

# IMPERIAL

Faculty of Natural Sciences

Department of Physics

MSc Quantum Fields and Fundamental Forces



Student Handbook  
2024–25

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## Welcome to Imperial

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 very much a part of this community of discovery and we hope you will take this opportunity to make your own unique contribution. At Imperial, we expect all members of our community, whether students or staff, to share and demonstrate our values of respect, integrity, collaboration, innovation and excellence in all we do and strive to achieve.

Imperial provides 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 the Early Career Researcher Institute 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 360 clubs, societies and projects is one of the largest of any UK university, making it easy to do something different with your downtime. Access to the gym and other sporting facilities will be dependent on government guidance. We are working to ensure that you have access to a variety of resources online to support your health and wellbeing if there are restrictions.

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.

## Our Principles

In 2012 Imperial and Imperial College Union agreed 'Our Principles'. This series of commitments was developed by academic and support staff in partnership with undergraduate and postgraduate students and Imperial College Union.

### **Imperial will provide through its staff:**

- A world-class education embedded in a research environment.
- Advice, guidance and support.
- The opportunity for students to contribute to the evaluation and development of programmes and services.

### **Imperial will provide students with:**

- Clear programme information and assessment criteria.
- Clear and fair academic regulations, policies and procedures.
- Details of full programme costs and financial support.
- An appropriate and inclusive framework for study, learning and research.

### **Imperial students should:**

- Take responsibility for managing their own learning.
- Engage with the university to review and enhance provision.
- Respect, and contribute to, the Imperial community.

### **The Imperial College Students' Union will:**

- Support all students through the provision of independent academic and welfare assistance.
- Encourage student participation in all aspects of the university.
- Provide a range of clubs, societies, student-led projects and social activities throughout the year.
- Represent the interests of students at local, national and international level.

## Welcome from the Early Career Researcher Institute

### Welcome to Imperial and to the Early Career Researcher Institute!

The Early Career Researcher Institute works closely with Imperial College Union to enhance your experience and to ensure that when decisions are being made which affect your time at the university, your voice is heard.

Another important aspect of our role is to provide you with a free and exciting programme of professional development opportunities, delivered through a range of modes, so you can access these wherever you are in the world.

Our staff have a variety of research and other career experiences. Our professional development opportunities are designed to support you as you progress through your programme, but also to help you improve your personal impact, and be prepared for your chosen career, whether that is within academia, industry, government or something completely different!

Importantly, by attending our courses and workshops, you will meet students from other academic departments, enabling you to start building your research connections. We also deliver exciting competitions throughout the year which are an opportunity to broaden your knowledge as well as to have some fun!

Our primary way to communicate with you will be through our monthly e-newsletter and our weekly professional skills email bulletins. However, do check our website, blog and social media platforms to keep up to date with all the latest activities available to you.

Finally, Imperial is an extremely exciting, stimulating and diverse environment in which to work, to study and to research. Do make the most of all that the university and your programme has to offer.

Please note that the Early Career Researcher Institute was formerly known as the Graduate School. We are working hard to update all our resources with our new name, so please bear with us as we continue to work through this task. For now, you can find out more about us via the website:



[www.imperial.ac.uk/students/academic-support/graduate-school/](http://www.imperial.ac.uk/students/academic-support/graduate-school/)

## Introduction from the President of Imperial College Union



Welcome to Imperial! To begin with, a huge congratulations on joining us here at Imperial– this is where you belong! This is a globally renowned institution and offers much more than just the degree you are looking to leave with. You will come across countless opportunities and meet an array of compelling people amongst your peers, accomplished academics and the wider university community. Imperial attracts the best talent from around the world - making it here is already a testament to your academic zeal and ambitious character. Now, what you make of your experience at Imperial has the potential to shape your future.

Being located in London is a true perk of being an Imperial student. Right on our west London doorstep are landmark museums and iconic venues, including the Royal Albert Hall which has hosted Imperial graduations for over 60 years. Beyond our campuses, the city has something for everyone; be that the West End, sporting arenas or diverse cuisines. I strongly encourage you to explore where and when you can – London is a fantastic place for your university memories to call home.

You will likely have chosen to come to Imperial for its academic reputation as an outstanding university, and it will deliver on this. The facilities for research and your learning are terrific. To accompany this, there are hundreds of student-led societies and events available to you outside of your degree. These are overseen by your students’ union – Imperial College Union. The Union is led by students, for students. The four deputy presidents and I have all been democratically elected to work full time on improving your student experience at Imperial. We have a large team of permanent staff behind us, running the many functions of the Union such as supporting clubs and training student representatives.



The Union also runs the Advice Service, where guidance and support can be provided on issues such as life in halls, complaints, and academic appeals. This is a free and confidential service that is independent from the university. You can access this by emailing [advice@imperial.ac.uk](mailto:advice@imperial.ac.uk).

University is a new stage of life. For many, this stage presents itself with newfound freedom and control over what you do. As daunting as it may seem, take advantage of it! Immerse yourself in your degree, your extra-curricular activities and in the connections you make.

No matter what problems you have or opportunities you’re looking for, we’re here to help. Our office is on Level 2 in Beit Quadrangle, and you can check out our website for more information.

Wishing you an incredible year ahead, Camille Boutrolle

Imperial College Union President 2024-25

 [union.president@imperial.ac.uk](mailto:union.president@imperial.ac.uk)  
 [imperialcollegeunion.org](http://imperialcollegeunion.org)



## 1. Introduction to the Department

### Welcome from the Programme Director

Welcome to Imperial College! We hope you have an enjoyable time during your year/two years in London at Imperial. The purpose of this handbook is to provide current students with a detailed description of the Quantum Fields and Fundamental Forces programme, including syllabuses, assessment and feedback mechanisms and more detailed information on how the course is delivered. This edition of the handbook applies to the academic year 2024-25. This renowned MSc programme is designed to prepare you for PhD study in fundamental theoretical physics by bridging the gap between an undergraduate programme in physics or mathematics and the research frontier. The origins of the programme date back to the founding of the Theoretical Physics Group by [Abdus Salam](#), one of Imperial's Nobel Laureates. You can read more about the history of the Group [here](#). The Theoretical Physics Group is internationally recognised for its contribution to our understanding of the unification of fundamental forces, the early universe, quantum gravity, supersymmetry, string theory, and quantum field theory. This programme has a relatively small number of students (in comparison to the undergraduate physics courses) and they have extensive access to the academic and research staff as well as support staff of the Department; students therefore should not hesitate to approach the Programme Directors or any member of staff for advice or assistance.




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## Academic and administrative staff

The MSc course lectures are given by staff in the Theoretical Physics Group, part of the Universe Community in the Physics Department at Imperial College. The current staff (and some of their duties) are



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## Departmental Information

You can find more information at

The Department of Physics Website : <https://www.imperial.ac.uk/physics/>

The Quantum Fields and Fundamental Forces MSc Website :

<https://www.imperial.ac.uk/theoretical-physics/postgraduate-study/msc-in-quantum-fields-and-fundamental-forces/>


## Attendance and absence

You must inform your Senior Postgraduate Tutor if you are absent from the university for more than three days during term. If the absence is due to illness, you must produce a medical certificate after seven consecutive days. If you miss an examination or the deadline for any other assessment (including lab work, in class tests, coursework or presentations) due to illness or other unforeseeable and unavoidable circumstance you must follow the Mitigating Circumstances Policy and Procedure. Please note that all claims for mitigation must be submitted within 10 working days of the examination or assessment deadline. If you are unable to provide evidence at the time you must submit the claim and indicate what evidence will follow and when it can be provided. Claims without evidence will normally be rejected. Please see the section on mitigation below.

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

Attendance will be monitored by registers at selected lectures and by registers at all examinations. Meetings with staff (for example, project supervisors, personal tutors) may also be used.

If you do not engage satisfactorily with your studies, Imperial will consider what action is necessary to support your continued study under the Unsatisfactory Engagement Policy:

 [www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/regulations/2022x2f23/Unsatisfactory-Engagement-Policy-and-Procedure.pdf](http://www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/regulations/2022x2f23/Unsatisfactory-Engagement-Policy-and-Procedure.pdf)

## Key dates 2024–2025

### Term dates

Autumn term: 28 September 2024 – 13 December 2024

Spring term: 04 January 2025 - 21 March 2025

Summer term: 26 April 2025 – 27 June 2025

### Closure dates

Christmas/New Year: 23 December 2024 - 01 January 2025  
(Imperial reopens on 02 January 2025)

Easter Holiday: 17 April 2025 – 22 April 2025  
(Imperial reopens on 23 April 2025)

Early May Bank Holiday: 05 May 2025

Spring Bank Holiday: 26 May 2025

Summer Bank Holiday: 25 August 2025

Deadline for Submission of Dissertation: 19 September 2025

Please note that the Graduation ceremony will be held at the earliest date after the Examination board meeting is held. The Examination board meeting typically happens in October, after the end of the course and the Graduation ceremony is typically in May of the year following the end of your course.

If you hold a student visa, the type and amount of work outside of the course that you can do is restricted. It is essential that you are aware of these restrictions so that you do not breach your for further details and note that only undergraduate students can undertake an internship during the summer vacation.



[www.imperial.ac.uk/students/international-students/visas-and-immigration/working-in-the-uk/work-rules-during-your-studies/](http://www.imperial.ac.uk/students/international-students/visas-and-immigration/working-in-the-uk/work-rules-during-your-studies/)

## 2. Programme information

### Programme Overview

The Theoretical Physics Group is internationally recognised for its contribution to our understanding of the unification of fundamental forces, the early universe, quantum gravity, supersymmetry, string theory, and many other aspects of quantum field theory. This MSc course is intended to bridge the gap between an undergraduate course in Physics or Mathematics and the research frontier in fundamental theoretical physics. The compulsory courses solidify students understanding of quantum physics and relativity, providing a strong basis in quantum field theory, with particular emphasis on key aspects of the standard model of particle physics, and the notion of symmetries (group theory) which are the core components of all modern theoretical physics. Elective courses cover Geometry, Black Holes, gravitational physics and cosmology on the one hand, or delve more deeply into quantum theory and Unification through Strings, SUSY and Beyond the Standard Model Physics on the other. Students with a less formal background will have the opportunity to take several approved Imperial undergraduate courses whose material is built on in other modules. The elective courses will touch on the research of members of the theory group, and students will have the opportunity to gain more detailed knowledge of a particular research area through optional special topics lectures and through writing a dissertation (core component) under the supervision of an academic staff member.

More detailed information for current students can be found [here](#).

### Learning Outcomes

At the conclusion of the QFFF MSc, you will be able to:

- Understand and have the resources to acquire deeper knowledge of the most fundamental laws and principles of theoretical physics across a broad range of fundamental topics.
- Understand and have the resources to acquire deeper knowledge of techniques for using mathematical tools to describe the physical world.
- Understand and have the resources to acquire deeper knowledge of research techniques, which may include critical examination and summation of scientific literature, and designing appropriate mathematical models and computations to test physical principles.
- Apply their theoretical knowledge of physical principles and advanced mathematical techniques to problems in quantum field theory, cosmology and other frontier areas of fundamental physical science
- Critically interpret mathematical models of physical behaviour.
- Design, undertake and report on a programme of original work.
- Critically evaluate and understand research-level scientific literature.
- Communicate theoretical and computational results and analysis clearly, making any assumptions and approximations explicit.
- Collaborate with peers to develop solutions to complex problems.

### Learning and Teaching Delivery Methods

Delivery is primarily through full-length lecture courses of about 30 lectures each. Each lecture course has problem sets and associated rapid-feedback sessions in which solutions to the problems are discussed. The Theoretical Physics Group has weekly seminars on topics of current research interest which are also aimed at the MSc students.

Following the April-May examination session, there is a two-week session of Special Topics short courses delivered by members of academic staff, Research Assistants and occasionally visiting academics. You then

must arrange with Research Project supervisors to work on their independent research projects during the following summer period, with Research Project Dissertations due for submission in late September of the corresponding academic year.

E-learning is provided via a mixture of Blackboard VLE with Panopto lecture recordings for review.

## Overall Workload

The overall workload consists of face-to-face sessions and independent learning. While actual contact hours may vary according to the elective modules chosen to study, the following gives an indication of how much time is allocated to different activities at each level of the programme. Given each ECTS credit taken equates to an expected total study time of 25 hours, the expected total study time is 2250 hours per year.

Typically, in a complete (one-year full-time or two-year part-time) participation in the programme, you will spend on the order of 20% in lectures, problem classes and seminars (around 450 hours) and on the order of 80% on independent study.

## Programme Structure

Students must take four Compulsory courses: Quantum Field Theory, Quantum Electrodynamics, Unification, and Particle Symmetries. In addition, students must take four elective courses with at most two in total from Group B in the list below (Group B are Undergraduate courses). Finally, students must complete a Research Dissertation.

MSc students are advised to discuss their choice of courses with their Personal Advisor if they are uncertain about their course programme. Students thinking about doing a PhD after their MSc are advised to choose courses closely related to their intended area of PhD research.

Imperial College graduates may already have taken some of the offered courses. In this case, they may not offer a course for examination a second time. Imperial College graduates who have already taken the Compulsory Quantum Field Theory or Unification courses should take Advanced Quantum Field Theory instead. An Imperial College graduate who has already taken both Quantum Field Theory and Unification should replace the second ineligible course with an Elective course in Group A (MSc level course).

**Part-time students** must be examined on one Compulsory course and two Elective courses during their first year.

The compulsory courses and possible electives are shown in the table below:

Code	Module Title	Core/Elective/ Compulsory	Group	Term	Credits
PHYS70011	Unification - the Standard Model	Compulsory		Autumn	7.5
PHYS70008	Quantum Field Theory	Compulsory		Autumn	7.5
PHYS70067	Quantum Electrodynamics	Compulsory		Autumn	7.5
PHYS70068	Particle Symmetries	Compulsory		Autumn	7.5
		Credit Total:	30		
PHYS60015	Group Theory	Elective	B	Spring	7.5
PHYS60011	Foundations of Quantum Mechanics	Elective	B	Spring	7.5
PHYS70069	Advanced Quantum Field Theory	Elective	A	Spring	7.5
PHYS70070	Black Holes	Elective	A	Spring	7.5
PHYS70066	Relativity and Cosmology	Elective	A	Spring	7.5
PHYS70065	Differential Geometry	Elective	A	Autumn	7.5

PHYS70064	The Standard Model and Beyond	Elective	A	Spring	7.5
PHYS70063	String Theory	Elective	A	Spring	7.5
PHYS70062	Supersymmetry	Elective	A	Spring	7.5
PHYS70006	General Relativity	Elective	B	Autumn	7.5
PHYS70009	Quantum Information	Elective	B	Autumn	7.5
PHYS70018	Quantum Theory of Matter	Elective	B	Spring	7.5
PHYS70061	Research Dissertation	Core		Summer	30
Credit Total					90

The two courses marked in **Blue** (Group Theory and FQM) are FHEQ Level 6 courses. All other courses are FHEQ Level 7. Group B are Undergraduate Courses.

## Timetable

The course lasts one calendar year full time (or two years part time). It begins in October, with formal coursework ending by June and project work occupying the summer vacation. The College standard lecturing schedule is followed, with 50 minute lectures commencing on the hour, Monday to Friday 9am to 6pm, with Wednesday afternoons free. The total number of lectures per week on the MSc course depends on the choice of courses, but it typically totals about 15 lectures.

The Compulsory QFT, Unification and Particle Symmetries lectures take place in the first term, along with the elective Differential Geometry course. These lecture courses start at a reasonably low level in order to make sure that everyone is up to speed in classical and quantum mechanics, group theory and relativity. We strongly suggest that students attend at least the first few weeks of the undergraduate General Relativity course to review tensor notation, even if they don't attend the entire course. As with the other undergraduate courses, this course may also be viewed using the Panopto system, which may reduce pressure on the lecture theatres. The Quantum Electrodynamics course begins late in the autumn term and continues into the beginning of the winter term.

Lectures for the remaining elective courses take place in the second term. The approved undergraduate courses are spread throughout the first and second term.

**Seminars:** Students are also welcome to attend the wide range of research seminars given at Imperial (and also other London colleges). Staff may recommend seminars that are particularly accessible. Also of interest are the Physics Department colloquia, about three times per term, designed to appeal to a wide audience.

**New Year tests:** After the New Year, there will be two tests (each two hours long) on the first term's courses, one on Particle Symmetries and Unification, the other on QFT. These tests do not count towards the final mark, so students are not obliged to take them, but they are strongly recommended, since the results are important in assisting staff members to write recommendation letters for PhD applications (which are generally scheduled in the second term).

**Examinations:** The first and second term courses are examined in the third term, over a period of approximately six weeks from late April into early June.

**Special Topics:** After the exams have finished in June, there will be a series of Special Topics lectures, in which postdocs and staff members talk about their research interests. These are a good source of inspiration for the MSc Dissertation, work on which will fill up the rest of the summer.



**Dissertation:** By about the beginning of July students should have a clear idea of their Dissertation topic and communicate a preliminary title to the Course Director. A preliminary draft of the Dissertation should be available for perusal by the Dissertation Supervisor (who in many cases will be different from the Personal Advisor) in early September, and the final deadline is usually the third Friday in September (you will be informed in due course of the precise date).

## MSc Dissertation Guidance

All MSc students must complete a Research Dissertation. The Dissertation is written under the supervision of a member of academic staff (Dissertation Advisor). This supervision may be undertaken as an individual, or students can choose to group into pairs. Particular advisors may suggest or prefer one mode or the other. When supervised as a pair, although the research topic area may be similar, students must nevertheless produce an independently written Dissertation.

**Content:** Most MSc Dissertations consist of an appraisal of a particular area of currently active research. It is not expected that you produce original research for the Dissertation given the short time available (in exceptional circumstances the content of a Dissertation may lead to an original research publication, however this is not expected nor required). What the examiners are hoping to see is a critical appreciation of the literature – what has been done, unsolved problems, areas for further research, and so on.

In reading the Dissertation, the examiners would like to see that you have absorbed and understood the material, and then presented it in your own way. In reviewing calculations, it is good practice to work through the calculational details independently to allow you to write them up in your own voice, rather than simply reproducing the literature. All sources must be properly referenced. A crime that must not be committed is to copy whole sentences or even paragraphs directly from published papers. The examiners reading the Dissertation will probably be more familiar with the literature than you are, and anyone caught doing this will be referred for disciplinary action by Imperial College. The Dissertation must be an independent piece of work. Whilst it is very useful to talk with other students who are writing Dissertations on similar topics, and is expected if you are working in pairs, the final piece of work you produce must not be collaborative. Any included text from another source must be properly indicated as a quotation and must be referenced. Serious cases of plagiarism may result in more severe disciplinary action. In this connection, students should consult the College's policy statement on examination offenses:

<https://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/>

**Finding a Dissertation Advisor:** All members of the theoretical physics group (Universe-Theory) can act as official advisor for an MSc Dissertation. In many cases postdoctoral research associates are encouraged to take an active role in the Supervision of Dissertations. Near the end of the Examinations in Term 3 a list of possible Dissertation projects by individual supervisors will be provided. However, students are welcome to develop their own proposals and approach relevant staff members. Although not usual, it may be possible for projects to be carried out partly or wholly at an external organisation (e.g. with a pending PhD supervisor) or with an Advisor in another Community/Department in College and requests will be considered on a case by case basis. Students should obtain approval from the Course Director in advance.

In all cases once a Dissertation preliminary title and Advisor have been found the Course Director should be informed by the student.

**Writing the Dissertation:** Most of the Dissertation should be written at a high technical level, comparable to published journals, aimed at experts in the field. However, it must in addition include an introductory

section aimed much lower, at a general physics audience (so that it could be understood by any MSc student, for example).

The Dissertation should be written in standard scientific style, along the lines of papers published in journals. It should be in good English, although imperfect English is tolerated from students who are not natural English speakers – the most important thing is conceptual clarity. It should also be written with correct spelling. Spell checkers are available on the word processors to assist this.

**Generative AI Tools:** Submitting work and assessments created by someone or something else as if it were your own is plagiarism and is a form of cheating. This includes AI-generated content. Please refer to the College's Academic Misconduct Policy for more information.

There exist many books describing how a scientific paper or Dissertation should be written. It is a very good idea to spend at least a few hours consulting one of these books before you put pen to paper. See, for example,

- Writing Successfully in Science, by Maeve O'Connor (HarperCollins Academic, London, 1991).
- How to Write and Publish a Scientific Paper, Third Edition, by Robert A. Day (Cambridge University Press, Cambridge, 1989).

Both these books may be found in the College libraries. Professional scientists spend a very large amount of time writing, so it is important to learn this skill as early as possible in one's career.

**Dissertation Length:** The length of the Dissertation depends to some extent on the content and subject area. As a rough guide, most Dissertations are between about 50 and 100 pages (double-spaced). Students should type their own Dissertations (except in exceptional circumstances), and you are strongly encouraged to use some version of LaTeX which is now used by almost everyone in theoretical physics (for example [Overleaf](#) is very popular). If you are not already familiar with LaTeX it is well worth taking the time to learn it. If not already familiar, make sure you budget for a week or so of getting the hang of word processing when organising your time. Standard macros for producing papers are readily available, and these help avoid having to worry about page layout and other similar things.

**Citations:** Citations are important in scientific writing and students should take care to refer to all sources used, and key sources for the topic even if not directly used, and also to present their references in a standard journal style. It is bad form, for example, to omit page numbers, or to have reference styles change from one citation to the next. No specific referencing style is required, but it should be consistent throughout the Dissertation. Students are encouraged to follow the referencing style of a major journal, such as Phys. Rev. D, Nuclear Physics or JHEP. The appropriate files needed for the LaTeX system are available online.

**Presentation:** The title page of the Dissertation requires only the title, your name, the date, and the statement, "Submitted in partial fulfilment of the requirements for the degree of Master of Science of Imperial College London".

**Past Dissertations:** Past cohorts Dissertations can be found [here](#). You are encouraged to look at examples from recent years to get a sense of the style/length/formatting. N.B. any substantive reproduction of previous Dissertations is plagiarism and may lead to severe disciplinary action.

## QFFF Course Syllabuses: Compulsory Courses

### PHYS70068: Particle Symmetries

Prof. Gauntlett

30 hours

**Introduction:** Role of symmetry in physics. Basic introduction to symmetries and particles of the standard model.

**Group Theory:** Introduction to group theory and representation theory. Brief discussion of finite groups. Matrix groups and the notion of Lie groups.

**Lie Groups:** The main part of the course is the treatment of Lie groups, Lie algebras and their representation theory.  $SU(2)$  and  $SU(3)$  and their representations are discussed in detail. Poincare group and Lorentz group and their representations. Heisenberg group and its representations.

Applications: Throughout the course we will discuss specific applications of Lie groups to particle physics.

### PHYS70008: Quantum Field Theory

Prof. Wiseman

27 hours

**Introduction:** Basic aims and ideas of field theory. Types of field and relationship to symmetries (relativistic, non-relativistic and other particle symmetries).

**Review of Classical Field Theory:** Lagrangian and Hamiltonian descriptions of field theory. Linearity and interactions. Internal symmetries and Noether's theorem.

Quantisation of a Scalar Field Plane wave solutions of the Klein Gordon equation. Quantisation and commutation relations. Creation and annihilation operators. Complex scalar fields and their conserved charge.

**Interacting QFT:** Cross-sections matrix elements and vacuum expectation values. Wick's theorem and normal ordering. Simple Feynman diagrams (without renormalisation). For a real scalar field. Possible extension to complex scalar field.

**Further Topics:** To be added as time allows

### PHYS70067: Quantum Electrodynamics

Prof. Magueijjo

30 hours

**Interacting Fields:** Time-ordered products. Green functions. Fermion electrodynamics. Interaction picture. Perturbation theory. Asymptotic conditions. Ordering theorems. Wick's theorem. Feynman diagrams. Compton scattering. Electron-electron scattering. Electron-positron annihilation. Cross-sections. Centre-of-mass frame.

**Renormalization:** Perturbative renormalization of QED to one loop. Regularization. Ward identities. Running couplings.

### PHYS97102: Unification

Prof. Rajantie

27 hours

**Introduction:** Lagrangian formulation of electrodynamics; Lorentz transformations; gauge invariance; scalar fields.

**Global symmetries:** Noether's theorem and conservation laws; matrix symmetries; Lie algebras; basic

representations.

**Local symmetries:** Covariant derivative; non-Abelian gauge fields.

**Spontaneous symmetry breaking:** Goldstone's theorem; Higgs mechanism.

**Fermion fields:** Spinor representations of the Lorentz group; chiral spinors; Dirac equation and spinor field Lagrangians.

**The Standard Model:** Quantum chromodynamics; electroweak theory; fermion representations; symmetries of the Standard Model; fermion masses.

## QFF Course Syllabuses: Elective Courses

N.B. The below syllabuses for advanced modules are indicative, depending on time the lecturer may not cover all topics or may choose to focus on certain topics or add new topics. The precise material covered is at the discretion of the lecturer.

### PHYS70069: Advanced Quantum Field Theory

Prof. Tolley

30 hours

**Functional Methods:** Path integrals in quantum mechanics and quantum field theory. Perturbation theory and Feynman diagrams. Feynman rules from path integrals. Fermions and Grassman variables.

**Renormalisation:** Ultraviolet divergences and regularisation. Renormalised perturbation theory. Wilsonian renormalisation. Renormalisation group. Callan-Symanzik equation. Dimensional regularisation.

**Non-Abelian gauge field theory:** Abelian and non-Abelian gauge symmetries. QCD and Yang-Mills theory. Gauge fixing and Faddeev-Popov ghosts. Computation of the beta function. Asymptotic freedom, colour confinement and the continuum limit.

### PHYS70062: Supersymmetry

Prof. Tseytlin

30 hours

**Introduction to supersymmetry:** Poincare algebra, Weyl and Majorana spinors. Grassmann algebra. N=1 Supersymmetry algebra: Representations of supersymmetry on one-particle states. Extended supersymmetry.

**Representation of supersymmetry on component fields:** Chiral multiplet. Wess-Zumino model. Supersymmetric generalisation of Maxwell action.

**Superspace and superfields:** Chiral superfields; superspace form of Wess-Zumino action; superpotential. Scalar superfield and supergauge transformations.

**Super Yang-Mills action:** Gauge-invariant models of interacting chiral and vector multiplets. Spontaneous supersymmetry breaking.

**Advanced topics:** Quantum properties of supersymmetric theories. Supergravity. Introduction to supersymmetric Standard Model.

### PHYS70066: Relativity and Cosmology

Prof. Magueijo

30 hours

**An action principle formulation of GR:** Tensor densities. Volume and integration on manifolds. The Levi-Civita tensor. Embedded surfaces and the ADM metric. Stokes theorem. The Einstein-Hilbert action and

the Palatini equation. The Gibbons-Hawking-York boundary term. A general definition of the stress-energy tensor. Scalar fields in curved space-time.

**Basic relativistic cosmology:** Geometry: Homogeneity and isotropy. Einstein metrics and maximally symmetric spaces. The Friedman-Roberston-Walker (FRW) metric. Conformal and proper time, and comoving coordinates. Maximally symmetric space-times: de Sitter (dS) and anti de Sitter (AdS) spaces. The matter content. Perfect fluids. Matter and radiation. The cosmological constant. Hawking's energy conditions. Scalar fields in cosmology (inflation and quintessence). The dynamics. The Friedman equations as the Einstein equations for FRW spacetimes. The Bianchi identity. Radiation and matter solutions with and without curvature. de Sitter solutions and their physical relevance.

**Gravity as a gauge theory:** Exterior calculus Forms and wedge product. The exterior derivative. Dualization. Integration revisited. The geometrical structure of gauge theories Gauge transformations and the covariant derivative. Gauge fields as connections. Gauge field strength as curvature, and its representation. The graded commutator and the covariant derivative of forms in the adjoint representation. Generalized Bianchi identities. The Yang-Mills action in the language of forms. The Cartan formalism and the spin connection The tetrad basis and General Relativity as a gauge theory. The connection 1-forms and the curvature 2-forms. The torsion 2-form and Cartan's theorem and structure equations. The first and second Bianchi identities of Einstein-Cartan gravity. Action principles: The first order formalism. The metric and connection as independent variables. The Einstein-Cartan(-Palatini-Kibble-Sciama) action. Equations of motion. The matter stress-energy 3-form and the spin-current. The cosmological constant and the boundary term in the Einstein-Cartan formulation.

### PHYS70070: Black Holes

Prof. Stelle

30 hours

**The Schwarzschild solution:** Gravitational collapse; geodesics; Eddington-Finkelstein coordinates; Kruskal-Szekeres coordinates; Carter-Penrose diagrams; causality, horizons and Cauchy surfaces; singularities and cosmic censorship.

**Charged and rotating black holes:** The Reissner-Nordstrom and Kerr solutions; causal structure; inner horizons; extremal black holes.

**Killing vectors and Killing horizons:** Symmetries and Killing vectors; black hole uniqueness theorems; black hole "no hair" theorems; asymptotic values of energy, momentum and angular momentum.

**Laws of black hole mechanics:** Energy conditions; zeroth, first, second and third laws of black hole mechanics; analogy with thermodynamics; conjectured generalised second law of thermodynamics.

### PHYS70065: Differential geometry

Prof. Hull

30 hours

**Manifolds:** The idea of a manifold. Tangent vectors, vector fields and flows. Differential forms and exterior calculus.

**Integration, Stokes' Theorem and Cohomology:** Integration of differential forms. Stokes' theorem. Cohomology and de Rham's theorem.

**Riemannian Geometry:** Volume forms and non-coordinate bases. Hodge theory. Connections, covariant differentiation, torsion and curvature. Cartan's structure equations.

**Fibre bundles:** The idea of a bundle. Vector and principle bundles.

The course will use examples from classical mechanics, quantum mechanics, electromagnetism, general relativity and gauge theory to illustrate these ideas and their application in physics.

### PHYS70063: String Theory

Prof. Hanany

30 hours

**Introduction to String Theory:** Worldsheet, Space Time, Branes

**Supergravity Multiplets:** Supergravity Multiplets in various dimensions and supersymmetries

Maximal Supersymmetry -- 10 supermultiplets with 32 supercharges in 3-11 dimensions

**Branes:** Brane spectroscopy, Branes ending on Branes, Branes and supersymmetric field theories, D branes and gauge theories, M5 branes and the (0,2) theory, Root Systems and branes.

### PHYS97094: The Standard Model and Beyond

Prof. Stelle

30 hours

This course extends the perspective on particle physics up to the current research front, using effective theory methods based on local and rigid symmetries. It is a natural continuation of the perspectives of the Unification and Particle Symmetries courses.

**The Standard Model in detail:** V-A structure; custodial symmetry; CKM structure; neutrino masses and neutrino oscillations.

**Discrete and Approximate Symmetries and their Breakdown:** CP invariance and violation; effective field theories and their approximate symmetries, chiral symmetry in particular; mathematical structure of nonlinear realisations and its application to nonlinear sigma models with chiral symmetry.

**Anomalies:** Rigid symmetry anomalies and their physical consequences; gauge anomaly cancellation; the theta parameter of QCD; the strong CP problem and axions.

**Grand Unification and its Difficulties:** The Georgi-Glashow Model, SU(5) and SO(10); the evolution of coupling constants; proton decay.

**Supersymmetry in Particle Physics:** Supersymmetric extensions of the Standard Model.

### QFF Course Syllabuses: Undergraduate Elective Courses

In addition to the above electives, students may present at most two of the following FHEQ Level 6/7 undergraduate courses (Group B), as need arises, depending on their educational backgrounds:

PHYS60015 Group Theory

PHYS60011 Foundations of Quantum Mechanics

PHYS70006 General Relativity

PHYS70009 Quantum Information

PHYS70018 Quantum Theory of Matter

Individual Syllabuses for undergraduate courses can be found here (internally only)

<https://www.imperial.ac.uk/physics/students/current-students/undergraduate-and-masters-degree-courses-list/>

### QFF Course Syllabuses: Special Topics (non-examinable)

This is a series of short non-examinable lecture courses, given in the summer term weeks following the course examinations by postdocs and staff members, covering areas of recent research interest. They are particularly useful to help MSc students select a topic for their Dissertation. Specific lecture topics will be provided closer to the time of delivery.

## Background Reading for the MSc course

Many students wanting to do the course will have read many popular books on particle physics, black holes etc., and one or two popular books are included below. But it is also important that certain more technical aspects of an undergraduate physics education be properly covered.

The main things students need to know about before starting the QFFF MSc course are as follows:

1. The Lagrangian and Hamiltonian formulation of classical mechanics. This is very important. It is covered in many texts, including quantum mechanics and quantum field theory courses, but two texts many students have found useful are:
  - T. Kibble and F. Berkshire, *Classical Mechanics* (Longman, Harlow, 1996).
  - T.M. Helliwell and V.V. Sahakian, *Modern Classical Mechanics* (Cambridge University Press, 2020)
2. Quantum mechanics to a good undergraduate level. Properties of harmonic oscillators, raising and lowering operators, angular momentum, Schrodinger and Heisenberg pictures, identical particles. Some familiarity with scattering theory is also useful. The most important thing is the Dirac notation, which is not always covered in many undergraduate courses. Many good books cover this. Two excellent treatments are
  - R. Shankar, *Principles of Quantum Mechanics*, Springer; 2nd ed. 1994 edition (31 Aug. 1994).
  - J.J. Sakurai and J. Napolitano, *Modern Quantum Mechanics*, (Cambridge University Press; 3rd edition, 2020).
3. Some familiarity with Lorentz transformations and tensor notation in special relativity is very useful. The earlier sections in many textbooks in general relativity cover this, as do some books on special relativity. Anyone who has not seen tensors at all, should start with their Newtonian version, Cartesian tensors, which are described in many classical mechanics books. The book
  - H.F. Jones, *Groups, Representations and Physics* (Institute of Physics, Bristol, 1998).

has a short section on tensor notation. The rest of this book, on group theory, serves as a valuable introduction to groups. It is not assumed that students know any group theory at the beginning of the MSc course, but some familiarity will certainly come in very useful.

4. Basic Electromagnetism. The basic properties of Maxwell's equations and its solutions. See, for example,
  - E.R. Dobbs, *Basic Electromagnetism*, Springer; Softcover reprint of the original 1st ed. 1993 edition (31 May 1993)
  - J.D. Jackson, *Classical Electrodynamics*, Wiley; 3rd edition (1 Dec. 1998).

Some books on electromagnetism also cover special relativity and tensors. Volume 2 of the Feynman lectures, for example, is very good on many of these things.

**Reading ahead:** For anyone wanting to read ahead, some texts covering the first term's work on quantum field theory are,

- I.J.R. Aitchison and A.J.G. Hey, *Gauge Theories in Particle Physics. Volume 1: From Relativistic Quantum Mechanics to QED* (Institute of Physics Publishing, Bristol, 2003).
- F. Mandl and G. Shaw, *Quantum Field Theory, Revised Edition* (Wiley, Chichester, 1993).
- L.H. Ryder, *Quantum Field Theory*, (Cambridge University Press, Cambridge, 1985).
- M. Srednicki, *Quantum Field Theory*, (Cambridge University Press; 1st edition, 2007)

A low-level discussion of quantum electrodynamics is

- R. Feynman, *QED: The Strange Theory of Light and Matter* (Princeton University Press, 1985; Penguin, 1990).

An excellent non-technical account of Unification by Theoretical Physics Group founder Abdus Salam:

- Abdus Salam, *Unification of Fundamental Forces: The First 1988 Dirac Memorial Lecture*, Cambridge University Press; Illustrated edition (1990).

An excellent technical introduction to General Relativity is:

- S. Carroll, *Spacetime and Geometry: An Introduction to General Relativity*, Pearson (2003).

An excellent introduction to String Theory at undergraduate level is

- B. Zwiebach, *A First Course in String Theory*, Cambridge University Press; 2nd edition (2009).

An introduction to D-brane physics is

- C. Johnson, *D-branes*, Cambridge University Press; 1st edition (2002).

An excellent introduction to Strings and Branes is

- P. West, *Introduction to Strings and Branes*, Cambridge University Press (2012).

Two readable accounts of modern particle physics are:

- S. Weinberg, *"Dreams of a Final Theory: The Search for the Fundamental Laws of Nature"* (Vintage, London, 1993).
- S. Carroll, *"The Particle at the End of the Universe"*, Oneworld Publications (2012).

An excellent modern technical review of Standard Model Physics is:

- C. Burgess and G. Moore, *The Standard Model: A Primer*, Cambridge University Press; Illustrated edition (2012)

An excellent non-technical account of Cosmology is:

- S. Weinberg, *The First Three Minutes: A Modern View Of The Origin Of The Universe*, Basic Books; 2nd edition (1993).



## My Imperial Campus

An app for students - designed by students!

My Imperial Campus is the beginning of a new mobile experience for the Imperial College London community. The app is being designed by Imperial students and alumni and delivered in an iterative way as the team learns more about the experiences that our community want in order to thrive at Imperial. The app is relatively young, and development is continual, please download and explore the app and look out for opportunities to get involved!

You can download the app for Android devices from the Play Store or for iOS devices from the App Store.

Current feature highlights:

- 'Search' is an AI chatbot allowing users to chat with information from the university website and other resources.
- 'Maps' – 2D maps of all campuses and the first 3D map of the South Kensington Campus (White City campus is next).
- 'Events' - All public events Student Union events and societies can be explored, edit your preferences in the settings to customise the feed. Here you can also find a 'Welcome week' filter to view specific events to enjoy at your welcome week.
- 'Timetable check-in' - The Business School and a growing list of other departments requires you to check into class if you are physically on site; use this feature to quickly check-in. Here you can also find a link off to view your full timetable in a browser.
- 'Internships and Careers' - Search through the latest internships and job vacancies received by the Careers Service.

## Imperial Success Guide

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

 [www.imperial.ac.uk/students/success-guide/pgt/](http://www.imperial.ac.uk/students/success-guide/pgt/)



## Student Shapers

Student Shapers is a chance to actively contribute to improving your learning experience at Imperial. This programme lets you work directly with staff on exciting projects that enhance the curriculum, create innovative teaching methods, and make a real difference in our learning community. The Student Shapers programme is open to all Imperial students across all departments. All opportunities that have been approved are listed in the 'Current Projects' area of the website.

 [www.imperial.ac.uk/students/studentshapers/how-to-get-involved/current-projects/](http://www.imperial.ac.uk/students/studentshapers/how-to-get-involved/current-projects/)

## Imperial Award

The Imperial Award is a programme that fosters personal development through self-reflection on your experiences, formally recognising this on your transcript. This programme is open to all students at

Imperial, including UG, PGT, PGR and intercalating students. The Imperial Award aims to help you uncover more about yourself and your potential, and to enhance your ability to articulate the achievements and skills you have developed through activities beyond the lecture hall. For more information, please visit the Imperial Award page.

[www.imperial.ac.uk/students/imperial-award/](http://www.imperial.ac.uk/students/imperial-award/)

### 3. Assessment

Within your programme of study, you will have different types of assessment which may include coursework, examinations, timed-remote assessment, presentations, labs or other forms of practical assessment.

Summative assessment is via written examinations in 4 compulsory and 4 elective modules, taken in the April-May examination session. The duration of exams organised by the QFFF programme is 3 hours; the duration of exams organised by the undergraduate Physics programme is 2 hours. The longer time for QFFF exams is warranted by the advanced nature of the subjects, requiring a more in-depth analysis.

Students normally submit their MSc Research Project Dissertation at the end of September of the corresponding academic year. Summative assessment of the Research Project Dissertation is undertaken by two readers. Overall standards are confirmed in agreement with the External Examiners.

Formative assessment is through problem sets in each QFFF module, coupled with Rapid Feedback (RF) sessions to discuss solutions. Feedback follows the guidelines of the Department of Physics, where written feedback for minor pieces of coursework should be provided to the student within 10 working days of the work being submitted. For major pieces of coursework feedback should be provided within 20 working days, although marks may not be returned until after the Board of Examiners meeting.

**Rapid Feedback:** The lecture modules each have classwork Rapid Feedback sessions which allow students to work through problems under the guidance of the lecturer and course assistants. Marking of student work by the RF session leaders is provided on a voluntary basis.

#### Marking of MSc Dissertations

The Dissertations are read and given a mark by at least two staff members, one of whom is usually the Dissertation Advisor. Bear in mind that the other marker may be less expert in the field than the Advisor, so it is important to make efforts at making your work comprehensible. Broadly speaking, the marking is broken down into content, presentation and originality:

**Content:** Has the student fully understood the area covered by the Dissertation? Is it scientifically correct? Is it a thorough account or are key parts missed out? Does it go into the area in sufficient depth? Does the Dissertation bring the reader up to the current frontier of knowledge in that area? (The breadth and depth with which the subject should be covered will vary depending on the area. Equally high marks are possible for covering a narrow area deeply or for giving a broad overview of a much larger area).

**Presentation:** Is the material described in an organised and coherent fashion? Is there an adequate introduction describing the field in broad and easily accessible terms, and explaining why the subject is useful and interesting? Is there an adequate conclusion, summarising the key aspects of the field and clearly elucidating the areas for further research? Are all the key works in the area adequately referenced? Is the text and its organisation original, or is any of it substantially similar to that of published papers or books?

**Originality:** As stated above, it is not necessary to do original research, but originality can be expressed through the way the subject matter is penetrated and understood. Is the Dissertation written in an interesting way? Is the subject presented in a way that would be enlightening for experts in the area? Does it indicate connections with other fields that no-one has thought of before? Has the student reproduced calculations independently and presenting them in their own manner? Has the student been able to fill in the missing steps in published accounts of the subject, thereby producing an account of it which goes beyond previous works?

The precise weighting of these three aspects is at the discretion of the Board of Examiners in consultation with External Examiners.

## Progression and Classification

### Award and Classification for Postgraduate Students

Award of a Masters Degree

To qualify for the award of a postgraduate degree you must have:

1. accumulated credit to the value of no fewer than 90 credits across FHEQ levels 6 and 7 (of which 75 credits must be at Level 7);
2. and no more than 15 credits as a Compensated Pass;
3. met any specific requirements for an award as outlined in the approved programme specification for that award.

### Classification of Postgraduate Taught Awards

The College sets the class of Degree that may be awarded as follows:

1. Distinction: 70.00% or above
2. Merit: 60.00% or above but less than 70.00%.
3. Pass: 50.00% or above but less than 60.00%.

For a Masters, your classification will be determined through the weighted average mark in the designated 'taught' and 'research' aspects of the programme, both of which must separately meet the threshold for the relevant classification band.

**Conditions for Merit/Distinction:** The guidelines for the award of a Distinction or a Merit are similar to those for Passes, substituting the Distinction level of 70% or the Merit level of 60% for the 50% Pass level. The corresponding mark levels need to be met separately in the Examinations and also the Dissertation. The MSc Dissertation must in all cases obtain a mark at or above the minimum corresponding level (70% for a Distinction, 60% for a Merit).

The award of Distinction and Merit MSc degrees is decided by the QFFF Board of Examiners and External Examiners in the final (November) Examiners Meeting. The Examiners reserve the right to change the mark thresholds in exceptional circumstances.

Your degree algorithm provides an appropriate and reliable summary of your performance against the programme learning outcomes. It reflects the design, delivery, and structure of your programme without unduly over-emphasising particular aspects.

## Re-sit/Re-entry

The basic requirements for an overall Pass in the MSc are as follows.

- The QFFF course has three basic components: 1) the four Compulsory Courses, 2) the four Elective Courses and 3) the Dissertation. A complete set of eight written course exams must be presented and passed in order to pass the MSc, with the Pass mark set at 50% for FHEQ Level 7 courses and 40% for FHEQ Level 6 courses.
- In the case of failed individual written exams, a maximum of two failing marks between 40% and 50% for FHEQ Level 7 courses or 30% and 40% for FHEQ Level 6 course may be compensated by other exam results, providing the overall exam average achieves the 50% Pass level.
- In the case of failed exams which cannot be compensated, exams will have to be resat. Cases involving a single failure may, upon occasion, be dealt with by a viva, upon recommendation of the QFFF Board of Examiners. In the absence of Mitigating Circumstances, College regulations limit the mark received in any such resit or viva to a bare (40% Level 6, 50% Level 7) Pass.
- The Dissertation must be passed with a mark of at least 50%.

**Examiners Meeting:** Preliminary decisions on performance in the written exams are made in an examiners meeting held in early summer. In the absence of Mitigating Circumstances, students will be granted the possibility to do resit attempts by the QFFF Board of Examiners at a specified time, usually the first opportunity after the failed attempt. For the Undergraduate modules (i.e. Quantum Field Theory, Unification and the listed Group B courses) resit examinations are typically in August/September. For MSc modules (Particle Symmetries, Quantum Electrodynamics, Group A) resits will be the following academic year.

Formal decisions on Passes and Failures are made at the QFFF course final Examiners' Meeting, which is generally held in mid-November following the assessment of the MSc Dissertations. Marks may undergo a scaling procedure in accordance with the Regulations for Taught Programmes of Study at the discretion of the Board of Examiners.

**Scaling:** The programme consists of modules run purely by the QFFF programme (Quantum Electrodynamics, Particle Symmetries, all "Group A" Level 7 Modules, and the Research Project) and modules run by the undergraduate Physics programme (all other modules). In order to ensure comparability across modules and appropriate mapping to Imperial's degree classification system, modules may undergo a scaling procedure in accordance with the Regulations for Taught Programmes of Study. This process would be applied consistently to all students in the cohort and reported to External Examiners and the Board of Examiners.

## Exit Awards

If the conditions for the Award of the MSc Degree at pass level are not met after resits, then the student may be eligible for one of two exit awards.

### **Award of a Postgraduate Diploma (PGDip)**

To qualify for the award of a Postgraduate Diploma, a student must have a minimum of 60 credits at Level 6 or above (this must include a minimum of 45 credits at Level 7).

### **Award of a Postgraduate Certificate (PGCert)**

To qualify for the award of a Postgraduate Certificate, a student must have a minimum of 30 credits at Level 6 or above (this must include a minimum of 20 credits at Level 7).

Imperial has policies and procedures to support the setting, sitting, marking and moderation of all assessment. These can be found within the Academic Regulations, Policies and Procedures at:

 [www.imperial.ac.uk/about/governance/academic-governance/regulations/](http://www.imperial.ac.uk/about/governance/academic-governance/regulations/)


 [www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/)

## Instruction to Candidates for Examinations

When taking examinations, students must ensure they follow the relevant instructions and guidance provided to them. In addition to the Instructions for Candidates, they must adhere to the specific instructions for each exam as provided by their programme team.

 [www.imperial.ac.uk/about/governance/academic-governance/regulations/](http://www.imperial.ac.uk/about/governance/academic-governance/regulations/)


Instructions for exam candidates can be found here:

 [www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/exam-arrangements-and-re-sits/Instructions-to-candidates-for-examinations.pdf](http://www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/exam-arrangements-and-re-sits/Instructions-to-candidates-for-examinations.pdf)

## Academic Integrity and Academic Misconduct

As your programme of study continues, you will be taught the concept of academic integrity and how you can ensure that any work that you complete now, or in the future, conforms to these principles. This means that your work acknowledges the ideas and results of others, that it is conducted in an ethical way, and that it is free from plagiarism. Academic integrity is fundamental to learning, teaching and research and it is important to understand what it means for you and the international community of research that you are joining.

Academic misconduct is the attempt to gain an academic advantage, whether intentionally or unintentionally, in any piece of assessment submitted to the university. This includes plagiarism, self-plagiarism, collusion, exam offences or dishonest practice. Full details of the policy can be found at:

 [www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/)

Definitions of the main forms of academic misconduct can be found below:

## Plagiarism

Plagiarism is the presentation of another person's thoughts, words, images, research 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 may be intentional, by deliberately trying to use


another person's work by disguising it or not citing the source, or unintentional where citation and/or referencing is incorrect.

Plagiarism must be avoided, with particular care on coursework, essays, reports and projects written in your own time but also in open and closed book written examinations. You can support your understanding of proper referencing and citation by using the resources available from the university such as the Library Services learning support webpages at:

 [www.imperial.ac.uk/admin-services/library/learning-support/plagiarism-awareness/](http://www.imperial.ac.uk/admin-services/library/learning-support/plagiarism-awareness/)

For group work, all members have responsibility for the integrity of the work submitted. Therefore, if plagiarism (or another form of academic misconduct) is proven, all group members may be liable for any penalty imposed.

Imperial requires you to complete mandatory training on plagiarism awareness. You can access this training online via the Early Career Researcher Institute's website:

 [www.imperial.ac.uk/students/academic-support/graduate-school/professional-development/masters-students/plagiarism-online/](http://www.imperial.ac.uk/students/academic-support/graduate-school/professional-development/masters-students/plagiarism-online/)

TurnitinUK is an online text matching service which assists staff in detecting possible plagiarism. The system enables institutions and staff to compare students' work with a vast database of electronic sources. Your programme team will explain how it is used in your programme.

 [www.imperial.ac.uk/admin-services/ict/self-service/digital-education-services/digital-education-platforms/turnitin/turnitin-for-students/](http://www.imperial.ac.uk/admin-services/ict/self-service/digital-education-services/digital-education-platforms/turnitin/turnitin-for-students/)

## Collusion

This is the term used for work that has been conducted by more than one individual, where this has not been permitted in the assessment brief. Where it is alleged that there has been collusion, all parties will be investigated initially under the Academic Misconduct procedure. Please be aware that this includes working with others in or outside the Imperial community, not just students on your programme.

You should note that whilst Imperial encourages students to support each other in their studies you should be careful to ensure that you do not go beyond the assessment brief with regards to individual work, always acknowledge the contributions of others in your work, and do not leave yourself open to allegations that you have supplied answers to enable another student to commit academic misconduct.

## Exam offences

Exam offences fall into two categories. These are offences that may be disruptive in the exam venue or those that are considered an attempt to gain an academic advantage. Examples of disruptive behaviour includes causing a disturbance in the exam room, having an electronic device that has not been fully turned off or talking in the exam room. Behaviour that may be considered an attempt to gain an academic advantage includes bringing unauthorised material into an exam (such as notes, unauthorised books or other material), attempting to communicate with others apart from the invigilator, or trying to remove examination material without permission. You must ensure that you follow all reasonable instructions of the invigilators.

## Dishonest practice

This is the most serious category under the procedure. Examples of dishonest practice include bribery, contract cheating, purchasing essays or other materials from other sources (which is now illegal in the UK) or other individual to submit as your own, taking an exam for someone else or getting someone else to take an exam for you, attempting to access exam papers before the exam, making a false claim for mitigating circumstances or providing fraudulent evidence, falsifying documentation or signatures in relation to assessment or a claim for mitigating circumstances.

## 4. Board of Examiners

### Board of Examiners

The Board of Examiners is composed of members of the Theoretical Physics Group (Universe Community - Theory).



Dr. Shai Chester



Prof. Carlo Contaldi



Prof. Claudia de Rham



Prof. Fay Dowker



Prof. Carlo Contaldi



Dr. Tim Evans



Prof. Jerome Gauntlett



Prof. Jonathan Halliwell



Prof. Amihay Hanany



Prof. Chris Hull FRS



Prof. Joao Magueijo



Prof. Kellogg Stelle



Prof. Andrew J. Tolley



Prof. Arkady Tseytlin



Prof. Daniel Waldram



Prof. Toby Wiseman

## External Examiners


 Neil Lambert, KCL

 Aristomenis Donos, Durham

An External Examiner is normally an experienced member of academic staff from another Higher Education Institution, that acts as a critical friend to the staff delivering your programme of study. For some programmes, one of the External Examiners could be an industry expert to provide the professional expertise needed to support the programme. External examining is an essential part of Imperial's quality assurance and enhancement process, ensuring that academic standards are maintained. The knowledgeable and independent views of external examiners are invaluable in certifying that the university's awards are appropriate, of comparable standard to the rest of the sector, as well as highlighting good practice and/or potential areas of enhancement.

During your programme you may be invited to meet your external examiners to discuss how you have found the programme. It is not appropriate however, for you to seek to submit complaints or representations directly to external examiners or to seek to influence them other than by giving feedback in a meeting. Inappropriate communication towards an examiner would make you liable for disciplinary action. If there is a specific issue that needs to be resolved, please see the Student Complaints Policy and Procedure.

A university summary of External Examiners reports from the previous academic year can be found here:

 [www.imperial.ac.uk/about/governance/academic-governance/academic-policy/external-examining/](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/external-examining/)


Please note that you will need to be logged in to your Imperial account to access the summary reports.

The individual External Examiner reports for your programme/department are available from your department.

## 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 Kensington Campus  
London SW7 2AZ

### Facilities

Our basic lecture room is Huxley 503. When not in use for lectures this will be booked for private study (MSc students are not allocated desks or offices, in keeping with College policy). Contact the theory group administrator Graziela de Nadai (Huxley 517) for more information on the use of facilities in Huxley.



Computer access and printing is available at Blackett level 3 computer lab and the Central Library on level 2. The Department's postgraduate office is located at Blackett 315 and open Monday to Friday 9:00 – 17:00.

If you notice any facility defects or maintenance issues, please contact the Customer Services Centre (CSC):

 [www.imperial.ac.uk/estates-facilities/customer-services-centre/](http://www.imperial.ac.uk/estates-facilities/customer-services-centre/)

### **Library Services**

The Abdus Salam Library at South Kensington is open 24 hours for study space, and further space is available to all students in GoStudy on levels 4 and 5 of the Chemistry Building. Further study space is available on level 3 of the Sheffield Building.

Make sure you find out who your subject librarian is as they'll be able to help you find books and online resources for your assignments. Also, don't forget to check out the library workshops and other campus libraries for access to specialist medicine and life sciences resources. You can borrow up to 40 books and, whether you're working on or off site, you'll be able to access e-books, e-journals and databases from their collection of almost 567,000 titles. If they don't have what you need, they can get it for you, simply ask them to buy it or request a copy through their free Document Delivery service.

For any questions library staff will be happy to help, simply chat with them online or contact them via email, phone or social media, just check the website for details:

 [www.imperial.ac.uk/library](http://www.imperial.ac.uk/library)

### **Maps**

Campus maps and travel directions are available at:

 [www.imperial.ac.uk/visit/campuses](http://www.imperial.ac.uk/visit/campuses)

### **Accessibility**

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

 [www.accessable.co.uk/organisations/imperial-college-london](http://www.accessable.co.uk/organisations/imperial-college-london)

### **Smoke-Free Policy**

All Imperial campuses and properties are smoke-free. This means that smoking and the use of e-cigarettes, including vapes, by staff, students or visitors is not permitted on or within 20 metres of Imperial. The policy covers all university properties, including student accommodation and sports grounds.

 [www.imperial.ac.uk/smoke-free](http://www.imperial.ac.uk/smoke-free)

## SafeZone

SafeZone is an Imperial app through which you can quickly and directly contact the Community Safety and Security team whenever you need them. Whether you're in an emergency situation, in need of First Aid or want to report an incident on campus, SafeZone allows you to be immediately put in touch with a member of our Community Safety and Security team and, at the touch of a button, can share your location and personal profile so that they can respond quickly and effectively to your specific needs. It also allows the entire Imperial community to stay informed in the event of a major incident in London or wherever you may be in the world. Safezone also provides information on other services, such as real-time updates on the university shuttle bus.



SafeZone is optional to register for and is now available to download on the Apple and Android App stores. Visit [www.imperial.ac.uk/admin-services/security/safezone/](http://www.imperial.ac.uk/admin-services/security/safezone/) for more details about SafeZone.


All existing phone numbers for the Community Safety and Security team are still operational. In the event of an emergency, you can still call 4444 from any internal College phone. In the event of a wider incident in London, you can now also call 0300 131 4444, Imperial's Emergency Recorded Message Line, which will point you in the direction of up-to-date information and advice.

## 6. Working while studying


If you are studying full time, Imperial 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 university working hours.

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

If you are here on a Student Route 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.

 [www.imperial.ac.uk/students/international-students/visas-and-immigration/working-in-the-uk/work-rules-during-your-studies/](http://www.imperial.ac.uk/students/international-students/visas-and-immigration/working-in-the-uk/work-rules-during-your-studies/)

If you are enrolled on a one-year full-time postgraduate programme, you are permitted to work full-time during the university Christmas and Easter closure period, as well as after the official course end date. Please note that one-year full-time postgraduate students are not considered on vacation during the summer months. You can only work full-time during the summer if you are undertaking an assessed work placements that is a formal part of your programme.

 [www.imperial.ac.uk/students/international-students/visas-and-immigration/working-in-the-uk/work-rules-during-your-studies/](http://www.imperial.ac.uk/students/international-students/visas-and-immigration/working-in-the-uk/work-rules-during-your-studies/)

If you are considering part-time work during term time you are strongly advised to discuss this with your supervisor or Personal/Senior Personal Postgraduate Tutor (see Wellbeing, Support and Advice section for more information). If you are on a Student Route visa you should also seek advice from the International Student Support team regarding visa limitations on employment.

The university's Board of Examiners will not normally consider as mitigating circumstances any negative impact that part-time work during term-time may have had on your performance in examinations or in other assessed work. Examinations or vivas cannot be rescheduled to accommodate your part-time working arrangements.

## 7. Health and Safety

Keeping you safe is a top priority for us. Imperial still encourages students to wear face coverings in crowded areas, to get fully vaccinated, to cover your coughs and sneezes, and to respect others' personal space. All staff and students are advised to stay at home if you are feeling ill or have any symptoms of respiratory disease.

The latest Imperial guidance to students can be seen at:

 [www.imperial.ac.uk/about/covid-19/](http://www.imperial.ac.uk/about/covid-19/)





The Imperial Health and Safety Policy can be found at:

 [www.imperial.ac.uk/safety/safety-by-topic/safety-management/health-and-safety-policy-statement/](http://www.imperial.ac.uk/safety/safety-by-topic/safety-management/health-and-safety-policy-statement/)

### Theoretical Physics Group Safety Coordinator is:

 Graziela de Nadai  
 Room 517, Huxley Building  
 47843  
 [g.denadai@imperial.ac.uk](mailto:g.denadai@imperial.ac.uk)

### Your Departmental safety contact is:

 Stefan Hoyle  
 Room 518, Sir Alexander Fleming Building  
 7872 850018  
 [fonssafety@imperial.ac.uk](mailto:fonssafety@imperial.ac.uk)

You may be required to complete inductions and attend training sessions to safely complete this course. These include:

- Introduction to Safety
- Fire and Safety Awareness
- Month One Safety Training

There is also a wide range of [eLearning micro-learning modules](#) focused on specialised topics and designed to raise awareness of hazards and control measures for working safely in hazardous areas (i.e., laboratories and workshops) across the university.

## Imperial Safety Department

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 university's activities range from the use of hazardous materials ([biological agents](#), [chemicals](#), [cryogenics](#), [gases](#) and [ionising/non-ionising radiation](#)) to field work, heavy or awkward lifting and driving.

All of Imperial's 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 university 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/safety-by-topic/accidents--incidents/](http://www.imperial.ac.uk/safety/safety-by-topic/accidents--incidents/)

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.

## Occupational Health requirements

Imperial's 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 university is respected, protected and improved whilst at work.

 [www.imperial.ac.uk/occupational-health](http://www.imperial.ac.uk/occupational-health)

## 8. University Policies and Procedures

### Academic Regulations


All registered students of Imperial are subject to the university Academic Regulations. The relevant set of regulations will depend on your programme and year of entry, please see our Regulations webpage to determine which apply to you:

 [www.imperial.ac.uk/about/governance/academic-governance/regulations](http://www.imperial.ac.uk/about/governance/academic-governance/regulations)

 [www.imperial.ac.uk/students/terms-and-conditions](http://www.imperial.ac.uk/students/terms-and-conditions)

## Academic Feedback Policy

We are committed in providing you with timely and appropriate feedback on your academic progress and achievement, enabling you to reflect on your academic progress. During your study you will receive different methods of feedback according to assessment type, discipline, level of study and your individual need. Further guidance on the Policy of Academic Feedback can be found on the Academic Governance website:

 [www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/academic-feedback/Academic-feedback-policy-for-taught-programmes.pdf](http://www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/academic-feedback/Academic-feedback-policy-for-taught-programmes.pdf)


Your research Dissertation will be informally formatively assessed throughout the summer term through feedback from your Dissertation Advisor to ensure the Dissertation is progressing as expected.

Please note that your examination scripts once completed belong to the university under the General Data Protection Regulations (GDPR). Please see the Imperial GDPR webpages for further information at:

 [www.imperial.ac.uk/admin-services/secretariat/policies-and-guidance/guidance/guide-2---exam-records/](http://www.imperial.ac.uk/admin-services/secretariat/policies-and-guidance/guidance/guide-2---exam-records/)


## Provisional Marks Guidance

Provisional marks are agreed marks that have yet to be ratified by the Board of Examiners. These results are provisional and are subject to change by the Board of Examiners. The release of provisional marks is permitted except in certain circumstances. Further information can be found in the Guidelines for Issuing Provisional Marks to Students on Taught Programmes:

 [www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/mark-and-moderation/Guidelines-for-issuing-provisional-marks-to-students-on-taught-programmes.pdf](http://www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/mark-and-moderation/Guidelines-for-issuing-provisional-marks-to-students-on-taught-programmes.pdf)

## Late Submission Policy

You are responsible for ensuring that you submit your assessments (including timed remote assessments) in the correct format and by the published deadline (date and time). Any piece of assessed work which is submitted beyond the published deadline (date and time) would be classed as a late submission and will incur a penalty (a cap at the pass mark, or it is classed as a fail). Further guidance on Late Submission of Assessments can be found on the Academic Governance website:

 [www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/mark-and-moderation/Late-submission-Policy.pdf](http://www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/mark-and-moderation/Late-submission-Policy.pdf)

If you submit late due to mitigating circumstances, the cap on your mark may be lifted if a claim for mitigating circumstances is accepted. Please see below.

## Mitigating Circumstances

During your studies you may be affected by sudden or unforeseen circumstances. You should always contact your Personal Tutor for advice and support. If this happens at the time of, or immediately preceding, your assessments you may be able to make a claim for mitigating circumstances. If successful this claim enables the Board of Examiners when reviewing your marks at the end of the year to have greater discretion with regards to offering repeat attempts (either capped or uncapped), a repeat year, or with your progression or final classification. Please note, the Board are not permitted to amend the marks that you were awarded, only to take your claim into account when making decisions.

All claims must be supported by independent evidence and submitted within 10 working days of the assessment deadline. Any claim made after this deadline is likely to be rejected unless there is a good reason (such as you were still unwell) until the point of submitting the claim. Details of the university's Mitigating Circumstances procedure can be found under the Mitigating Circumstances tab on the page below:



[www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/)

Through the procedure you may also be able to request an extension deadline to some forms of assessment. Wherever possible it is expected that this is used as it will enable you to complete your studies within the same academic year (rather than over the summer holiday or in the next year).

Your department will have specific instructions for making a claim for mitigation or for requesting an extension. Details can be found at <https://www.imperial.ac.uk/physics/students/current-students/taught-postgraduates/>

Support for ongoing or long-term conditions, or for registered disabilities would not normally fall under the remit of mitigating circumstances and students should be supported through their studies with additional examination arrangements. More details can be found at:



[www.imperial.ac.uk/disability-advisory-service/current-students/support-available/adjustments-and-support/](http://www.imperial.ac.uk/disability-advisory-service/current-students/support-available/adjustments-and-support/)

## Academic Misconduct Policy and Procedures


As has been highlighted under the Academic Integrity section, it is important that you learn how to properly attribute and acknowledge the work, data and ideas of others. Any proven form of academic misconduct is subject to penalties as outlined in the university's Misconduct Policy and Procedures.



[www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/)

## Unsatisfactory Engagement

Unfortunately, for a variety of reasons, sometimes students struggle to meet the university's expectations with regards to their engagement with their studies. Imperial has a process to identify and support students by reaffirming these expectations with an action plan. If a student does not engage satisfactorily with these supportive measures, they can be withdrawn from their studies. The full details of this process, and the appeals procedure relating to it can be found at:

 [www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline)

## Fitness to Study

Imperial expects students to participate within the university community, such as by fully engaging and studying to the academic level required and working and living cooperatively. If there are concerns that a student is unable to engage as expected, due to an underlying physical and/or mental health difficulty, the university has a process to ensure that decisions about a students' ability to study are made through a supportive, timely and transparent process which operates in the best interests of the student:

 [www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline)

## Mutual Expectations


The mutual expectations document provides a suggested starter list of expectations that master's students and their project supervisors might expect from each other. It is designed to facilitate conversations to establish effective partnerships and it is recommended that the document is discussed at the first meeting between a main project supervisor and a new student. It should be noted that this is not exhaustive, and that departments may have variations in roles and responsibilities; supervisors should be aware of any such variations and will feed this into their discussions with students. Further, it is recognised that supervisors may not always be best placed to meet all the expectations laid out in the document, but should be aware of who, in their department, can. Students and project supervisors are encouraged to discuss, tailor and personalise the document further to suit. It is also recommended that students and their project supervisors re-visit the document throughout the duration of the project.

The Mutual Expectations document is available here:

 [www.bb.imperial.ac.uk/bbcswebdav/xid-12494962\\_1](http://www.bb.imperial.ac.uk/bbcswebdav/xid-12494962_1)

## Academic Appeals Procedure

We have rigorous processes and procedures in place to ensure assessments are conducted with fairness and consistency, claims for mitigating circumstances have been considered reasonably and in line with the regulations of the university, and that the decisions of the Boards of Examiners maintain the integrity of our academic awards. Should you believe that you have grounds to appeal these decisions, we have laid out clear and consistent procedures through which appeals can be investigated and considered:

 [www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline)

The [ICU Advice service](#) can help you with understanding this policy and supporting you through the process.

## Arithmetic Marks Check

If you consider that there may have been an error in the adding up of your marks, you may request an arithmetic mark check. Please note that this must be requested within 10 working days of the official notification of your results from the Assessment Records team in Registry. You may not request marks check for a previous year of study. Please note that a marks check is not a remark of your work, but an administrative check that the marks have been accurately recorded.

## Student Complaints

Imperial strives to ensure that all students are well supported in their studies and receive a good experience of their programme and the wider university activities. If you feel that your experience has not lived up to these expectations Imperial has an agreed Student Complaints process through which your concern can be investigated and considered.

If you have any concerns about your experience at Imperial and have been unable to address these informally, you should contact Student Complaints who can provide advice about what is the appropriate way to seek to resolve this at:



[student.complaints@imperial.ac.uk](mailto:student.complaints@imperial.ac.uk)



[www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline)

## Student Disciplinary Procedure

Imperial has the right to investigate any allegation of misconduct against a student and may take disciplinary action where it decides, on the balance of probabilities, that a breach of the Student Code of Conduct has been committed. The general principles of the Student Disciplinary Procedure are available on the university website:



[www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline/](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/complaints-appeals-and-discipline/)

## Intellectual Property Rights Policy

Imperial's [Intellectual Property \(IP\) policy](#) governs the ownership and management of universities Intellectual Property and its College's discretionary Reward to Inventors Scheme.

Further guidance on the Imperial Intellectual Property Rights Policy is available on the university website:



[www.imperial.ac.uk/research-and-innovation/about-imperial-research/research-integrity/ip/](http://www.imperial.ac.uk/research-and-innovation/about-imperial-research/research-integrity/ip/)

Further information about the Imperial Enterprise Lab can be found at:



[www.imperial.ac.uk/students/enterprising-students/](http://www.imperial.ac.uk/students/enterprising-students/)

## Use of IT Facilities

View the Conditions of Use of IT Facilities:





[www.imperial.ac.uk/admin-services/ict/self-service/computers-printing/conditions-of-use-of-it-resources/](http://www.imperial.ac.uk/admin-services/ict/self-service/computers-printing/conditions-of-use-of-it-resources/)

## **General Data Protection Regulation (GDPR)**

All staff and students who work with personal data are responsible for complying with GDPR. Imperial will provide support and guidance, but you do have a personal responsibility to comply.

In line with the above please see the university's Privacy Notice for Students which form part of the Terms and Conditions of registration with Imperial.



[www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/admissions/Privacy-Notice-for-Students-and-Prospective-Students.pdf](http://www.imperial.ac.uk/media/imperial-college/administration-and-support-services/registry/academic-governance/public/academic-policy/admissions/Privacy-Notice-for-Students-and-Prospective-Students.pdf)

## 9. Wellbeing, support and advice

### In your department

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 at Imperial.

#### Your Personal Tutor

Every QFFF MSc student is assigned a member of the academic staff as Personal Tutor at the beginning of the course. Your Personal Tutor is your first point of contact for pastoral support and advice. He or she will be able to advise students on selection of courses, career matters, writing recommendation letters, and also any matters of a non-academic nature. You can arrange to have a meeting with them at any time during your studies (although most Personal Tutors will have set office hours or may require you to make an appointment). If necessary, they will direct you to an appropriate source of support.

The Postgraduate tutor in the Physics Department is

Dr Robert Forsyth (Email: [ph.pgt-tutor@imperial.ac.uk](mailto:ph.pgt-tutor@imperial.ac.uk)) who is available to discuss any matter, personal and academic, in confidence.

#### Departmental Disability Officers

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

Your Departmental Disability Officer is: **Mery Fajardo**

Email: [m.fajardo@imperial.ac.uk](mailto:m.fajardo@imperial.ac.uk)

More information on Departmental Disability Officers is available at:



[www.imperial.ac.uk/disability-advisory-service/current-students/support-available/departmental-disability-officers/](http://www.imperial.ac.uk/disability-advisory-service/current-students/support-available/departmental-disability-officers/)


More information about how to request additional arrangements for exams if you have a disability is available at:



[www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/additional-exam-arrangements-in-respect-of-disability](http://www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/additional-exam-arrangements-in-respect-of-disability)

### Postgraduate coaching


As well as professional development opportunities, the Early Career Researcher Institute has a dedicated coaching programme designed to help you through challenging times. The **Postgraduate student coaching programme** has been established to provide an opportunity to talk, independently from your academic department, about challenges you may be experiencing during the course of your studies. The programme primarily focuses on building effective working relationships and there may be other self-development issues that you can explore with a trained coach.

 [www.imperial.ac.uk/students/academic-support/graduate-school/wellbeing-and-support/coaching/](http://www.imperial.ac.uk/students/academic-support/graduate-school/wellbeing-and-support/coaching/)

## Attributes and Aspiration Short Course

Attributes and Aspirations (AA) is an online short course that supports you to develop career planning and transferable skills. AA is flexible, has no assessments and can be accessed whenever you need it allowing you to proactively plan for your future. You can also use AA to develop key skills such as critical thinking, problem solving and time management. These will help you be a better student and are essential for your future - whether you choose to move to further study or to a job in industry.

AA is designed specifically for Imperial master's students. The Postgraduate Education Team worked with the Careers Service to design AA so that it works for you. We researched and talked to organisations that hire master's students, PhD course coordinators and alumni to make sure the skills and techniques taught in AA are those that you really need for your professional future. For further information, please see the AA web pages.

 [www.imperial.ac.uk/students/attributes-and-aspirations](http://www.imperial.ac.uk/students/attributes-and-aspirations)

## Your Union

All Imperial students automatically become members of Imperial College Union when they register at the university. The Union provides a range of independent support.

### Imperial College Union Advice Service

The ICU Advice Service delivers free, confidential, and impartial advice covering academic issues, complaints and disciplinaries, College accommodation, and internal and external signposting. Contact [the ICU Advice Service](#) and complete the registration form to speak with a member of the team.

 [www.imperialcollegeunion.org/advice](http://www.imperialcollegeunion.org/advice)

### Student representatives

Imperial College Union operates two Representation Networks of over 600 elected student representatives – the Academic Representation Network and the Wellbeing Representation Network. Reps represent the voice of students and can direct you to internal and external support services. The Union's Liberation Officers also work to make sure that the views of under-represented and interest groups are heard at Imperial.

If you have any feedback about issues in your department relating to academic or wellbeing issues, you can speak to one of your student representatives.

 [www.imperialcollegeunion.org/your-union/your-representatives/a-to-z](http://www.imperialcollegeunion.org/your-union/your-representatives/a-to-z)

## Officer Trustees

The Union is led by a team of Officer Trustees who are elected every year by the students of Imperial. They take a year out of their studies and work full-time at the Union, representing the voices of students in the Union, the university and the wider community.

The Officer Trustees represent students in a variety of roles, including Education, Welfare, Finance & Service and Clubs & Societies. These elected students are here to represent your views as a student body do make sure you get in touch with them if there's something you would like to discuss or change.

## Student Hub

The Student Hub brings together information on many of Imperial's key administrative services in one easily accessible place. The staff in the Hub can provide general advice and information on a wide range of aspects of life at Imperial, including your student records and enrolment (letter of registration for proof of your student status, transcripts and awards), fees and finance, accommodation and international student queries. If your query needs specialist guidance, the Hub team will sign-post you to other university student support services as appropriate.

The Hub is on hand to answer your questions in person (at our desks in South Kensington and White City), by email, phone or online through the ASK Student Hub service.



[www.imperial.ac.uk/student-hub](http://www.imperial.ac.uk/student-hub)

## Student Support Zone

Student Support Zone has lots of information about the resources available at Imperial and beyond to help you to stay healthy and happy. It's a great place to start when you're looking for some support – it covers advice about housing and money, health, wellbeing and maintaining a good work-life balance, and provides the details of who you can contact if you need some extra support.



[www.imperial.ac.uk/student-support-zone](http://www.imperial.ac.uk/student-support-zone)

## Centre for Academic English

The goal of the Centre for Academic English is to ensure you develop both the ability and the confidence to excel as a communicator on your degree programme as well as in the workplace. From the very beginning of your degree and all the way through, we're here to help you realise your potential.

To achieve this, we've designed a flexible academic STEM communication programme enabling you to create your own personalised learning pathway. As you build your pathway, you'll have the freedom to select the resources you need wherever you need them. These resources are the result of close collaborations with departments and so will meet your communication needs for Imperial written and spoken course assignments.

To find out more about what is available for you, visit the Centre for Academic English website.

Centre for Academic English



Level 3, Sherfield Building, South Kensington Campus



[english@imperial.ac.uk](mailto:english@imperial.ac.uk)



[www.imperial.ac.uk/academic-english](http://www.imperial.ac.uk/academic-english)

## Useful support contacts

### Health and wellbeing

If you have moved home to take up your place at Imperial, you will need to register with a new doctor (also known as a General Practitioner or GP) so that you can access NHS healthcare. It's important that you register with a doctor soon after you arrive – don't wait until you are sick, as this could delay your access to treatment.

### Imperial College Health Centre



40 Prince's Gardens, South Kensington Campus



020 7584 6301



[imperialcollege.hc@nhs.net](mailto:imperialcollege.hc@nhs.net)



[www.imperialcollegehealthcentre.co.uk](http://www.imperialcollegehealthcentre.co.uk)

### Imperial College Dental Centre



Prince's Gardens, South Kensington Campus



020 7589 6623



[www.imperialcollegedental.co.uk](http://www.imperialcollegedental.co.uk)

### Student Counselling and Mental Health Advice Service



020 7594 9637



[counselling@imperial.ac.uk](mailto:counselling@imperial.ac.uk)



[www.imperial.ac.uk/counselling](http://www.imperial.ac.uk/counselling)

### Multi-Faith Chaplaincy Service



15 Prince's Gardens, South Kensington Campus



[chaplaincy@imperial.ac.uk](mailto:chaplaincy@imperial.ac.uk)



[www.imperial.ac.uk/chaplaincy](http://www.imperial.ac.uk/chaplaincy)

### Disability Advisory Service



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



020 7594 9755



[disabilities@imperial.ac.uk](mailto:disabilities@imperial.ac.uk)



[www.imperial.ac.uk/disability-advisory-service](http://www.imperial.ac.uk/disability-advisory-service)


### International Student Support




020 7594 8040

 [www.imperial.ac.uk/students/international-students/](http://www.imperial.ac.uk/students/international-students/)

### Careers Service

 Level 5, Sherfield Building, South Kensington Campus


 020 7594 8024

 [careers@imperial.ac.uk](mailto:careers@imperial.ac.uk)


 [www.imperial.ac.uk/careers](http://www.imperial.ac.uk/careers)

### Accommodation

Information and guidance around private housing and private halls for PG students is available from the Student Accommodation Office. Online you can find a Private Housing Masterclass that guides you through each step of your private housing search. The team also hosts private housing events, pop-ups and contract-checking services.

 Level 3, Sherfield Building, South Kensington Campus

 020 7594 3300


 [accommodation@imperial.ac.uk](mailto:accommodation@imperial.ac.uk)


 [www.imperial.ac.uk/students/accommodation/prospective/pg/](http://www.imperial.ac.uk/students/accommodation/prospective/pg/)

 [www.imperial.ac.uk/students/accommodation/private-accommodation/](http://www.imperial.ac.uk/students/accommodation/private-accommodation/)

### ICT and software

ICT Service Desk

 Abdus Salam Library, South Kensington Campus

 020 7594 9000

 [www.imperial.ac.uk/ict/service-desk](http://www.imperial.ac.uk/ict/service-desk)

Software shop

 [www.imperial.ac.uk/admin-services/ict/self-service/computers-printing/devices-and-software/](http://www.imperial.ac.uk/admin-services/ict/self-service/computers-printing/devices-and-software/)

## 10. Student Administration

The Student Administration team are responsible for the administration and maintenance of the student records for all students studying at Imperial. 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 and Transport for London, as well as other external bodies.

The team are 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. The 'My Documents' online portal allows you to access your documents, including proof of enrolment and award documentation. You can then digitally share these documents with third parties such as an employer or university.

Each document has a unique QR code with the official university watermark, making it easier for employers and others to verify your credentials. This online document sharing is a legitimate service, introduced and authorised by Imperial.

We would like to encourage you to use this online service in place of paper-based documentation. You can access the 'My Documents' portal here:



[www.imperial.ac.uk/student-records-and-data/for-current-students/request-an-official-document/](http://www.imperial.ac.uk/student-records-and-data/for-current-students/request-an-official-document/)

### Student Records



+44 (0)20 7594 7268



[student.records@imperial.ac.uk](mailto:student.records@imperial.ac.uk)

### Degree Certificates



+44 (0)20 7594 7267



[certificates@imperial.ac.uk](mailto:certificates@imperial.ac.uk)

## 11. Work-life balance

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

### Imperial College Union

The Union's range of 360+ 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](http://www.imperialcollegeunion.org/about-us)

 [www.imperialcollegeunion.org/activities/a-to-z](http://www.imperialcollegeunion.org/activities/a-to-z)

### Move Imperial

Imperial has a wide range of sports and activities on offer that cater for all experience levels and abilities. We have a recreational activity offer, competitive sports teams and an elite sport programme. We are dedicated to ensuring we have a diverse, inclusive and exciting offer for all.

More information about Imperial student memberships and updates to our services can be found at:

 [www.imperial.ac.uk/ethos/memberships/students/](http://www.imperial.ac.uk/ethos/memberships/students/)

For an annual fee you will get use of the gym and swimming facilities on our campuses. More information about Imperial student memberships and updates to our services can be found at:

 [www.imperial.ac.uk/sport](http://www.imperial.ac.uk/sport)

We have a huge collection of online resources, home workout videos, healthy recipes and playlists available to all as part of our Move More campaign, more information can be found at:

 [www.imperial.ac.uk/sport/get-active/move-more-programme/](http://www.imperial.ac.uk/sport/get-active/move-more-programme/)



## 12. Student feedback and representation

Imperial and Imperial College Union are 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.

The QFFF MSc class should choose a Student Representative during the autumn term, to serve as contact person between the class, the Course Director and the College. Constructive comments about the course from students are welcome at any time, either made directly to a lecturer, or passed through a Personal Advisor or through the Student Representative to the Course Director.

### 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 website.



[www.imperialcollegeunion.org/representation/a-to-z](http://www.imperialcollegeunion.org/representation/a-to-z)

### Staff-Student Committee

Staff-Student Committees are 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. Imperial good practice guidelines for staff-student committees are available here:



[www.imperial.ac.uk/about/governance/academic-governance/academic-policy/student-feedback](http://www.imperial.ac.uk/about/governance/academic-governance/academic-policy/student-feedback)

## 13. Student Surveys

The quality of the lecture courses is monitored through questionnaires at the end of each course, and also by lecturers occasionally sitting in on each other's lectures. Students are invited to fill out questionnaires specific to the QFFF course, as well as the College questionnaire which is run by Registry. Your feedback is important to your department, university and Imperial College Union. Whilst there are a variety of ways to give your feedback on your university experience, the following surveys give you regular opportunities to make your voice heard:

### **Module Evaluation Questionnaire (MEQ)**

The MEQ is your chance to tell us about the modules you have attended. The questionnaire is open to students across all years of study and runs at the end of the autumn, spring and summer terms.

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

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](http://www.imperial.ac.uk/students/academic-support/student-surveys/pg-student-surveys)

## 14. And finally

### Alumni services

When you graduate you will be part of a lifelong community of over 250,000 alumni, with access to a range of exclusive benefits including:

- discounts on further study at Imperial and at Imperial College Business School
- an alumni email address
- networking events
- Library membership and access to a bank of online resources, webinars and events via our alumni platform Imperial Plexus
- careers support for up to three years after you graduate as well as networking opportunities and professional development events
- access to our Alumni Visitor Centre at the South Kensington Campus, a co-working community space with free Wi-Fi, a bookable meeting room and complimentary refreshments

Visit the alumni website to find out more about your new community, how to access your benefits, and how to get in touch with fellow alumni around the world.



[www.imperial.ac.uk/alumni](http://www.imperial.ac.uk/alumni)