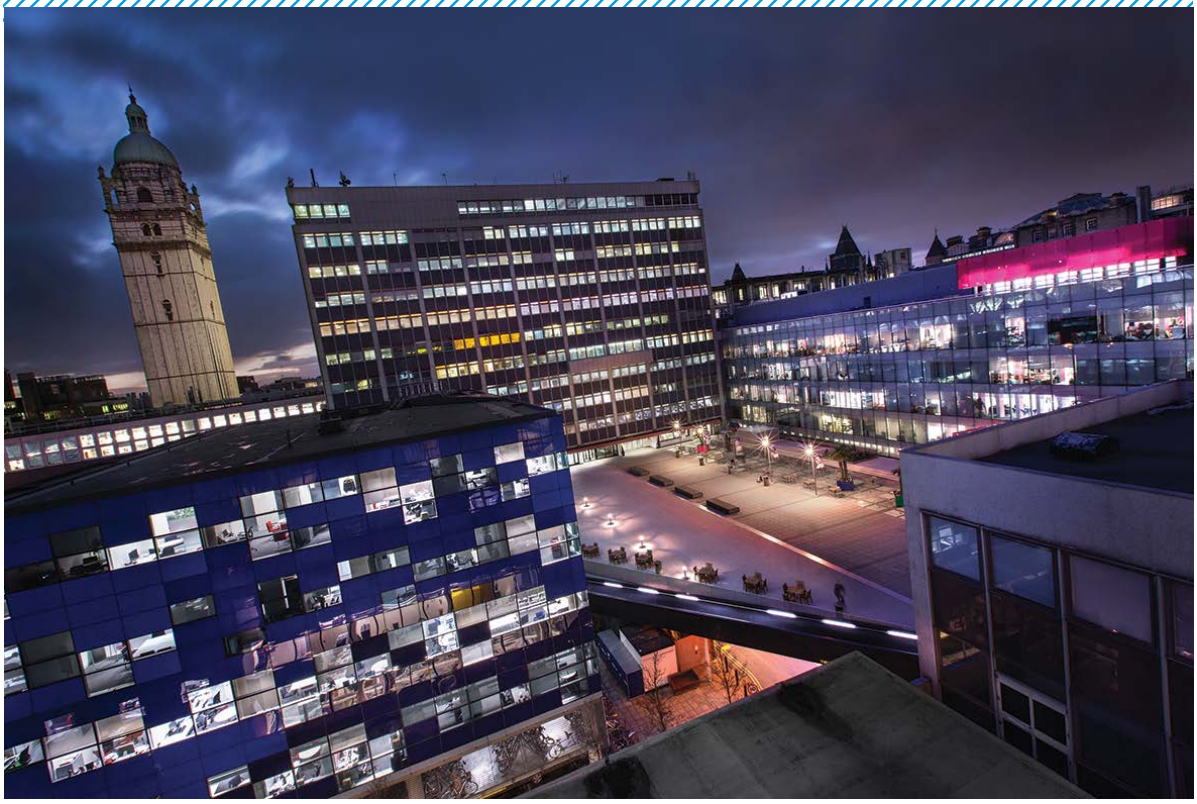
Imperial College London



DEPARTMENT OF MATHEMATICS

Faculty of Natural Sciences

**MRes in Stochastic Analysis and Mathematical Finance**

# STUDENT HANDBOOK 2016–17

# Contents

# Welcome to the College

Congratulations on joining Imperial College London, the only university in the UK to focus exclusively on science, medicine, engineering and business.

From Fleming's discovery of Penicillin to Gabor's invention of holography, Imperial has been changing the world for well over 100 years. You're now part of this prestigious community of discovery and we hope you will take this opportunity to make your own unique contribution.

We're committed to providing you with the very best academic resources to enrich your experience. We also provide a dedicated support network and a range of specialist support services to make sure you have access to the appropriate help, whether that's further training in an academic skill like note taking or simply having someone to talk to.

You'll have access to an innovative range of professional development courses within our Graduate School throughout your time here, as well as opportunities to meet students from across the College at academic and social events – see page 6 for more information.

We actively encourage you to seek out help when you need it and try to maintain a healthy work-life balance. Our choice of over 340 clubs, societies and projects is one of the largest of any UK university, making it easy to do something different with your downtime. You also have free access to gym (following a one-off orientation fee of £40 in 2016) and swimming facilities across our campuses.

As one of the best universities in the world, we are committed to inspiring the next generation of scientists, engineers, clinicians and business leaders by continuing to share the wonder of what we do through public engagement events. Postgraduate students, alongside our academics and undergraduate students, make a significant contribution to events such as our annual Imperial Festival and our term-time Imperial Fringe events – if you're interested in getting involved then there will be opportunities for you to do so.

## Welcome from Professor Sue Gibson, Director of the Graduate School

The Graduate School has several roles but our main functions are to provide a broad, effective and innovative range of professional skills development courses and to facilitate interdisciplinary interactions by providing opportunities for students to meet at academic and social events. Whether you wish to pursue a career in academia, industry or something else, professional skills development training will improve your personal impact and will help you to become a productive and successful researcher.

Professional skills courses for Master's students are called "Masterclasses" and they cover a range of themes, for example, presentation skills, academic writing and leadership skills (see page 6 for more information).

All Masterclasses are free of charge to Imperial Master's students and I would encourage you to take as many as you can to supplement your academic training. The Graduate School works closely with the Graduate Students' Union (GSU) and is keen to respond to student needs, so if there is an area of skills training or an activity that you would like us to offer, but which is not currently provided, please do get in touch (see page 6).

The Graduate School also runs a number of exciting social events throughout the year which are an opportunity to broaden your knowledge as well as to meet other students and have fun. Particular highlights include the Ig Nobel Awards Tour Show, the Chemistry Show and the 3-minute thesis competition. You should regularly check the Graduate School's website and e-newsletters to keep up to date with all the events and training courses available to you.

Finally, I hope that you enjoy your studies here at Imperial, and I wish you well.

## Welcome from Dr Janet De Wilde, Head of Postgraduate Professional Development

I would like to welcome you to the Graduate School programme for postgraduate professional development. Our team of tutors come from a wide variety of experiences and we understand just how important it is to develop professional skills whilst undertaking postgraduate studies and research. Not only will this development improve your success during your time at Imperial, it will also prepare you for your future careers. We are continually working to develop the courses we offer and over this year you will see a range of new courses including face-to-face workshops, interactive webinars and online self-paced courses. I encourage you to explore and engage with the diverse range of opportunities on offer from the graduate school and I wish you well in your studies.

## The Graduate School

You automatically become a member of the Graduate School when you register as a postgraduate student at Imperial.

The Graduate School has been set up to support all postgraduate students at the College through:

- Training and development courses
- Networking activities, social and academic events to encourage cross-disciplinary interactions
- Forums to represent the views of postgraduate students throughout the College


**‘Masterclass’ professional skills courses**

You can see the full range of free professional skills courses for postgraduate students on the Graduate School website:

www.imperial.ac.uk/study/pg/graduate-school/professional-skills/masters

All courses can be booked online.

**Contact us**

Level 3, Sherfield Building, South Kensington Campus

020 7594 1383

graduate.school@imperial.ac.uk

www.imperial.ac.uk/graduate-school

## Imperial Success Guide

The Imperial Success Guide is an online resource with advice and tips on the transition to Master’s level study. More than just a study guide, it is packed with advice created especially for Imperial Master’s students, including information on support, health and well-being and ideas to help you make the most of London.

www.imperial.ac.uk/success-guide

## Introduction from the President of Imperial College Union

I am delighted to welcome you to Imperial, and to the Graduate Students' Union (GSU). I hope that your time here will be fulfilling and valuable, and the GSU is here to try and facilitate this.

Imperial College London is such a wonderful and transformative place that provides a unique and thrilling environment for research and for advanced studies, and the graduate students are a vital and valued part of the wider community of Imperial. Our graduate students are at the forefront of the research done. Therefore, at the GSU we ensure that the experience here fosters both academic achievement and personal development in our students.

The GSU is a University-wide representative body for postgraduate students at Imperial. It promotes the interests and welfare of its members, provides social and recreational activities and advocate for you and your opinions to the University and bodies external to the university. I encourage you to become an active member of the GSU– through involvement in your departments and the many University societies, and through our representational and campaigning activities.

I wish you all a fantastic time here at Imperial. Please take advantage of our rich community, and hope to meet you all soon.

Ahmed Shamso

gsu.president@imperial.ac.uk

gsu
GRADUATE STUDENTS' UNION

# 1. Introduction to the Department

## Welcome from MRes Course Director

Dear student

Welcome to Imperial College for the start of your MRes.

This handbook contains all the key information you will need to understand how the course will be structured over the next 12 months, the key dates for the submission of assessed work, what will be expected of you academically, and who are the important contacts within the Department.

Dr Thomas Cass

6M35 Huxley Building

South Kensington Campus

London SW7 2AZ

180 Queen`s Gate

Tel: +44 (0) 20 7594 8554

thomas.cass@imperial.ac.uk

## Welcome from Head of Department

Dear Colleague

Welcome to the Department of Mathematics at Imperial College.

I hope that your time here as a postgraduate student is both productive and fruitful.

Best wishes with your studies.

Prof Richard Craster

644 Huxley Building

South Kensington Campus

London SW7 2AZ

180 Queen`s Gate

Tel: +44 (0) 20 7594 8554

r.craster@imperial.ac.uk

## Welcome from Director of Postgraduate Studies

Dear New MRes Students,

Welcome to the Mathematics Department at Imperial. The Department is eager to help you make your year of study a satisfying period of learning and creativity.

Please read on. Your success and comfort will depend on your familiarity with the essentials of being an MRes student. I know you may experience a degree of information overload initially. But read at least this page and keep the welcome pack within reach for reference.

1. Engage: Mathematics and science are social activities. Your fellow students across the department and throughout the college are wonderful resources of help, friendship, inspiration and creative stimulation, so get involved.

2. Academic and administrative support: The intention is that you develop a constructive, and hopefully friendly and fulfilling, relationship with the lecturers of the courses and your project supervisor.

3. Depth and breadth: Good mathematics and science needs the right balance between depth and breadth. One inevitably needs a thorough knowledge of ideas, methods and techniques from as broad a field as practically possible. Through breadth one may become aware of existing approaches that can turn out to be helpful when working on specific problems. Breadth is also needed in order to know what today's interesting and important open problems are. On the other hand, depth is needed to ensure that one's level of understanding is sufficiently detailed to allow one to make creative contributions.

During your MRes study it is a good idea to attend seminars and the department colloquia, participate in discussion groups, etc. and in general feed your curiosity.

I sincerely wish the next few years may lead you to the insights and achievements you are hoping for,

Prof Henrik Jeldtoft Jensen

Room 1201, 12th floor, Electrical Engineering Building

South Kensington Campus

Tel: +44 (0)20 759 49853 Fax: +44 (0)207 594 8517

pgr.director@imperial.ac.uk

## Academic and administrative staff

| | | |
|---|---|---|
| Dr Thomas Cass<br>Senior Lecturer in mathematical Finance<br>&<br>Director for the MRes in Stochastic Analysis and Mathematical Finance | Office 6M35<br>Level 6M, Huxley Building<br>South Kensington Campus<br>+44 (0) 20 7594 8554<br>thomas.cass@imperial.ac.uk |  |
| Prof Henrik Jensen<br>Prof. of Math. Physics, Research in Complex Sys.<br>&<br>Director of Postgraduate Studies | Room 1201, Level 12<br>Electrical Engineering Building<br>South Kensington Campus<br>+44 (0)20 759 49853<br>pgr.director@imperial.ac.uk |  |
| Dr Tony Bellotti<br>Senior Lecturer in Statistics<br>&<br>Postgraduate Welfare Tutor in Mathematics<br><br>***Please contact me if you have a non-academic problem, such as medical or financial, which is troubling you and is affecting your research work***. | Office 522<br>Level 5, Huxley Building<br>South Kensington Campus<br>+44 (020) 7594 8521<br>pgr.welfare@imperial.ac.uk |  |
| **Anderson Santos**<br>Postgraduate Administrator | Office 651<br>Level 6, Huxley building<br>South Kensington Campus<br>+44 (020) 7594 8381<br>a.santos@imperial.ac.uk |  |

## English language requirement

If you are not a native English speaker you must meet the College's English language requirements.

See the Admissions website for details:

www.imperial.ac.uk/study/pg/apply/requirements/english

For information on English language support available while you're here, see Support for international students section in this handbook.

## Attendance and absence

You must inform your supervisor and the PG Administrator if you are absent from the College for more than three days during term. If the absence is due to illness you must produce a medical certificate after seven days. If you miss an examination through illness you must produce a medical certificate immediately.

The Registry will be informed of all student non-attendances as the College is obliged to report the non-attendance of students on Tier 4 visas to the Home Office.

## Key dates 2016–17

### Term dates

| | |
|---|---|
| Autumn term: | 1 October–16 December 2016 |
| Spring term: | 7 January–24 March 2016 |
| Summer term: | 29 April–30 June 2016 |

### Closure dates

| | |
|---|---|
| Christmas/New year: | 24 December 2016–02 January 2017 |
| Easter holiday: | 24 March–30 March 2017 |
| Early May bank holiday: | 02 May 2017 |
| Spring bank holiday: | 30 May 2017 |
| Summer bank holiday: | 29 August 2017 |

### Key events

| | |
|---|---|
| Postgraduate Awards Ceremonies: | 03 May 2017 (provisional) |
| Imperial Festival and Alumni Festival: | 6–7 May 2017 |

## Week 1 – Induction timetable

| | | |
|---|---|---|
| **Monday 3 October** | | |
| 2pm<br>4pm | SIAM **Student Chapter Introduction**<br>**+ College Campus Tour**<br>PhD students representative team<br>• Marina Amado Ferreira – AMMP section<br>• Matt Price-Williams – Statistics section<br>• Chiara Taranto – Pure section<br>• Arman Khaledian – Mathematics and Finance section<br>SIAM Student Chapter committee<br>• Francesco Ferrulli – President<br>• Marco Francischello – Vice-President<br>• Jake Dunn – Secretary<br>• Johannes Pausch – Treasurer<br>• Simon Schöller – Communications Officer<br>• Preye Ayabina – Bio-Mathematics Representative<br>• Andrea Natale – Fluids Representative<br>• Markus Schmidtchen – Applied PDEs Representative | LT 340, Level 3, Huxley Building |
| 4pm<br>open end | SIAM **– board games evening**<br>Free nibbles | Maths Common Room, Level 5, Huxley Building |
| **Tuesday 4 October** | | |
| 10am<br>10:40am | **General Admin + Expenses Claim + PWP**<br>Anderson Santos – PG Administrator | LT 340, Level 3, Huxley Building |
| 11am<br>12pm | **Safety Induction**<br>Health and Safety team | LT 213 (Clore), level 2, Huxley Building |
| 1:20pm<br>1:40pm | **Professional Skills Development Programme – Graduate School**<br>Graduate School team | LT 213 (Clore), level 2, Huxley Building |
| 1:55pm<br>2:25pm | **Centre for Academic English**<br>Dr Julie King – Director of CfAE<br>Non-native speakers of English (only) | LT 213 (Clore), level 2, Huxley Building |
| 2pm<br>2:30pm | **Library Session**<br>Ann Brew | Library foyer |
| 2:30pm<br>4pm | **SIAM JAMS**<br>Free nibbles | LT 340, Level 3, Huxley Building |

| | | |
|---|---|---|
| **Wednesday 5 October** | | |
| 11am<br>12pm | **MRes in Stochastic Analysis and Mathematical Finance Introductory Talk**<br>Dr Tom Cass – MRes Programme Director<br>Meet the Maths Finance section academic team<br>Attendance by MRes and CDT FCA (UCL) students | LT 340, Level 3, Huxley Building |
| 1pm<br>1:30pm | **ICT + Security**<br>Duncan McLachlan (IT Support Specialist) | LT 213 (Clore), level 2, Huxley Building |
| 4pm<br>6pm | **SIAM Mingle**<br>Free food and drinks *(attendance by new and current PhD students)* | Maths Common Room, Level 5 Huxley Building |
| **Thursday 6 October** | | |
| 5pm<br>open end | **SIAM Pub Quiz**<br>Free food and drinks | Physics Common Room, Level 8 Blackett Building |
| **Friday 7 October** | | |
| 9am<br>11-12pm | **SIAM Brunch**<br>Free food and drinks | Room to be confirmed |
| 7pm | **SIAM Movie Night**<br>Free nibbles *(attendance by new and current PhD students)* | Room to be confirmed |

**Non-compulsory events around the College**

Take a look at a number of social events organised by the Imperial Students Union.
Please visit their events webpage and select the dates on the calendar.

**Sunday 2nd October**

| | | |
|---|---|---|
| 10am – 5pm | Student Hub open for all student enquiries | Great Hall, Sherfield Building |
| 11am | International Welcome Event | Great Hall, Sherfield Building |
| 7pm – till late | UG mingle (Imperial College Union)<br><br>UG &PG - The Lite Mingle(Imperial College Union) | ICU, Beit Quad<br><br>JCR – Level 2, Sherfield Building |

**Tuesday 4th October**

| | | |
|---|---|---|
| 11am – 4pm | The Fresher's Fair (Imperial College Union) | Across campus |
| 5pm – 7pm | The Fresher's Fair After-Party (Imperial College Union) | Metric, Imperial College Union |

**Wednesday 5th October**

| | | |
|---|---|---|
| 9am – 5pm | Sports Trials | Sports Grounds and Ethos |
| 8pm – till late | Fresher's Ball (Imperial College Union) | FiveSixEight, Metric and Union Bar , ICU, Beit Quad |

**Saturday 8th October**

| | | |
|---|---|---|
| 7pm – 2am | Postgraduate mingle (Imperial College Union) | ICU, Beit Quad |

## Training and conferences funding

Research Training Support Grant (RTSG) – also known as 'consumables' – is an annual allowance, managed by the department, against which MRes students (on the 1+3 programme = MRes+PhD) can claim training-related expenses (e.g.: books, conferences expenses and equipment directly related to their research project).

Students' RTSG allowance is normally £1,000 per year (for four years). In doubt, please contact the PG Administrator.

1. Students are expected to keep track of their annual claims.

2. Expenses can be claimed on the E1 form: http://www.imperial.ac.uk/mathematics/study/students/phd/

3. All expenses claim forms need to have the supervisor's + the student's signatures.

4. The forms need to be submitted to the PG Administrator.

## Laptop purchase

In the beginning of every academic year, the department bulk orders Windows operating laptops. MRes students (on the 1+3 programme = MRes+PhD) are encouraged to take advantage of this discounted price.

### How does it work?

Students can cover the laptop from their RTSG allowance. The PG Administrator email every new student around August for the students to express their interest.

### Purchase options

1. Full HP laptop cost will be covered by RTSG allowance.

or

2. If MacBook is the preferred option, then the exceeding amount (in relation to the HP laptop) will be paid by the student to the department account.

or

3. If you do want to take part at this stage, you have until the end of year 2 to let me know if you would like to buy a laptop under the annual order scheme.

Desktop Computers – We do not normally provide PhD students with a desktop computer, unless required by their research and approved by a supervisor.

Please speak with the PG Administrator once you start your studies if this is the case.

**Laptop model and price**

Total cost HP EliteBook 850 G3 = £944.14 (incl. VAT)

Accessories

- Ultraslim Keyed Cable Lock
- 15.6 Slim Sleeve (carrier case)
- 3-button USB Laser Mouse

Insurance

- 3 year Battery Warranty Card
- HP 3 year Next business day Onsite with Defective Media Retention Notebook Only Service
- HP 3 year Accidental Damage Protection Gen 2 for Commercial Notebooks Service

Specifications

- HP IDS UMA i5-6300U 850 G3 Base NB PC
- Microsoft Windows 8.1 Pro 64 Ed UK
- Win8.1 Driver DVD
- WEBCAM Integrated 720p HD
- 15.6 inch LED FHD SVA Anti-Glare enabled for Webcam (1920x1080)
- 8GB (1x8GB) 2133 DDR4
- 256GB M2 SATA-3 Three Layer Cell Solid State Drive
- Intel 8260 ac 2x2 +Bluetooth 4.2 LE MOW
- 3 Cell 46 WHr Long Life
- 45 Watt Smart nPFC 3 pin RC 4.5mm AC Adapter
- C5 1.8m Power Cord UK
- 3/3/0 Warranty EURO
- AMT Enabled
- Dual Point UK
- Country Localization UK
- eStar Enable IOPT
- Core i5 vPro G6 Label
- HP Deliv SVC Door/Dock NB

MacBook cost = this year's order made by students varied from £1,200 to £1,700. It will depend on the model and specification.

Please email me the MacBook specification so I can get a quote from our supplier.

It will include

- MacBook
- 3 years repair, damage and theft insurance

# 2. Programme information

## Imperial Mobile app


Don't forget to download the free Imperial Mobile app for access to College information and services, including your course timetable, College emails and a library catalogue search tool.

www.imperial.ac.uk/imperialmobile

## Overview: Aims, objectives and learning outcomes

The MRes is a 12-month course, which provides a high-level training in Mathematical research for students who will most likely go on to pursue a PhD. The programme you will follow has been tailored to equip you with the skills you need to begin research in topics of contemporary interest. You will attend and take examinations in advanced level courses, learn to write on mathematics research topics and receive the opportunity to give seminar-level presentations. You will also undertake and complete a substantial dissertation on a topic suggested by your project supervisor.

The focus of MRes is in stochastic analysis and mathematical finance, these are two economically important area of mathematical research in which the Mathematics Department at Imperial College has established strengths. Mathematical finance is a subject area with a long history stretching back decades. Recent years have witnessed an explosion in research activity, largely driven by demand from the global finance industry. Many exciting problems emerge in the field all the time, and the subject is an important crossing point for mathematicians from different backgrounds giving them the opportunity to collaborate. The modern foundation of the theory can be traced back to the seminal 1973 paper of Black and Scholes. Their key observation, that certain types of financial risk can *always* be perfectly hedged, underpins today's options pricing industry. It is one of the finest examples of mathematics applied to the field of commerce.

The department offers expertise in many leading-edge issues in the area including implied volatility, Levy processes, stochastic optimal control, and the theory of backward stochastic differential equations. As well as topics such as systemic risk, credit derivatives, risk measures, and the challenges posed by financial regulation, all which have been given impetus after the 2008 crisis.

A key mathematical tool is the discipline of stochastic analysis, which constitutes a second focus for the MRes. The theory has been developed into a coherent body of knowledge over the last seventy years or so, and is now an essential toolkit for anyone who aims to model and understand randomly-evolving real-world phenomena. An example is Ito's theory of stochastic calculus, which gives a precise mathematical theory of integration with respect to random, and possibly highly irregular, paths such as the sample paths of Brownian motion. The so-called stochastic differential equations based on this calculus provide a fundamental modelling framework for random systems in finance, engineering, computer science and biology.

Stochastic analysis is the cornerstone of much applicable research, and the department offers world-leading expertise in a range of subjects from stochastic filtering, functional Ito calculus, the theory of rough paths, to stochastic simulation methods.

# 3. Assessment

## Structure and assessment

There are two assessed elements to the MRes, which will contribute to the eventual total with the weightings indicated below.

1. Taught element (25% of total marks for the MRes)
   The assessment for this element comprises:
   - **Examinations**. You must attend three lecture courses from the list (below) of *Core Courses*. Each course will run in one of the three terms, and assessment will usually be by written examination, but could also include a small project or coursework, or an oral examination. You must register for any examination you wish to take by e-mailing the Course Administrator. Registration must occur by the penultimate week of the term in which you attend the course.

   In addition to the Core Courses, you must attend two Elective Courses chosen from the list below. For example, you might want to select them to develop an interest in a new area, or to support the research project you will undertake as part of the research element (see below). More information on the courses titles, their contents and timing can be found below in the detailed course descriptions.

2. Research element (75% of total marks for the MRes)
   A substantial part of your study programme will be an extended research project. This is a piece of work that runs throughout the year, and will involve you writing a dissertation under the supervision of an academic in the Department. Some students starting the MRes will already have had contact with a potential supervisor, others will not. You should speak to the Director about your interests at the start of the first term; he or she will be able to suggest literature to read and academic members of staff with similar interests to whom you could discuss further. At the end of the fourth week of term we will expect you to have identified a supervisor.

   The topic will concern an exciting area of current mathematical interest, usually in which your supervisor is working, and in which he/she will provide expert guidance. In the process you will develop proficiency in important aspects of research. You will learn how to read and synthesise mathematical literature, you will gain experience in mathematical and scientific writing, and you will develop your communication skills ideas by giving presentations based on your findings.

   The development of these skills will be supported throughout by a variety of courses, reading groups, lectures and seminars.
   - A lecture on *Reading Scientific Literature.*
   - Regular weekly seminars in mathematical finance and in stochastic analysis will run throughout each term, and you will be expected to attend.
   - Subject-specific reading groups: the Course Director will be able to give you more information about the arrangements for these meetings.
   - Exercises in scientific writing and scientific presentation.
   - Short courses offered by the Graduate School

   At the start of the first term you will be expected to find a supervisor to work with on the dissertation. In the first week of the year, there will be an introductory session in

which members of the academic staff introduce themselves and their research interests. You should be active in approaching potential supervisors to discuss possible topics for the dissertation. At the end of week 4 of the Autumn Term, you will need to decide who will be your project supervisor. Your supervisor will recommend an academic paper to read and, by the end of week 9 of the Autumn Term, you will need to write a summary and critique the contents of this paper. The purpose of this first term writing exercise is to both to initiate progress on your research topic, and to identify any weaknesses in your writing skills which need to be addressed. Your report will be assessed by your supervisor and a second marker. It will count 5% towards to total marks available in the research element.

An important staging post for the research project is the Preliminary Report, which you must submit by 3rd Friday March. This will be a document, of no more than 4000 words, which consists of a literature review together with a plan for the development of the rest project. The report will be marked and you will make a 20-minute oral presentation on its contents. The final dissertation will be a much more substantial piece of work, with an upper limit of 30,000 words. The deadline for submitting the dissertation is 15th September. You will again make a 20-minute oral presentation, which will be immediately followed by questions from two members of staff who are familiar with your research area. The contribution of these different components is summarised below.

1. **First term writing exercise** (5%)
   **Deadline**: by first Friday of December – 4 pm
   **Length**: approximately 5 pages
   **Content**: a written report summarising an academic paper based on ideas close to the intended project area. If a student shows signs of poor fluency in reading or scientific writing, help will be given at this stage.
   **Submission format**: as PDF to PG Administrator and Supervisor

2. **Preliminary report** (10%):
   **Deadline**: by third Friday of March – 4 pm
   **Length**: approximately 4,000 words
   **Content**: a written report consisting of a literature review and outlook
   **Submission format**: as PDF to PG Administrator and Supervisor
   Assessment will be split between the written report (90%) and a 20-minute oral presentation (10%), which will take place shortly after the submission date (above) of the written report.
   **Oral presentation** will take place around late March/early April
   You will deliver the oral presentation in front of other students and members of the academic staff. You will be informed of precise arrangements closer to the time. The presentation will be followed by questions. You will be assessed on both on the quality of your presentation and your ability to answer questions on it.

3. **Research project** (85%): This component comprises of:
   a. **The final dissertation** (75%)
      **Deadline**: by 15th September – 4pm
      **Length**: a maximum of 30000 words
      **Submission format**:
      Email PDF to PG Administrator and Supervisor
      Hand 1 copy (spiral binder) to PG Administrator's office

b. **An oral examination based on final dissertation** (10%)
**Date**: it will take place around late September/early October
You will prepare a 20-minute oral presentation in front of two academic members of staff.
You will be informed of precise arrangements closer to the time. The presentation will be followed by questions. You will be assessed on both on the quality of your presentation and your ability to answer questions on it.

## List of courses

Please discuss your choice of courses with your supervisor:

- to take exams for **three** core courses
- to attend **two** elective courses (exams not required for elective)

**Core Courses**

Students attend lecture courses throughout the year and must register for assessment in three Core Courses which will be chosen from the following list.

**Autumn term**

**M5MR1: Stochastic integrals: an introduction to Itô calculus (Prof R. Cont)**

This course is a PhD-level introduction to the theory of stochastic integration and the Itô calculus, a calculus applicable to functions of stochastic processes with irregular paths, which has many applications in finance, engineering and physics. The course shall focus on the mathematical foundations of stochastic calculus. We shall develop the theory in the setting of semimartingales, which covers most examples of stochastic processes of interest in applications - including jump processes and diffusion processes.

**M5MR4: Stochastic processes (Dr T. Cass)**

This course gives an introduction to probability theory and measure theory and introduces stochastic processes and the basic tools from stochastic analysis to provide the mathematical foundations for option pricing theory.

It includes an intermediate introduction to axiomatic probability theory and measure theory, explaining notions like probability spaces, measures, measurable functions, integration with respect to measures, convergence concepts for random variables, joint distributions, independence and conditional expectations. It studies stochastic processes in discrete and continuous time; mainly the random walk, Brownian motion, and their properties. These in turn involve notions like the quadratic variation, the reflection principle, the Markov property and the martingale property.

We will cover the stochastic Itô integral, the Itô formula, and their mathematical applications; for example, stochastic differential equations and some references to partial differential equations.

**M5MR12: Markov Processes (Dr A. Hening)**

The purpose of this course is to provide an introduction to an important class of stochastic processes-continuous time Markov processes. Usually, a discrete time Markov process is defined by specifying the law that leads from the state at one time to that at the next time. One cannot use this approach in continuous time. It is necessary to describe the transition law infinitesimally in time, and then prove that this description leads to a well-defined process for all time. Markov processes are some of the most widely used stochastic processes – they have applications in biology, finance, physics and other fields.

We start with a few examples - Brownian motion and continuous time Markov chains. Using these examples we can define continuous time Markov processes in greater generality. The key ingredient is the Hille-Yosida theorem, which links the generator (infinitesimal description of the process) to the semigroup (evolution of the process over time). Usuallyonly the generator is known explicity. We will explore how one can deduce properties of the process from information about the generator. As examples we will look at modifications of Brownian motion, in which there is special behaviour at the boundary of the state space. We will also briefly introduce stochastic differential equations and some of their properties.

The second part of the course will be about stationary and quasi-stationary distributions of Markov processes. If one has a deterministic system (ODE), then one is usually interested in whether there exists an equilibrium. For stochastic processes the natural analogue is whether there exists a stationary distribution. We will look at examples from stochastic differential equations (SDE) and study the long time behaviour of the processes.

We will give conditions under which the processes converge in some sense to a stationary distribution.

The prerequisites for this course are measure theoretic probability and real analysis.Some knowledge of functional analysis would also be helpful.

Suggested reading materials:

1. ‘Continuous Time Markov Processes : An Introduction' T. M. Liggett
2. ‘Diffusions, Markov Processes and Martingales' L.C.G. Rogers and D. Williams
3. `Foundations of Modern Probability' O. Kallenberg
4. `Stochastic stability of differential equations' R. Khasminskii

The lectures will be self-contained and will not make references to the books.

The following is a list of topics that will be covered:

1. Feller Markov semigroups: properties and examples
2. From Feller Markov processes to infinitesimal description: How to get a generator from a semigroup/resolvent, examples.
3. From infinitesimal description to Feller Markov process: How to get a semigroup from a generator, quasi left continuity.
4. Existence of a Feller Markov process with a given Feller Markov semigroup.
5. Kolmogorov condition for path continuity.
6. Examples and applications
7. A short introduction to SDE.
8. Stationary distributions of Markov processes: theory and applications

**Spring term**

**M5MR5: Advanced methods in derivative pricing (Dr J. Jacquier)**

This course can be seen as the continuation of Stochastic Processes. We shall revisit and go further in some of the concepts developed there, such as the Martingale Representation Theorem, Change of measure and Girsanov theorem, Quadratic variation of semimartingales, Feynman-Kac Theorem, Existence and uniqueness of SDEs.

We shall in particular see these fundamental results in action, when studying the properties of the volatility surface: existence of the implied volatility and the local (Dupire) volatility for general semimartingales, existence and uniqueness of stochastic volatility models.

**M5MR7: Lévy processes: theory and applications (Dr M. Pistorius)**

In this course we present an introduction to the theory of Levy processes, a fundamental class of continuous time stochastic processes, which includes the Poisson process, the Wiener process and the stable process and which is encountered in many financial modelling applications

We start by considering jump-diffusions and develop the corresponding stochastic calculus for this class of stochastic processes. By way of illustration, a number of financial applications are presented.

We then move on to infinitely divisible distributions, the Levy-Khintchine formula, Levy-Ito decomposition and discuss the path-wise construction and simulation of paths of general Levy processes. When time permits we cover elements of fluctuation theory and Markov process theory.

**M5MR8: Simulation methods for finance (Dr H. Zheng)**

This course is an introduction to simulation methods in finance and more generally to probabilistic numerical methods for PDEs.

It starts with discussion of random number generators, statistical tests and moves on to cover numerical schemes for solving Stochastic Differential Equations: the Euler, Milstein and certain higher-order schemes. Properties of weak and strong convergence, consistency and numerical stability are established.

It then discusses variance reduction techniques and estimation of sensitivities. The course will be concluded by studying a numerical method for American Options and non-linear PDEs, if time permits.

**M5MR9: Dynamic portfolio theory (Dr H. Zheng)**

This is an introductory course on dynamic portfolio theory. The objective is to cover the basic mathematical methods for solving DPT problems.

We will discuss Merton's optimal investment problem, utility maximization in complete and incomplete markets, stochastic control, dynamic programming principle, HJB equation, classical solution, verification theorem, viscosity solution, convex duality, martingale representation, dual stochastic control, Markov modulated model, etc.

We will also discuss many applications, including utility indifference pricing, wealth maximization, optimal liquidation, turnpike property, mean-variance portfolio with constraints, quadratic hedging, etc.

**M5MR11: Stochastic differential equations (Dr T. Cass)**

This is an advanced course on stochastic differential equations. It will build upon the theory of stochastic integration developed in the first term course Stochastic Processes (M5MR4). The following topics will be covered:

1. A review of Brownian motion, and stochastic integration with respect to continuous semimartingales. Applications will include Itô's formula, the exponential martingale inequalities, Girsanov's theorem, the Dubins-Schwartz characterisation of continuous local martingales, the martingale representation theorem, the Burkholder-Davis-Gundy inequalities, Stratonovich calculus and Tanaka's formula.

2. Stochastic differential equations (SDEs). Itô processes and diffusions. Strong and weak solutions, existence and uniqueness and formulation using the martingale problem method. Kolmogorov's forward and backward equations, the Feynman-Kac formula.

3. One-dimensional SDEs and diffusion processes. The Yamada-Watanabe theorem. Examples and applications.

**M5MR13: Convex analysis and optimization (Dr P. Siorpaes)**

This course gives an introduction to convex analysis (the study of convex sets and functions) and to convex optimization (which is a large class of optimisation problems that includes least-squares and linear programming problems), working almost exclusively in the finite dimensional setting.

Outline:

- Convex sets: convexity-preserving operations, convex, conical and affine hulls, relative interior, projection on closed convex sets, polar sets and bipolar theorem, recession and barrier cones, normal and tangent cones, extreme points and Krein-Milman Theorem, Hahn-Banach separation theorem

- Convex functions: convexity-preserving operations, lower-semicontinuity, first and second order differentiability, characterizations, difference of convex functions, subdifferential and its properties, regularizations of a convex function, convex conjugate function (a.k.a. Fenchel-Legendre transform)

- Optimization: formulation of constrained convex optimization problems, Langrangian function and multipliers, dual problem, optimality conditions, saddle points, Fenchel's duality theorem

- Some applications (in simplified settings): fundamental theorem of asset pricing, optimal investment, Kantorovich duality in optimal transport

**Elective Courses**

In addition, every student on the course will attend two Elective Courses. These may be modules from the above list not already submitted for examination, any module offered by the London Graduate School in Mathematics and Finance, or the following courses:

**M5P7: Functional analysis (Dr D. Gajic)**

This module brings together ideas of continuity and linear algebra. It concerns vector spaces with a distance, and involves linear maps; the vector spaces are often spaces of functions.

Vector spaces. Existence of a Hamel basis. Normed vector spaces. Banach spaces. Finite dimensional spaces. Isomorphism. Separability. The Hilbert space. The Riesz-Fisher Theorem. The Hahn-Banach Theorem. Principle of Uniform Boundedness. Dual spaces. Operators, compact operators. Hermitian operators and the Spectral Theorem.

**M3M3: Introduction to partial differential equations (Dr E. Zatorska)**

1. Basic concepts: PDEs, linearity, superposition principle. Boundary and Initial value problems.
2. Gauss Theorem: gradient, divergence and rotational. Main actors: continuity, heat or diffusion, Poisson-Laplace, and the wave equations.

3. Linear and Qasilinear first order PDEs in two independent variables. Well-posedness for the Cauchy problem. The linear transport equation. Upwinding scheme for the discretization of the advection equation.
4. A brief introduction to conservation laws: The traffic equation and the Burgers equation. Singularities.
5. Derivation of the heat equation. The boundary value problem: separation of variables. Fourier Series. Explicit Euler scheme for the 1d heat equation: stability.
6. The Cauchy problem for the heat equation: Poisson's Formula. Uniqueness by maximum principle.
7. The ID wave equation. D'Alembert Formula. The boundary value problem by Fourier Series. Explicit finite difference scheme for the 1d wave equation: stability.
8. 2D and 3D waves. Casuality and Energy conservation: Huygens principle.
9. Green's functions: Newtonian potentials. Dirichlet and Neumann problems.
10. Harmonic functions. Uniqueness: mean property and maximum principles.

## Penalties for late submission

The College's policy on the late submission of assessed work can be found here:

https://workspace.imperial.ac.uk/registry/Public/Exams/PenaltiesLateSubmissionAssessedWork-Feb%202014.pdf

## Re-sit policy

The programme follows the College Academic and Examination regulations which permit re-entry to *written examinations only* on one occasion. This will be at the next available opportunity (usually the following academic year).

Regulations for the award of Taught Master's Degrees, Postgraduate Diplomas and Postgraduate Certificates

## Mitigating circumstances

If you are prevented from submitting an assessment or attending an examination because of mitigating circumstance (e.g. illness or bereavement), you must submit a Request for Mitigation Form to the Course Director and Course Administrator within five working days of the deadline that has been missed.

The College's policy on the handling of mitigating circumstances, together with the Request for Mitigation Forms can be found here:

https://workspace.imperial.ac.uk/registry/Public/Exams/MitigatingCircumstancesPolicyProcedures-Feb%202014.pdf

## Feedback

Informal feedback will be given by verbally supervisors after each assessment. The candidate will receive provisional marks on the assessments they have taken in July.

## Marking scheme

Any candidate who achieves less than 40 per cent in a component or module will be deemed to have failed that component or module. Where appropriate, a Board of Examiners may condone any mark(s) in the range 40-50 in some components or modules provided the aggregate for that element is above 50 per cent.

Subject to there being no mark in any module or component which fails uncondonably, a candidate must achieve at least 50 per cent in each element in order to pass the MRes; in order to be awarded a result of a merit, a candidate must achieve at least 60 per cent in each element; in order to be awarded a result of distinction, a candidate must achieve at least 70 per cent in each element.

Where appropriate, a Board of Examiners may award a result of merit where a candidate has achieved an aggregate mark of 60 per cent or greater across the programme as a whole AND has obtained a mark of 60 per cent or greater in each element with the exception of one element AND has obtained a mark of 50 per cent or greater in this latter element.

Where appropriate, a Board of Examiners may award a result of distinction where a candidate has achieved an aggregate mark of 70 per cent or greater across the programme as a whole AND has obtained a mark of 70 per cent or greater in each element with the exception of one element AND has obtained a mark of 60 per cent or greater in this latter element.

A link to the College's Academic and Examination regulations may be found here:

http://www3.imperial.ac.uk/registry/proceduresandregulations/regulations

## Programme webpage and specification

Follow the link to view:

- The departmental course webpage
- The programme specification

## Religious obligations and assessments

The College's policy on such matters can be consulted by following the link below:

https://workspace.imperial.ac.uk/registry/Public/Exams/Exams%20and%20religious%20obligations.pdf

## Plagiarism and Examination Offences

The College takes plagiarism and other matters of academic foul play extremely seriously, and offenders are liable to be punished severely. Plagiarism is the presentation of another person's thoughts, words, images or diagrams as though they were your own. Another form of plagiarism is self-plagiarism, which involves using your own prior work without acknowledging its reuse.

Plagiarism is considered a cheating offence and must be avoided, with particular care on coursework, essays, reports and projects written in your own time and also in open and closed book written examinations.

Where plagiarism is detected in group work, members of that group may be deemed to have collective responsibility for the integrity of work submitted by that group and may be liable for any penalty imposed, proportionate to their contribution.

For further information, please refer to the Cheating Offences Policy and Procedures section of this handbook.

Cases of suspected plagiarism will be dealt with under the Colleges Examination Offences Policy and may result in a penalty being taken against any student who is found guilty. All suspected cases will be reported to the College Registry. Minor cases may be referred to the Board of Examiners for consideration. All other cases will be referred to the University and may be heard by a panel of senior members of staff from outside the College. The penalties for plagiarism may include:

- reduced marks or zero marks for that piece of work or for the whole course module;
- a resubmission of the work after a specified time in the case of projects and dissertations;
- exclusions from future examinations of Imperial College London;
- Withdrawal of degrees already awarded by Imperial College London.

# 4. Board of examiners

**Board of Examiners**

- Dr Thomas Cass
- Professor Damiano Brigo
- Professor Rama Cont
- Dr Jack Jacquier
- Dr Mikko Pakkanen
- Dr Martijn Pistorius
- Dr Harry Zheng

**External examiners**

- Professor Jan Obloj – Oxford
- Dr Alex Hening – Oxford
- Dr Pietro Siorpaes – Oxford
- Dr Ilya Chevyrev – Oxford

It is common for Master's level students to have some form of academic or social interaction with their external examiners at some point during or after their studies as well as during the assessment process itself.

It is inappropriate for you to submit complaints or representations direct to external examiners or to seek to influence your external examiners. Inappropriate communication towards an examiner would make you liable for disciplinary action.

External examiners reports can be found here:

www.imperial.ac.uk/staff/tools-and-reference/quality-assurance-enhancement/external-examining/information-for-staff

# 5. Location and facilities

Imperial has a number of campuses in London and the South East. All have excellent travel links and are easily accessible via public transport.

**Your main location of study will be:**

South Campus

Department of Mathematics

Imperial College London

Huxley Building

180 Queen`s Gate

London - SW7 2AZ

**Facilities**

HUXLEY BUILDING

Level 1 - Colour poster printer – email PDF to PG Administrator

Level 4 - Mathematics Learning Centre - 416

Level 5 - Common Room (tea, coffee, snacks) - 549

Level 6 - Staff mail room - 655A

Stationary cupboard – 649a (with Kalra or Rosie's permission)

Level 6M - Student mail room – 6M52

**Shuttle bus**

A free shuttle bus runs between our South Kensington, White City and Hammersmith Campuses on weekdays. Seats are available on a first-come, first-served basis. You need to show your College ID card to board. Download the timetable at:

www.imperial.ac.uk/estates-facilities/travel/shuttle-bus

**Maps**

Campus maps and travel directions are available at:

www.imperial.ac.uk/visit/campuses

**Accessibility**

Information about the accessibility of our South Kensington Campus is available online through the DisabledGo access guides:

www.disabledgo.com/organisations/imperial-college-london-2

## 6. Working while studying

If you are studying full time, the College recommends that you do not work part-time during term time. If this is unavoidable we advise you to work no more than 10–15 hours per week, which should be principally at weekends and not within normal College working hours.

Working in excess of these hours could impact adversely on your studies or health.

If you are here on a Tier 4 visa you can work no more than 20 hours a week during term time. Some sponsors may not permit you to take up work outside your studies and others may specify a limit.

If you are considering part-time work during term time you are strongly advised to discuss this issue with your supervisor or Postgraduate Tutor. If you are on a Tier 4 visa you should also seek advice from the International Student Support team regarding visa limitations on employment.

Please refer to our policy on working while studying:

www.imperial.ac.uk/media/imperial-college/faculty-of-engineering/bioengineering/public/student/Student-Employment-During-Studies.pdf

# 7. Health and safety

You are responsible for looking after your own health and safety and that of others affected by your College-related work and leisure activities. You must:

- comply with all local and College policies, procedures and codes of practice and with the arrangements which the College has in place to control health and safety risks.
- ensure that your activities do not present unnecessary or uncontrolled risks to yourself or to others.
- attend appropriate induction and training.
- report any accidents, unsafe circumstances or work-related ill health of which you become aware to the appropriate person.
- not interfere with any equipment provided for Health and Safety.
- inform your supervisor or the person in charge of the activity in cases where you are not confident that you are competent to carry out a work or leisure activity safely, rather than compromise your own safety or the safety of others.

The College's Health and Safety Policy can be found at:

www.imperial.ac.uk/media/imperial-college/administration-and-support-services/safety/internal/policies/Health-and-Safety-Policy-Statement-May-2015---re-signed-by-Provost.pdf

**Your Departmental safety contact is:**

Andy Pope

Room 131, level 1, Huxley Building

020 7594 8544 (internal: 48544)

a.pope@imperial.ac.uk

**<u>The College Safety Department</u>**

The Safety Department offers a range of specialist advice on all aspects of safety. This includes anything which you feel might affect you directly, or which may be associated with teaching, research or support service activities.

The College's activities range from the use of hazardous materials (biological, chemical and radiological substances) to field work, heavy or awkward lifting, driving, and working alone or late.

All College activities are covered by general health and safety regulations, but higher risk activities will have additional requirements.

The Safety Department helps departments and individuals ensure effective safety management systems are in place throughout the College to comply with specific legal requirements.

Sometimes the management systems fail, and an accident or a near-miss incident arises; it is important that we learn lessons from such situations to prevent recurrence and the Safety Department can support such investigations. All accidents and incidents should be reported online at:

www.imperial.ac.uk/safety

To report concerns or to ask for advice you should contact your programme director, academic supervisor or departmental safety officer in the first instance. You may also contact the Safety Department directly.

Andy Pope

Room 131, level 1, Huxley Building

020 7594 8544 (internal: 48544)

a.pope@imperial.ac.uk

**Occupational Health requirements**

The College Occupational Health Service provides services to:

- protect health at work
- assess and advise on fitness for work
- ensure that health issues are effectively managed

The Service promotes and supports a culture where the physical and psychological health of staff, students and others involved in the College is respected, protected and improved whilst at work.

www.imperial.ac.uk/occupational-health

Department of Mathematics, Imperial College London
Huxley Building, 180 Queen's Gate
Head of Department, Professor Richard Craster
(effective 6th September, 2016)

# Department of Mathematics
# Health & Safety Information

Apart from some computing work carried out in the Department's computer rooms, mathematics staff & students are involved only with office work, lectures and classes, so hazards (other than medical and fire) are few. General tidiness is important and passageways should be kept clear. Perceived dangers should be reported immediately to the Departmental Safety Officer: Mr Andrew Pope (ext 48544 – Huxley Building, Room 131).

**EMERGENCY** **Ambulance, First Aid or cardiac arrest (requiring defibrillator):**

***Dial internal extension 4444 OR 020 7589 1000 from a mobile***

**TRAINED FIRST AID PERSONNEL**
**SOUTH KENSINGTON CAMPUS**

***Please see First Aid notice***

**SAFETY INCIDENTS / ACCIDENTS**
All incidents / accidents must be reported onto ***Salus*** (College incident reporting system) – access via the Safety Department website front page or, https://salus.imperial.ac.uk/AIR2/Incbook/incbook_tab_begin.aspx?First=1 .

**FIRE AND EMERGENCY** **When the warning sirens sound, evacuate the building at once.**

All exit routes are clearly indicated and everyone should make themselves familiar with them -
**ON NO ACCOUNT SHOULD LIFTS BE USED WHEN ALARMS SOUND.**
Lecturers will advise each class on the exit to use.

To give warning of the outbreak of fire, break the glass on one of the fire alarm call points situated around the building (mainly near staircases).

Some rooms and exits have electronic locking systems after normal hours, i.e. after 1800hrs (rooms 212, 213, 410 and the Huxley level 4 Mathematics Learning Centre at all times). These will automatically unlock when alarms sound.

**FIRE WARDENS**
Please see the current Blackett & Huxley Fire Wardens list.

Anyone lecturing is automatically a fire warden for the group they are lecturing to.

| | |
|---|---|
| College Chief Fire Officer, Mr Adrian Dorrington | ext 41709 |
| Sherfield Security Control Desk | ext 48910 |
| Mathematics Departmental Safety Officer, Mr Andrew Pope, Huxley 131 | ext 48544 |
| Natural Sciences Faculty Safety Manager, Mrs Julia Easton | mobile 07714 051 270 or ext 47700 |

# FIRST AID

## Department of Mathematics

In the event of an accident or medical emergency,
contact your NEAREST First Aider / Lifesaver:

### College Health Centre

**40, Prince's Gardens**
**Southside, Watts Way**
**(South Kensington Campus)**

**extensions: 49375/6**
**46301 or 020 7584 6301**
**(24hrs / Out of Hours contact for staff / students registered with the College Health Centre as NHS patients)**

### Mental Health First Aid at Work

| | | |
|---|---|---|
| **Dr Tony Bellotti** | **Room 522 – Level 5, Huxley Building** | **extension, 48521** |
| **Mrs Anne-Marie Hilder** | **Room 632 – Level 6, Huxley Building** | **extension, 40800** |
| **Dr Sara Merino Aceituno** | **Room 6M33 – Level 6M, Huxley Building** | **extension, 58560** |

### First Aid at Work

| | | |
|---|---|---|
| **Dr Claude Warnick** | **Room 624, Level 6 – Huxley Building** | **extension: 58512** |
| **Ms Taru Khanna** | **Room 411, Level 4 – Huxley Building** | **extension: 42286** |
| **All Security staff** | **Level 2 (Ground Level), Sherfield Building** | **extensions: 58900 / 58920 / 48910 or, 020 7589 1000** |

### Emergency First Aid at Work

| | | |
|---|---|---|
| **Ms Michelle Nguyen** | **Room 537 – Level 5, Huxley Building** | |
| **Ms Chiara Taranto** | **Room 539 – Level 5, Huxley Building** | |
| **Ms Jessica Zhuang** | **Room 540 – Level 5, Huxley Building** | |
| **Prof Richard Craster** | **Room 644 - Level 6, Huxley Building** | **extension: 48554** |
| **Dr Tom Coates** | **Room 662 - Level 6, Huxley Building** | **extension: 43607** |
| **Mr Alexander Malcom** | **Room 671 – Level 6, Huxley Building** | |
| **Dr Eva-Marie Graefe** | **Room 682 – Level 6, Huxley Building** | **extension: 48549** |
| **Mr Onur Teymur** | **Room 6M09 – Level 6M, Huxley Building** | |
| **Mr Navid Nabijou** | **Room 613 – Level 6M, Huxley Building** | |

First Aid Box locations: Huxley 131, Huxley 411, Huxley 537, Huxley 649a, Huxley 671, Huxley 6M09

If you cannot locate a First Aider within the Huxley Building, or require a defibrillator, please contact College Security:

**extension: 4444**
**OR 020 7589 1000 from a mobile**

Outside of normal working hours, contact College Security:

**extension: 4444**
**OR 020 7589 1000 from a mobile**

# Blackett & Huxley Buildings Fire Wardens (Dept Maths & Dept Physics)

**Fire Wardens during lectures:** The lecturer automatically assumes the role of Fire Warden if the fire alarm activates during a lecture. The lecturer needs to ensure that those attending the lecture leave in an orderly manner via the nearest exit and go to the appropriate assembly point to await further instruction.

| Fire Wardens | Level | Building |
|---|---|---|
| Paul Brown | Level 1 | Blackett |
| Mr Andrew Pope | Level 1 | Huxley |
| Brian Willey | Level 1 | Blackett |
| Dave Bowler | Level 1 | Blackett |
| | | |
| Viv Frater | Level 2 | Blackett |
| Neil Powell | Level 2 | Blackett |
| Malcolm Hudson | Level 2 | Blackett |
| | | |
| Andrew Knight | Level 3 | Blackett |
| Stefan Hoyle | Level 3 | Blackett |
| Jan de Abela-Borg | Level 3 | Blackett |
| Loli Sanchez Rey | Level 3 | Blackett |
| John Conway | Level 3 | Blackett |
| | | |
| Graham Axtell | Level 4 | Blackett |
| Paul Beaumont | Level 4 | Blackett |
| Robert Whisker | Level 4 | Blackett |
| Kalra Taylor | Level 4 | Huxley |
| | | |
| Vera Kasey | Level 5 | Blackett |
| Paul Dauncey | Level 5 | Blackett |
| Julia Sedgbeer | Level 5 | Blackett |
| Graziela De Nadai Sowrey | Level 5 | Huxley |
| | | |
| Martin Kehoe | Level 6 | Blackett |
| Jude Baylis | Level 6 | Blackett |
| Sara Chesnick | Level 6 | Blackett |
| | | |
| John Gibbons | Level 6 | Huxley |
| Chris Sisson | Level 6 | Huxley |
| | | |
| Tim Oddy | Level 6M | Huxley |
| Andrew Parry | Level 6 M | Huxley |
| | | |
| Richard Bantges | Level 7 | Huxley |
| Paul Green | Level 7 | Huxley |
| Ciara Mulholland | Level7 | Huxley |
| Eva Gledhill | Level 7 | Huxley |
| | | |
| Alan Finch | Level 8 | Blackett |
| Robert Kingdom | Level 8 | Blackett |
| Alice Powell | Level 8 Common Room | Blackett |
| S Kena Cohen | Level 8 | Blackett |
| Sam Ladak | Level 8 | Blackett |
| Tyler Roschuk | Level 8 | Blackett |
| | | |
| Carolyn Dale | Level 9 | Blackett |
| Bhavna Patel | Level 9 | Blackett |
| Juraci Didone | Level 9 | Blackett |
| Linda Jones | Level 9 | Blackett |
| | | |
| Andrew Jaffe | Level 10 | Blackett |

Physics Fire Coordinator: Simon Graham s.graham@imperial.ac.uk 020 7594 7870
Maths Fire Coordinator: Kalra Taylor k.taylor@imperial.ac.uk 020 7594 8483

Information on fire wardens and College fire safety requirements can be found here:
http://www3.imperial.ac.uk/safety/policies/individualpolicies/firesaf

# 8. College policies and procedures

## Regulations for students

All registered students of the College are subject to the Regulations for Students, the College Academic and Examination Regulations and such other regulations that the College may approve from time to time.

www.imperial.ac.uk/about/governance/academic-governance/regulationswww.imperial.ac.uk/students/terms-and-conditions

## Appeal and complaints procedures

We have rigorous regulations in place to ensure assessments are conducted with fairness and consistency. In the event that you believe that you have grounds for complaint about academic or administrative services, or wish to appeal the outcome of an assessment or final degree, we have laid out clear and consistent procedures through which complaints and appeals can be investigated and considered:

www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline

## Academic integrity

You are expected to conduct all aspects of your academic life in a professional manner. A full explanation of academic integrity, including information on the College's approach to plagiarism is available on the Student Records and Data website:

www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/plagiarism-academic-integrity--exam-offences

## Cheating offences policy and procedures

It is important that you learn how to properly attribute and acknowledge the work, data and ideas of others. Plagiarism is scientific misconduct, and students whose assessments can be shown to contain plagiarism are subject to penalties as outlined in the College's Cheating Offences Policy and Procedures – see Appendix 3 of the Examination Regulations which can be found here:

www.imperial.ac.uk/about/governance/academic-governance/regulations

## Intellectual property rights policy

For further guidance on the College's Intellectual Property Rights Policy, please contact the Research Office:

www.imperial.ac.uk/research-and-innovation/research-office/ip

## Use of IT facilities

View the Conditions of Use of IT Facilities:

www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/policies-regulations-and-codes-of-practice/information-systems-security/iss-policies/policy2/

## MRes Code of Practice

The Code of Practice for MRes programmes is available here:

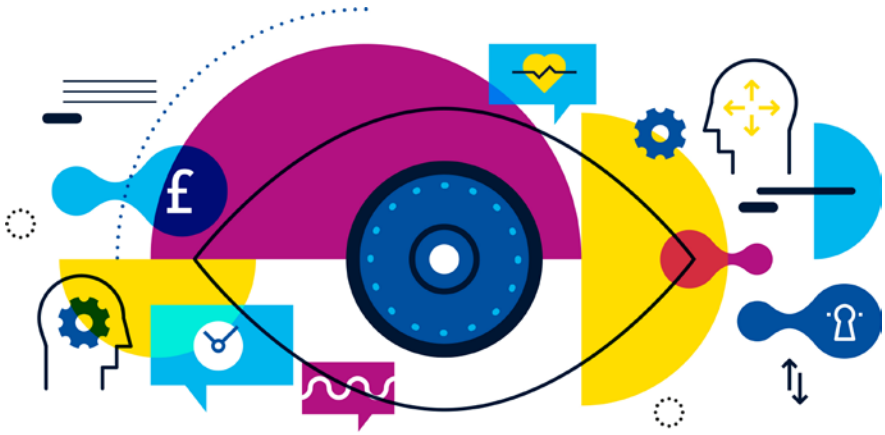
www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/masters-level-precepts/Code-of-practice-for-MRes-programmes.pdf

# 9. Well-being and advice

## Student Space

The Student Space website is the central point for information on health and well-being.

www.imperial.ac.uk/student-space



## Director of Student Support

The Director of Student Support has overall responsibility for all matters relating to student support and well-being.

www.imperial.ac.uk/people/d.wright

## Departmental support and College tutors

Your Department has a system of academic and pastoral care in place to make sure you have access to the appropriate support throughout your time here. This includes:

### Postgraduate tutor

The Department's postgraduate tutor can offer pastoral support and advice. You can arrange to have a meeting with him/her at any time during your studies – what you discuss will be completely confidential.

If necessary they will direct you to an appropriate source of support.

| | | |
|---|---|---|
| Dr Tony Bellotti<br>Postgraduate Welfare Tutor | Office 522<br>Level 5, Huxley Building<br>South Kensington Campus<br>+44 (020) 7594 8521<br>pgr.welfare@imperial.ac.uk |  |

### College tutors

College tutors operate outside of any department. They provide guidance and assistance to students in regard to welfare issues and are also involved in College disciplinary matters involving students. For more information see:

www.imperial.ac.uk/student-space/here-for-you/college-tutors-and-departmental-support

## Advice services

The tutor system is complemented by a College-wide network of advice and support. This includes a number of specialist services.

### Careers Service

The Careers Service has strong links to your Department and you will have a named Careers Consultant and Placement and Internship Adviser who will run both group sessions and individual meetings within your Department. You can arrange to meet with your linked Careers Consultant or Placement and Internship Adviser either in your Department or centrally on Level 5 Sherfield where the Careers Service is based.

Visit the Career Service's website to:

- Book a careers appointment
- Find resources and advice on successful career planning

www.imperial.ac.uk/careers

### Counselling and Mental Health

The Student Counselling and Mental Health Advice Service offers short-term counselling to all registered students. The service is free and confidential. Counsellors are available at the South Kensington, Hammersmith and Silwood Park Campuses.

www.imperial.ac.uk/counselling

### Financial support and tuition fees

If you've got any questions about student financial support (loans, scholarships and research council studentships, US and Canadian loans) then contact the Student Financial Support team:

020 7594 9014

student.funding@imperial.ac.uk

If you suddenly find yourself in financial difficulties or experience an unexpected change in circumstances, you may be eligible to apply for emergency financial help through the Student Support Fund. The Fund offers a one-off payment of up to £2,000 to cover such emergencies as last minute accommodation and travel necessities, equipment and childcare. It does not have to be repaid.

www.imperial.ac.uk/students/fees-and-funding/student-support-fund

For tuition fees queries, contact the Tuition Fees team:

020 7594 8011

tuition.fees@imperial.ac.uk

### Imperial College Union (ICU) Advice Centre

Imperial College Union runs the Advice Centre independently of the College with advisers on hand to provide free, confidential, independent advice on a wide range of welfare issues including housing, money and debt, employment and consumer rights, and personal safety.

www.imperialcollegeunion.org/advice

### Student Hub

The Student Hub represents a single point of contact for all key administrative information and support. The Student Hub team can help you with enquiries about:

- Accommodation (including checking contracts for private accommodation)
- Admissions
- International student enquiries
- Research degrees
- Student financial support
- Student records
- Tuition fees

Level 3, Sherfield Building, South Kensington Campus

020 7594 9444

student.hub@imperial.ac.uk

www.imperial.ac.uk/student-hub

## Health services

### NHS Health Centre and finding a doctor

Even if you're fit and healthy we recommend that you register with a local doctor (GP) as soon as you arrive in London. For help finding your nearest GP see the Student Space website:

www.imperial.ac.uk/student-space/here-for-you/find-a-doctor

There is an NHS Health Centre on our South Kensington Campus which you may visit during clinic hours if you're feeling unwell. Students living within the practice catchment area are encouraged to register with the Centre.

www.imperialcollegehealthcentre.co.uk

### NHS Dentist (based in the Health Centre)

Imperial College Dental Centre offers a full range of NHS and private treatment options.

www.imperial.ac.uk/student-space/here-for-you/dentist

## Disability support

### Disability Advisory Service

The Disability Advisory Service provides confidential advice and support for all disabled students and students with specific learning difficulties.

If you think you may have dyslexia or another specific learning difficulty but have never been formally assessed, the Disability Advisory Service offers initial screening appointments.

Room 566, Level 5, Sherfield Building, South Kensington Campus

020 7594 9755

disabilities@imperial.ac.uk

www.imperial.ac.uk/disability-advisory-service

### Departmental Disability Officers

Departmental Disability Officers are the first point of contact within your department. They can apply for additional exam arrangements on your behalf, and will facilitate support within your Department.

| | | |
|---|---|---|
| Dr Tony Bellotti<br>Postgraduate Welfare Tutor | Office 522<br>Level 5, Huxley Building<br>South Kensington Campus<br>+44 (020) 7594 8521<br>pgr.welfare@imperial.ac.uk |  |

More information on Departmental Disability Officers is available at:

www.imperial.ac.uk/disability-advisory-service/support/ddos

More information on procedures for the consideration of additional exam arrangements in respect of disability is available at:

www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/exam-arrangements-and-re-sits/Exam-arrangements-in-respect-of-disability.pdf

## Library and IT

### Information and Communications Technologies (ICT)

If you're having problems with technology (including computers, laptops and mobile devices), you can get help from ICT's Service Desk.

020 7594 9000

www.imperial.ac.uk/ict/service-desk

### Software shop

The Software shop offers a variety of general and subject specific software programs and packages for free or at a discounted price for Imperial students.

www.imperial.ac.uk/admin-services/ict/shop/software

### Library services

The Central Library at South Kensington is open around the clock pretty much all year. Make sure you find out who your departmental librarian is as they'll be able to help you find resources for your subject area. Also, don't forget to check out the Library's range of training workshops and our other campus libraries for access to specialist medicine and life sciences resources. Alongside these physical spaces and resources, the Library provides over 170,000 electronic books, journals and databases available both on and off campus and a free document delivery service to help you source books and articles from around the UK and the rest of the world:

www.imperial.ac.uk/library

| | | |
|---|---|---|
| Ms Ann Brew<br>Liaison Librarian for Mathematics and Physics | Central Library<br>South Kensington Campus<br>+44 (020) 7594 5736<br>ann.brew@imperial.ac.uk |  |

### Religious support

The Chaplaincy Multi-faith Centre has chaplains from many different religions, as well as prayer rooms and information on places of worship. In addition, it runs meditation classes and mindfulness workshops for stress management. There is a student-run Islamic prayer room on campus and separate areas available for male and female Muslims.

www.imperial.ac.uk/chaplaincy

## Support for international students

### English language support

The Centre for Academic English provides free in-sessional English courses for international students while they are studying.  These include classes and workshops on academic language, social language, the four skills of reading, writing, listening and speaking, 1-1 consultations with a tutor to work on a piece of academic writing or an oral presentation, self-study resources in the VLE Blackboard, and the Conversation Project, which partners students with a native-speaker volunteer to practise social and conversational English.

www.imperial.ac.uk/academic-english

### International Student Support team

Students from outside the UK make up around half of our student population, so our International student Support team offers year-round support to help our international students settle into Imperial life. This includes UK visa and immigration advice and trips to different places of interest.

www.imperial.ac.uk/study/international-students

# 10. Student Records and Data

The Student Records and Data team are responsible for the administration and maintenance of the student records for all students studying at the College. This includes enrolments, programme transfers, interruption of studies, withdrawals and processing of examination entry for research degree students. The team also use this information to fulfil reporting duties to the Student Loans Company, Transport for London and the UKVI, as well as other external bodies.

The team is currently responsible for the processing of student results and awards on the student record system as well as the production and distribution of academic transcripts and certificates of award.

Student Records and Data produce a variety of standard document requests for both current and previous students including council tax letters, standard statements of attendance and confirmation of degree letters.

Appeal administration also sits within the team, as does the responsibility for confirming qualifications via the Higher Education Degree Datacheck service.

**Student records and examinations**

+44 (0)20 7594 7268

records@imperial.ac.uk

**Degree certificates**

+44 (0)20 7594 8037

certificates@imperial.ac.uk

# 11. Work-life balance

The pace and intensity of postgraduate study at Imperial can be demanding so it's important to find time for outside interests.

## Imperial College Union

The Union's range of 340+ student-led clubs, societies and projects is one of the largest of any UK university, opening up lots of ways for you to enjoy your downtime.

www.imperialcollegeunion.org/about-us

## Graduate Students' Union

The Graduate Students' Union is the postgraduate arm of Imperial College Union. The GSU works alongside the Imperial College Union President to ensure that the requirements of postgraduate students are catered for. It also organises a number of academic and social events during the year.

www.union.ic.ac.uk/presidents/gsu

## Sport

Beginners and semi-professionals alike will receive a warm welcome in our sports clubs, which are subsidised by Imperial College Union to make it a little bit cheaper to keep doing a sport you love.

Access to swimming facilities, including sauna, steam room and spa at Ethos sports centre, is completely free from your very first day. Gym facilities across all campuses are also free after you've completed a fitness orientation for a one-off charge (£40 in 2016–17).

www.imperial.ac.uk/sport

# 12. Student feedback and representation

## Feedback from students

The College and Union is committed to continually improving your education and wider experience and a key part of this is your feedback. Feedback is thoroughly discussed by your student representatives and staff.

## Student representation

Student Representatives are recruited from every department to gather feedback from students to discuss with staff. More information about the role, and instructions on how to become an academic representative, are available on the Imperial College Union (ICU) website.

www.imperialcollegeunion.org/your-union/your-representatives/academic-representatives/overview

## Staff-Student Committee

The Staff-Student Committee is designed to strengthen understanding and improve the flow of communication between staff and students and, through open dialogue, promote high standards of education and training, in a co-operative and constructive atmosphere. College good practice guidelines for staff-student committees are available here:

www.imperial.ac.uk/about/governance/academic-governance/academic-policy/student-feedback

The Department of Mathematics PGR Committee takes place 3-4 time per year.

It includes sections tutor, student representatives and the postgraduate administrator.

Please see the full committee list on this page:
http://www.imperial.ac.uk/mathematics/study/students/phd/

Any member of the panel is always open for opinions and suggestions from students. Make your voice heard.

# 13. Student surveys

Your feedback is important to your department, the College and Imperial College Union.

Whilst there are a variety of ways to give your feedback on your Imperial experience, the following College-wide surveys give you regular opportunities to make your voice heard:

- PG SOLE lecturer/module Survey or departmental equivalent
- Student Experience Survey (SES)
- Postgraduate Taught Experience Survey (PTES) – next due to run in spring 2018

The PG SOLE lecturer/module survey or equivalent runs at the end of the autumn and spring term(s) [delete spring if appropriate for your programme]. This survey is your chance to tell us about the modules you have attended and the lecturers who taught them

For PG SOLE (or equivalent survey) your lecturers will receive their individual numerical results and comments shortly after the survey closes. To make the most of your opportunity to give your feedback, please do not use offensive language or make personal, discriminatory or abusive remarks as these may cause offence and may be removed from the results. Whilst this survey is anonymous, please avoid self-identification by referring to personal or other identifying information in your free text comments.

The Student Experience Survey (SES) is another opportunity to leave your views on your experience. This survey will cover your induction, welfare, pastoral and support services experience.

The Postgraduate Taught Experience Survey (PTES) is the only national survey of Master's level (MSc, MRes, MBA and MPH) students we take part in. This is the only way for us to compare how we are doing against the national average and to make changes that will improve our Master's students' experience in future. PTES covers topics such as motivations for taking the programme, depth of learning, organisation, dissertation and professional development. PTES last ran in spring term 2016 and will run again in spring 2018.

All these surveys are anonymous and the more students that take part the more representative the results so please take a few minutes to give your views.

The Union's "You Said, We Did" campaign shows you some of the changes made as a result of survey feedback:

 www.imperialcollegeunion.org/you-said-we-did

If you would like to know more about any of these surveys or see the results from previous surveys, please visit:

 www.imperial.ac.uk/students/academic-support/student-surveys/pg-student-surveys

For further information on surveys, please contact the Registry's Surveys Team at:

 surveys.registrysupport@imperial.ac.uk

# 14. And finally

## Alumni services

When you graduate you will be part of a lifelong community of over 190,000 alumni, with access to a range of alumni benefits including:

- discounts on further study at the College and at Imperial College Business School
- alumni email service
- networking events
- access to the Library and online resources
- access to the full range of careers support offered to current students for up to three years after you graduate
- access to our Alumni Visitor Centre at the South Kensington Campus, with free Wifi, complimentary drinks, newspapers and magazines, and daytime left luggage facility

Visit the Alumni website to find out more about your new community, including case studies of other alumni and a directory of local alumni groups in countries across the world.

www.imperial.ac.uk/alumni