An introduction to Imperial College London
Our mission statement

Imperial College London embodies and delivers world class scholarship, education and research in science, engineering, medicine and business, with particular regard to their application in industry, commerce and healthcare.

We foster interdisciplinary working internally and collaborate widely externally. This is demonstrated through our multidisciplinary Masters courses and centres for doctoral training.
Our attributes

Specialisation in world class, innovative science

Academic excellence

London location

An enterprise culture

Inspiring people in a culturally diverse environment

Globally connected

Interaction between disciplines
Times Higher Education Supplement

World University Rankings 2012/13:

- 3rd in Europe
- 10th in world
- overall
- for engineering and technology
- for life sciences
- for clinical, pre-clinical and health
- for physical sciences

Times Good University Guide 2014

- 5th overall

The Complete University Guide 2014

- 4th overall
14 Nobel Prize Winners and one Field’s medallist

- Alexander Fleming: Penicillin
- Denis Gabor: Holography
- Rodney Porter: Structure of Antibodies
- Andrew Huxley: Nerve Impulses
- Abdus Salam: Theoretical Physics
- Simon Donaldson: Algebraic geometry
**History**

**1851–1890:** Building on the Great Exhibition, Prince Albert supported the idea of South Kensington becoming the London Centre for Science and Arts. Constituent Colleges formed.

**1907:** Imperial College founded by merger of:
- City and Guilds College
- Royal College of Science
- Royal School of Mines

**1987:** Management School formed (now Imperial College Business School)

**1988-2000:** Mergers with:
- St Mary’s Hospital Medical School
- National Heart & Lung Institute
- Charing Cross and Westminster Medical School and Royal Postgraduate Medical School

**2007:** Formation of Imperial College Healthcare NHS Trust and the Academic Health Science Centre.

**2007:** Imperial becomes independent of the University of London in its centenary year.
The resulting museums on the South Kensington Campus

The Science Museum
The Victoria and Albert Museum
The Natural History Museum
The Royal Albert Hall
Imperial estate today

8 campuses:
- Charing Cross,
- Chelsea & Westminster,
- Hammersmith,
- Northwick Park,
- Royal Brompton,
- Silwood,
- South Kensington,
- St Mary’s.

In addition, a seven-acre campus, Imperial West is being developed in White City.
Research strategy

- To undertake research of the highest international quality within an intellectually challenging and inspiring environment.
- To extend the frontiers of knowledge within and beyond existing research disciplines.
- To bring together research expertise within and beyond the College to address science challenges of today and the future.
Research collaborations

External collaborations and partnerships allow Imperial to develop the quality, reach and impact of its research.

**CERN – Geneva**
Imperial physicists among those working on experiments to collide subatomic particles using Compact Muon Solenoid particle detector

**Francis Crick Institute**
Imperial founder organisation of the Institute which will bring together scientists from all disciplines to examine why disease develops and find new treatments

**Qatar Carbonates and Carbon Storage Research Centre**
Collaboration between Imperial, Shell, Qatar Petroleum and Qatar Science and Technology Park – helps to enhance natural gas production
Interdisciplinary workings

Bringing together expertise from across Imperial to tackle some of world’s greatest problems. Examples include:

**Grantham Institute for Climate Change**
- £12 million donation by the Granthams – largest private funding given to climate change in the UK
- Research to develop mitigation techniques
- Influence international policy

**Institute for Security Science and Technology**
- Brings together scientists and engineers to develop novel ways of solving security problems

**Energy Futures Lab**
- Investigating solutions to provide a secure and sustainable future energy supply for society
- Builds on high-quality research across Imperial in areas including energy efficiency, nuclear power, renewable energy, transport, electrical networks, economics and policy development
Education

Courses

- 116 undergraduate courses
- 138 postgraduate taught courses
- 6:1 ratio of undergraduate applications to admissions

Student experience

- Staff, students and alumni feeding into the development of a new Education and Student Strategy
- Departments working on the delivery of plans to enhance the student experience
- Actions range from reducing coursework in favour of more practical classes to introducing buddying systems as well as ensuring quicker and clearer feedback routes
21st century learning

Imperial Horizons
• Designed to broaden undergraduates’ education and develop career-enhancing skills
• Opportunities to study a new language, explore the humanities, learn about business and investigate global challenges

MSc Strategic Marketing – iPad trial
• All students are given an iPad
• QR (Quick Response) codes used at the start of each lecture, allowing students to download the slides directly to their iPad
• Apps used to facilitate note-taking

Maths Learning Centre
• State-of-the-art learning centre
• 64 computers + study desks fitted out with audiovisual facilities for project presentations

“The MLC is fantastic – the new facilities enhance the student experience.”
– Jenny Evans, Mathematics and Physics Librarian
Translation strategy

• To engage with the world to understand, identify and lead emerging scientific challenges and solutions

• To maximise the social and economic value of our education and research through the transfer of knowledge, talent and technology

• To find innovative ways to extend the reach and impact of all our work

“We distinguish our approach to translation by being (i) open to external engagement, which stimulates the exchange of new ideas and a shared understanding of how we might address emerging challenges; (ii) multidisciplinary in mobilising people, knowledge and expertise across our internal and external boundaries; and (iii) innovative in widening the overall reach and impact of our work – both in the UK and internationally.”
Our people

Students
14,342 full-time (2011-12)
  • 9,080 – undergraduate
  • 2,501 – taught postgraduate
  • 2,761 – research postgraduate

Staff
3,397 academic and research staff
3,079 support staff

An international institution
Students from over 125 countries
Top non-UK country (students): China
30% of full-time students non-UK nationals
35% of staff non-UK nationals
Faculty of Natural Sciences

• Departments

Chemistry  Life Sciences  Mathematics  Physics  CEP

• Research Institutes

Grantham Institute for Climate Change  Institute of Chemical Biology  Institute for Shock Physics  Institute of Global Health Innovation  Institute of Systems and Synthetic Biology  Institute of Biomedical Engineering (IBE)  Energy Futures Lab

• 18 Research Centres – exemplars include the Centre for Plastic Electronics (CPE) and the Centre for Synthetic Biology and Innovation (CSynBI)
Masters Courses in Chemistry

MRes in Catalysis: Chemistry & Engineering

MRes in Green Chemistry

MRes in Nanomaterials

MRes in Drug Discovery & Development

MRes in Bioimaging Sciences

MRes in Chemical Biology of Health & Disease

MRes in Plant Chemical Biology

MSc in Theory and Simulation of Materials (Hosted by Physics)

MRes in Plastic Electronic Materials (Hosted by Physics)

http://www3.imperial.ac.uk/chemistry/postgraduate/mres
Masters Courses in Mathematics

- MSc in Applied Mathematics
- MSc in Pure Mathematics
- MSc in Mathematics & Finance
- MSc in Statistics
- MRes in Mathematical Sciences

http://www3.imperial.ac.uk/mathematics/admissions/postgraduatecourses
MSc Courses in Life Sciences

MSc in Applied Biosciences & Biotechnology

MSc in Bioinformatics & Theoretical Systems Biology

MSc in Conservation Science

MSc in Ecology, Evolution & Conservation

MSc in Ecological Applications

MSc in Quantitative Biology

MSc in Taxonomy & Biodiversity

http://www3.imperial.ac.uk/lifesciences/postgraduate/courselist
MRes Courses in Life Sciences

MRes in Biodiversity Informatics & Genomics

MRes in Biosystematics

MRes in Ecology, Evolution & Conservation Research

MRes in Molecular and Cellular Biosciences

MRes in Molecular Plant & Microbial Sciences

MRes in Plant Chemical Biology (Hosted by Chemistry)

MRes in Structural Molecular Biology

MRes in Systems and Synthetic Biology

http://www3.imperial.ac.uk/lifesciences/postgraduate/courselist
Centre for Environmental Policy

MSc in Environmental Technology

Specialist Options

- Business & Environment
- Ecological Management
- Energy Policy
- Environmental Analysis & Assessment
- Environmental Economics & Policy
- Global Environmental Change & Policy
- Pollution Management
- Water Management

http://www3.imperial.ac.uk/environmentalpolicy/teaching/msc
Masters Courses in Physics

- MSc in Optics & Photonics
- MSc in Physics and MSc in Physics with Extended Research
- MSc in Physics with Shock Physics
- MSc in Quantum Fields & Fundamental Forces
- MSc in Theory and Simulation of Materials
- MRes in Controlled Quantum Dynamics
- MRes in Photonics
- MRes in Plastic Electronic Materials

http://www3.imperial.ac.uk/physics/admissions/pg/msc
Student Statistics
• ~800 undergraduate, 120 Masters, and 270 PhD students
• 2009: 34% female intake
• 33% of undergraduates continue with further studies (mostly PhD)
• highly trained analytical minds for the financial sector
• 115 academic staff

Outreach to London’s global community
• fostering of science communication skills from undergraduates to faculty
• embedding of top-level science with the arts: Royal College of Music joint degree programme, Royal College of Arts projects, artist in residence
• cultural diversity and championing of women in science and engineering

http://www.imperial.ac.uk/physics
Academic Research in Blackett: 120 staff and 220 RAs

- **Astrophysics**: Steve Warren + 6 staff  
  Far Infrared/sub-mm, X-ray, Gravitational Lensing, Cosmology, Galactic, Solar, ….

- **Condensed Matter Theory**: Matthew Faulkes + 9 staff  
  Materials Modelling, Metamaterials, Complexity Science, Nanotechnology, Quantum Phases

- **Experimental Solid State Physics**: Lesley Cohen + 15 staff  
  Semiconductor Optoelectronics, Functional Magnetism, Nanotechnology, Molecular Materials and Devices, Quantum Optics, Photovoltaics, Spintronics, Plasmonics, Superconductivity, …

- **High Energy Physics**: Jordan Nash + 21 staff  
  Beyond the Standard Model, CMS/LHCb/D0/BaBar, Neutrino Factory, T2K, Dark Matter, Gravitational Waves, Grid Computing…

- **Photonics**: Paul French + 11 staff  
  Fibre and solid state lasers, Sculpted thin films, Data storage, Imaging, Adaptive optics, Nonlinear optics,

- **Plasma Physics**: Steve Rose + 7 staff  
  Laser-solid interactions, Particle acceleration, Magnetic Confinement Fusion, Wire array Z-pinch, Astrophysical Jets, Dusty Plasmas, Laser-Plasma theory, …

- **Quantum Optics and Laser Science**: Mungshik Kim + 11 staff  
  Attosecond science, Quantum coherence, Quantum Optics, Quantum Information, Atom chips, Trapping and Cold matter, EDM measurement, Non-linear …

- **Space and Atmospheric Physics**: Steve Schwartz + 13 staff  
  Heliospheric and Solar-Terrestrial Physics, Planetary Physics, Earth’s Atmosphere and Oceans, Earth Observation, Climate change, Instrumentation, …

- **Theoretical Physics**: Jerome Gauntlett + 14 staff  
  Quantum Field Theory, Quantum Gravity/Foundations of QM, String Theory & M-Theory, Cosmology,
Experimental Solid State Physics

**NanoPlasmonics**
Maier, Pendry and team

**Magnetic Monopole Defects**
Branford team: Nature Physics 2010;
Science 2012

**Low-voltage ZnO thin-film transistors**
Anthopoulos and team

**Organic Photovoltaics**
Kim, Nelson and Bradley: Macromol. 44 2011
MSc course outline:
• Multidisciplinary
• Six core courses: advanced math, equilibrium, kinetics, elasticity, electronic structure, multiscale simulation methods
• Choice of two options
• Major research project
• Entry criteria: GPA of 3.2+/4 or 4+/5 (MIT)

Career options:
• Materials underpin all modern technology e.g.:
  o Energy
  o Transport
  o Security
  o IT & communication
• Links (including funding) with Argonne National Lab, Baker Hughes, US Air Force, Johnson Matthey etc.

Highlights:
• Cohort-based
• Direct transfer to PhD
• Residential professional skills training (PhD):
  o Team-working
  o Career planning
  o Science communication (BBC)
• Outreach activities
• Master classes with senior figures
Quantum Fields and Fundamental Forces

MSc course outline:
- Compulsory courses cover the Standard Model, Quantum Field Theory and QED
- Options include string theory, supersymmetry and particle cosmology
- Guest lectures by leading physicists
- Entry criteria: GPA of 3.2+/4 or 4+/5 (MIT)

Career options:
- Programme aimed at preparing students for a PhD in theoretical physics
- Mathematical skills gained in great demand in other areas of physics, mathematics and business

Highlights:
- Theoretical physics group established by Nobel Laureate Abdus Salam
- Over 30 years of teaching theoretical physics
- Two week research seminar series

http://www3.imperial.ac.uk/theoreticalphysics
Imperial today