Key facts
In the 2014 Research Excellence Framework, over 80% of our research was rated as world-leading and internationally excellent.

Over £45m has been invested to provide state-of-the-art facilities, including modern workshops and laboratories, and highly specialised, cutting-edge equipment alongside dedicated computer rooms and social spaces.

Dean of Faculty: Professor Peter Atkinson
Associate Dean for Research: Professor Vincent Reid
Associate Dean for Postgraduate Studies: Dr Chris Edwards
PG research students: 481
PG taught students: 508
Fees and funding
Tuition fees are payable for study at Lancaster University and the fee charged will depend on the course that you wish to study.
To find out how much your tuition fee will be, please refer to our online course search www.lancaster.ac.uk/masters
To help with study and living costs, we offer students a range of scholarships and bursaries. The UK government also provides a postgraduate loan scheme for eligible students taking Masters courses.
For more information about the funding opportunities available, please visit www.lancaster.ac.uk/pgfunding

About the Faculty of Science and Technology
The Faculty of Science and Technology is home to a vibrant and active community of postgraduate students from around the world. Our researchers engage in projects that make a demonstrable difference to the economy and society. In 2016/2017, the Faculty attracted over £20m in research income from organisations including NATO, UK Government, DEFRA, and we offer a significant number of opportunities supported by UK research councils.
Underpinned by research, our Masters programmes are taught by experts at the cutting-edge of their field and our research students benefit from working alongside academic staff with specialist knowledge and expertise in core scientific disciplines. We place emphasis on an interdisciplinary approach to teaching. It is common for our postgraduate students to cross subject boundaries enhancing the multidisciplinary nature of their studies.
The significant investment in our buildings and facilities means that we provide a first class experience and a highly stimulating and innovative environment for both our students and staff.
Our Masters programmes remain relevant and up to date with industry by working in partnership with organisations, such as Unilever and BP, who actively contribute to the design and delivery of our modules. Our established Business Partnerships and Enterprise team work with small and medium businesses, voluntary organisations, social enterprises, public sector institutes such as the NHS and UK Government, and global companies like Microsoft, Shell and Toshiba. These organisations provide valuable opportunities to gain work experience whilst studying.

Graduate School
In the Faculty of Science and Technology we’re committed to helping you successfully complete your PhD. To help you achieve this, we’re keen to integrate you into a strong postgraduate community to help you share experiences and meet other postgraduate researchers from across the Faculty.
When you arrive at Lancaster to start your research, we’ll invite you to an induction session where we’ll introduce you to everything that the Graduate School has to offer, which includes the Graduate School Research Training Programmes, financial support and opportunities to engage in the wider research community.

“A degree from Lancaster is a special achievement. However, I believe that Lancaster is about more than just getting students through the course. They give you extra support and guidance to really develop yourself.”

Anna Wieclawska
PhD Psychology

For more information please visit www.lancaster.ac.uk/sci-tech
Chemistry

The Department boasts an expanding team of research-active staff at the forefront of research in their respective fields. It benefits from a significant investment from the University, and an extensive array of new laboratories, instrumentation and equipment to support our ambitious research activity.

We are a vibrant community, and our research transcends traditional discipline boundaries, for example linking with biology and medicine, engineering, energy, materials, environmental science, and physics. Our staff have diverse backgrounds and therefore have interests spanning many areas of both fundamental and technological interest. Perhaps most importantly, we share common ground in research-excellence, an inclusive and collaborative spirit, and a dedication to passing on our knowledge to a new generation of researchers.

Research degrees

+ Chemistry PhD
+ Natural Sciences PhD
+ Chemistry (by Research) MSc

Research areas

Research in the Department is broadly structured into a series of sub-disciplines or themes, including:

+ A wide range of synthetic chemistry
+ Chemical theory and computation
+ Analytical chemistry and spectroscopy
+ Chemical biology
+ Materials

Business engagement

Working in partnership

We liaise with all areas of the chemical industry, ranging from multinational oil, chemical and pharmaceutical companies, to a host of smaller enterprises producing new and specialised products. We have relationships with the Nuclear Research Institute, the Lloyd’s Register Educational Trust, DEFRA, the UK Centre for Ecology and Hydrology, and many other organisations.

We also have an award-winning global supplier of chemical regulatory services to industry, The REACH Centre, based in the business office space on campus in the Lancaster Environment Centre, which works with the Department.

£11.4m Collaborative Technology Access Programme (cTAP)

The new cTAP centre, based in the Department, supports both small and large advanced manufacturing companies to develop new products and services by providing direct access to our expertise, equipment and facilities for the testing and manufacture of new chemicals, materials, semiconductor devices and products.
### Chemistry

#### Research degrees

<table>
<thead>
<tr>
<th>Program</th>
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<th>Duration</th>
<th>Entry requirements</th>
<th>Assessment</th>
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<tbody>
<tr>
<td><strong>Chemistry PhD</strong></td>
<td>We welcome applications from those seeking to perform leading fundamental and technologically relevant research across the areas of analytical chemistry and spectroscopy; chemical biology; materials; chemical theory and chemical computation; and a broad range of synthetic chemistry. Our research-based PhDs are supported by taught courses, providing skills in modern research techniques, including analytical chemistry, experimental design, advanced laboratory techniques, spectroscopy, computational and materials chemistry, together with courses to develop transferable skills. This ensures that our postgraduate students extend their knowledge of all areas of chemistry, and possess a wide range of skills to aid employability.</td>
<td>36-48 months, full-time or 48-84 months, part-time</td>
<td>A 2:1 undergraduate or Masters degree in Chemistry, or an equivalent degree in a related discipline such as Physics or Chemical Engineering, appropriate to the proposed research project</td>
<td>Original research and thesis</td>
</tr>
<tr>
<td><strong>Natural Sciences PhD</strong></td>
<td>This PhD offers an academic training route for graduates seeking to perform leading fundamental and technologically relevant research that transcends the traditional discipline boundaries by linking one or more other disciplines with chemistry. Options include Biology and Medicine, Computation, Engineering, Physics and subjects offered by Lancaster Environment Centre. A substantial amount of research addresses research questions that fall between the boundaries of traditional disciplines. Real-world problems require a multi-disciplinary approach, and research expertise at the interfaces of these disciplines is essential to delivering impactful solutions. A Natural Sciences PhD will capture and give expression to such research training.</td>
<td>36-48 months, full-time or 48-84 months, part-time</td>
<td>A 2:1 undergraduate or Masters degree in Chemistry, or an equivalent degree in a related discipline such as Biochemistry, Biophysics, Physics, Computation or Chemical Engineering, appropriate to the proposed research project</td>
<td>Original research and thesis</td>
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### Chemistry (by Research) MSc

<table>
<thead>
<tr>
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<th>Assessment</th>
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<tbody>
<tr>
<td><strong>Overview</strong></td>
<td>Our Masters by research programme provides the opportunity to undertake a short, in depth independent research project in one of our research groups. It will equip you for more sustained and original work at the doctoral level or for advanced-level applied research positions. This degree will develop relevant analytical and technical skills, together with transferable skills related to research, communication, problem solving, and independent working. For information on possible projects, and for further details of our specific research interests, please see our Departmental website.</td>
<td>12 months, full-time or 24 months, part-time</td>
<td>A 2:1 undergraduate or Masters degree in Chemistry, or an equivalent degree in a related discipline such as Physics or Chemical Engineering, appropriate to the proposed research project</td>
<td>Original research and thesis</td>
</tr>
</tbody>
</table>
The School of Computing and Communications is ranked 7th in the UK for its world-leading and internationally excellent research (REF 2014). We offer postgraduate taught programmes with specialisations in computer science, communication systems, data science and cyber security. Our ethos is to combine our research excellence with practical, experimental approaches to equip you with the knowledge and skills to achieve your career aspirations.

You will benefit from high quality teaching delivered by globally recognised academics, state-of-the-art facilities including dedicated 24-hour teaching laboratories, individual supervision, and mentoring by academic staff.

Our partnerships with industry and commerce are exemplary. Our Knowledge Business Centre links to over 1000 IOT businesses, providing an invaluable resource for finding full-time or part-time employment, or starting your own company. You can benefit from organised placement and internship activities integrated directly into your studies, providing an invaluable resource for finding employment stepping stones.

Preparing for your future career is important. We provide all computing and communications students with the opportunity to apply for work experience through the Computing and Communications Internship Programme. Internships allow you to apply your academic knowledge in real-world situations - and get paid for it!

We have our own dedicated business engagement team. Located in InfoLab21, the team provides a bridge between business and academia, including support for student industrial experience and employability. The routes to industrial experience vary, with new opportunities being added throughout the year. The opportunities often include:

- Masters placements with businesses throughout the region and country
- Support for student entrepreneurship and business start-up
- Short-and long-term employment opportunities through business facing projects
- Getting involved with commercially driven research and innovation initiatives
- Summer internships

Real-world exposure to the commercial sector enhances the opportunities for employment and research, broadening the student experience and providing valuable employment stepping stones.
Computing and Communications

Research degrees

Communication Systems PhD

Overview
We welcome applications from well-qualified and motivated students for PhD study. You’ll work under individual supervision to become a leading expert in your area, while research training courses will support your learning and help you realise your maximum potential. Annual progress review panels keep your work on track and our seminar programmes and state-of-the-art facilities provide access to ideas and technologies that will stimulate your development as a research scientist.

Entry requirements
A 2:1 honours degree, or its equivalent, in an Engineering or associated discipline

Duration
36 months, full-time or 48-72 months, part-time

Director of Studies
Dr Gerald Kotonya

Original research and thesis
You will then progress to a period of independent research activity that forms the basis of the rest of your study.

Supervisor and subsequently develop a research production of a learning contract with a research proposal that forms the basis of the rest of your study.

Cyber Security MSc

Overview
The overall aim of this MSc is to equip you with the knowledge and skills necessary to work within the IT security profession. It takes advantage of Lancaster having recently been awarded the highly prestigious status of an EPSRC-GCHQ Academic Centre of Excellence in Cyber Security Research, and combines advanced technical skills with disciplines such as Economics, Risk Management, Psychology and Social Science. Its strength and uniqueness lies in its multidisciplinary nature, merging expertise from across Lancaster’s faculties to educate the next generation of security specialists.

You will then progress to a period of independent research project work and complete a project dissertation. Upon successful completion of the MSc, you will have clearly demonstrated your ability to meet the required high levels of technical professionalism.

Entry requirements
A 2:1 honours degree, or its equivalent, in Computing or a closely related discipline.

Assessment
Relevant industry experience may be considered Coursework and dissertation

Modules
- A Research or Industrial-Focused Dissertation
- Advanced Human-Computer Interaction
- Applied Data Mining
- Data Mining
- Elements of Distributed Systems
- Professional and Research Methodology
- Research or Industrial Placement
- Systems Architecture and Integration

Teaching programmes

Computer Science MSc

Overview
The Computer Science MSc has been designed to meet the needs of contemporary industrial and research practices. Modern computing is characterised by its massive scale, highly interconnected nature and socially oriented user interaction techniques. Under the guidance of our leading academics, you will learn about the design and development of computer systems, with technology and users in mind, and gain expertise in subjects such as Cloud Computing, Big Data and Data Mining, Enterprise Architectures and Interaction Design.

The degree also provides a placement that allows you to gain practical experience through interaction with innovative companies or within our internationally renowned research groups.

Entry requirements
A 2:1 honours degree, or its equivalent, in Computer Science or a closely related discipline.

Assessment
Relevant industry experience may be considered Coursework and dissertation

Modules
- A Research or Industrial-Focused Dissertation
- Cybercrime
- Information System Forensic Investigation
- Information System Penetration and Countermeasures
- Information System Risk Management
- Information System Security Management
- Introduction to Law for Cyber Security Specialists
- Network and System Security
- Security and Conflict in the Digital Age
**Data Science MSc**

**Overview**
This interdisciplinary MSc is aimed at students who wish to develop skills in the emerging discipline of Data Science. Building upon data science fundamentals, a variety of pathways through the MSc are available and allow students to choose from a range of elective modules according to their skills, interests and career aspirations. Students then undertake a 12-week summer placement either within industry (in a business setting), or as part of an academic research project to consolidate their learning.

Optional pathways span fundamentals and also application areas including:

- **Business Analytics**: how to gain business insight from large and complex industrial data
- **Data Mining**: how data mining can be performed at scale, and in a range of application areas (e.g., marketing and finance, social computing)
- **Health Informatics**: how to build models and gain insight to improve public health and aid clinical decision making
- **Systems and Technologies**: how to build large-scale systems for answering data science questions
- **Statistical Inference**: how to specify models and build a statistical framework to gain insights from data

**Modules**

**Core**
- Data Mining
- Data Science Fundamentals
- Generalised Linear Models
- Likelihood Inference
- Programming for Data Scientists

**Optional (elective) Modules**
- Applied Data Mining
- Clinical Trials
- Data Mining for Marketing, Sales and Finance
- Elements of Distributed Systems
- Environmental Epidemiology
- Extreme Value Theory
- Forecasting
- Longitudinal Data Analysis
- Methods for Missing Data
- Multi-level Modelling
- Optimisation and Heuristics
- Principles of Epidemiology
- Statistical Genetics and Genomics
- Survival Analysis
- Systems Architecture and Integration

**Director of Studies**
Dr Chris Edwards (Computing), Dr Deborah Costain (Statistical Inference)

**Duration**
12 months, full-time or 24 months, part-time

**Entry requirements**
A 2:1 honours degree, or its equivalent, in a subject relevant to Computer Science, Mathematics or Statistics

**Assessment**
Coursework and examination

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**E-Business and Innovation MSc/PgDip**

**Overview**
Taught by experts from both the Management School and the School of Computing and Communications, this programme is about understanding how companies innovate with digital technologies to create new business models, products, and services. You will learn how digital business innovation strategies are developed, managed and delivered to achieve business value. The programme also focuses on digital entrepreneurship. The knowledge and skills that you will gain from this programme will make you attractive to many forward-looking companies who are at the cutting-edge of business and technologies, including companies that are looking for innovative ways to digitise their product and service offerings, and companies that want to increase intimacy with their customers through innovative digital interactions. You will be equipped with strong entrepreneurial skills that are particularly applicable in the digital space. Graduates of this programme are located internationally, in large companies, in the small/mid-sized sectors, and in their own digital start-ups.

**Modules**
- Business Analysis and Enterprise Systems
- Business Planning and Finance
- Digital Innovation
- E-Business
- E-Marketing
- Information Management and Strategy
- Innovation
- Management in Context
- Managing Complexity
- Managing IT Architecture (IBM)
- Technology for E-Business
- Technology in Context

**Director of Studies**
Professor Juliana Sutanto (SCC contact Dr Phil Benachour)

**Duration**
MSc: 12 months, full-time / PgDip: 9 months, full-time

**Entry requirements**
At least a 2:1 honours degree, or its equivalent, from any discipline

**Assessment**
Coursework, exam, ten-week consultancy project and dissertation
The Engineering Department has a philosophy of excellence and an established record of innovative teaching, world-class research and close links with industry. Over recent years the University has invested heavily in the Department, including a flagship building to provide a world-class environment with specially designed teaching laboratories and office areas, and a rapidly growing selection of state-of-the-art equipment.

The Department is also home to world-class academics from a wide range of engineering disciplines. In the latest Research Excellence Framework (REF 2014), 91% of our research was rated as world-leading and of international excellence for impact. Staff, postdoctoral researchers and PhD students all recognise us for the vibrancy of our research environment.

We offer taught and research-based courses at Masters level, doctoral training and short courses for continuing professional development. Our multidisciplinary approach, strong industrial connections, and excellence in teaching and research, mean that the Department is one of the top in the country for employment success.

Research areas

The Chemical Engineering Group researches numerous important aspects of Chemical and Biochemical Engineering, from fundamental science to engineering applications, working on scales that go from molecular-sized systems to large industrial plants. This includes, but is not limited to, electrochemical energy storage and conversion, gas storage and separation and functional porous materials, photoelectrochemical and nanogravimetric sensors, the modelling of chemical kinetics in nuclear reprocessing activities and the modelling and optimisation of chemical kinetics for renewable and alternative fuels.

Energy

The Energy Research Group is focused on the technological, environmental, economic and social impacts of energy technologies and includes the Renewable Energy Group (LUREG). The group is engaged in a wide range of cutting-edge fundamental and applied research activities in sustainable energy utilisation, including renewable energy technologies. The group undertakes research in a number of core areas of both mainstream and renewable energy technologies, specifically in bioenergy utilisation, combustion and fuels, electricity system, hydro power and fluid machinery, wave and tidal energy, wind energy and other cleaner energy utilisation technologies.

Research degrees

- Engineering PhD
- Engineering (by Research) MSc

Taught programmes

- Electronic Engineering MSc
- Engineering Project Management MSc
- Mechanical Engineering MSc
- Mechanical Engineering with Project Management MSc
- Wireless Communication Systems MSc

For more information please visit www.lancaster.ac.uk/sci-tech

Business engagement

Gaining experience and skills

Preparing for your future career is important. Our staff have established relationships with a range of large and small organisations in the north-west and we link practical work and projects to these companies throughout the programmes. You can also develop transferable skills such as team working, time management, leadership, networking, and commercial awareness.

In addition, we provide all engineering students with the opportunity to apply for work experience through the Faculty internship programmes. Whether these will be right for you depends on the time available on your course, but they can be another opportunity for you to apply your academic knowledge in real-world situations - and get paid for it!

Many employers use students working on postgraduate projects to test out a new role and may offer them employment as a result. Previous internship roles have included a researcher for Amey and United Utilities, product development for a filter manufacturer, design development for a nuclear safeguarding manufacturer, and draftsman for a horticultural device manufacturer.

£11.4m Collaborative Technology Access Programme (oTAP)

The new oTAP centre supports both small and large advanced manufacturing companies to develop new products and services by providing direct access to our expertise, equipment and facilities for the testing and manufacture of new chemicals, materials, semiconductor devices and products.

Contact us

Head of Department
Professor Claudio Paoloni
Postgraduate Coordinator
Rachael Venn
Enquiries
+44 (0)1524 593795
fst-pg-admissions@lancaster.ac.uk
www.lancaster.ac.uk/engineering
**Engineering degrees**

### PhD

**Overview**
Applications for postgraduate study by research (full-time, part-time and industry-based) leading to a PhD are welcomed. Research in the Department is grouped into five main areas, each drawing on a range of different fields. The areas are:

- Chemical Engineering
- Engineering of Microwaves, Terahertz and Light (E-MIT)
- Energy
- Nuclear Science and Engineering
- Structures, Materials and Manufacturing

**Duration**
3-4 years, full-time or 4-7 years, part-time

**Entry requirements**
A 2:1 honours degree, or its equivalent, in an Engineering or associated discipline.

**Assessment**
Original research and thesis

### MSc

**Overview**
This programme is ideal for students with industrial experience who wish to work in a specific area, and prefer flexibility to the taught MSc programmes. Flexibility is the key to this programme. It begins with an induction where you are allocated a supervisor and often an industry contact; this sets the direction of your research and identifies training needs. The Graduate School’s research training programme offers a range of sessions to meet those needs. Regular supervision and access to seminar groups, together with interim research reports, ensures good progress towards a final dissertation.

**Duration**
12 months, full-time or 24 months, part-time

**Entry requirements**
A 2:1 honours degree, or equivalent, with strong evidence of excellence in research and writing

**Assessment**
Interim reports with a final dissertation based on the research

"With a state-of-the-art technological infrastructure our leading academics aim to tackle the big challenges which our world faces today. We collaborate with other universities and companies, both locally and on a global scale, to open new frontiers in cutting-edge research. Our excellent teaching is kept current by this pioneering research, allowing us to offer up-to-date programmes which are also relevant for industry."

**Professor Claudio Paolini**
Head of Department

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### MSc by Research

**Overview**
This programme will upskill engineers and scientists around key advances in electronic engineering: including applications of miniaturised electronics in biology, high frequency engineering, embedded systems, wireless communications, control and system-on-chip engineering. There is a strong theme around high reliability and manufacturing technology to prepare students for the demands on the electronics industry and for dependable and pervasive electronic systems across a range of emerging markets including health, energy and the environment. Practical work is core to all technical modules, with a group project and individual projects included in the programme.

Examples of previously successful projects include:

- Detection of living cells in a microfluidic system using electrochemical and RF technologies
- Self-repairable electronics through unification of self-test and calibration technology
- Solution-processed electronics over a large area: design and realisation of a fully computerised XY(Z) spray coater employing multiple pneumatic and/or ultrasonic airbrushes
- Higher-order mode couplers in semiconducting RF cavities
- Monolithic microwave integrated circuit (MMIC) design for wireless networks
- Vision and robotic control interface system

**Modules**

**Core**
- Broadband Communications
- Embedded Systems
- Linking Group Project
- Microengineering
- System-on-Chip Engineering

**Optional Modules**
- Intelligent Control or Digital Signal Processing
- Interfacing and Integration or Digital Communications
- RF Electronics or Renewable Energy

**Overview**

**Director of Studies**
Professor Andrew Richardson

**Duration**
12 months, full-time or 24 months, part-time

**Entry requirements**
A 2nd class honours degree, or its equivalent, in a related Engineering discipline which may include communications, electrical engineering, computer systems and physics. A HND together with appropriate practical experience may also be acceptable

**Assessment**
Combination of coursework and/or examination and a major project/dissertation
**Engineering**

**Taught programmes**

**Engineering Project Management MSc**

**Overview**
This programme is aimed at engineers wishing to advance their engineering and management skills and enable the move from a technical to a technical-managerial position.

The management side of the programme provides a thorough understanding of strategic thinking, project planning and control, while the technical component of the course is flexible and can be customised to meet particular engineering interests. Engineering modules can be chosen from other Engineering MSc and MEng programmes, subject to timetable restrictions.

The programme has a strong practical element, containing case studies, workshops, a company-linked group project and a substantial company-linked individual project.

**Modules**
- Core
  - Developing Project Management Professional Practice
  - Individual Project
  - Leadership and Change in Project Environments
  - Linking Group Project
  - Principles of Project Management
  - Problem Solving in Teams
- Plus any three other modules offered by the department.
- Options include
  - Electrochemical Engineering
  - Intelligent Control
  - Mechanics and Actuators
  - Nuclear Fuels Engineering
  - Renewable Energy
  - Smart Systems

**Entry requirements**
A 2nd class honours degree, or equivalent, in an Engineering or technical subject.

**Duration**
12 months, full-time or 24 months, part-time

**Assessment**
Coursework, examination, projects and dissertation

**Director of Studies**
Dr Andrew Pinkerton

**Mechanical Engineering MSc**

**Overview**
The Mechanical Engineering MSc programme comprises taught modules in advanced mechanical engineering subject areas. In addition to this is an individual applied engineering project which is supervised by an academic member of staff. This programme will appeal to you if you are progressing directly from undergraduate study in an engineering or related field; are an experienced professional wishing to update your skills; or are an engineering graduate/professional holding an accredited bachelor’s degree and wishing to fulfil the academic requirements for Chartered Engineer (CEng) registration. The programme is accredited by the Institution of Mechanical Engineers as meeting the further learning requirements for CEng.

**Modules**
- Core
  - Advanced CAD/CAM
  - Design and Modelling of Systems
  - Individual Project
  - Intelligent System Control
  - Linking Group Project
  - Mechanics and Actuators
  - Renewable Energy

**Entry requirements**
A 2nd class honours degree, or its equivalent, in Electronic/Electrical Engineering, Control, Computer Science/Computer Engineering, Physics or Mathematics. Relevant industry experience may be considered.

**Duration**
12 months, full-time or 24 months, part-time

**Assessment**
Coursework, exams and dissertation

**Director of Studies**
Professor Andrew Richardson

**Wireless Communication Systems MSc**

**Overview**
This course is designed to equip graduates with the specialist skills in modern wireless communication systems such as 3G, Wi-Fi, mobile WiMAX and LTE, space-time coding, software defined radio, and reconfigurable analogue and digital RF systems. It also provides knowledge in the use of wireless and DSP techniques in many application areas including Internet of Things, medical, geophysical, aerospace, automotive and environmental systems.

The degree provides a placement in either industry or research. Our dedicated Knowledge Business Centre maintains links to over 500 partner companies to ensure that students can apply their knowledge and skills in a real-world industry.

Graduates from this course are actively sought after by employers in mobile and wireless industries.

**Modules**
- Advanced Communications
- Digital Communication
- Digital Signal Processing
- Embedded Systems
- Individual project (research or industry focused)
- RF Electronics
- System-on-Chip Engineering
- Wireless Broadband

**Entry requirements**
A 2nd class honours degree or, at its equivalent, in Electronic/Electrical Engineering, Control, Computer Science/Computer Engineering, Physics or Mathematics. Relevant industry experience may be considered.

**Duration**
12 months, full-time or 24 months, part-time

**Assessment**
Coursework, examination, projects and dissertation

**Director of Studies**
Dr Andrew Pinkerton

**Mechanical Engineering with Project Management MSc**

**Overview**
This programme is aimed at engineers wishing to advance their engineering skills and acquire new management skills.

The taught modules cover a broad range of engineering design and evaluation skills and how they can be applied to mechanical products and systems. In addition, the course teaches the key concepts and issues associated with engineering project management and organisational behaviour together with the project management processes, tools and techniques required to handle them.

The programme is taught with a strong practical focus and includes case studies, workshops, a company-linked group project and a substantial company-linked individual project.

**Modules**
- Advanced CAD/CAM
- Applied Project Management
- Individual Project
- Intelligent System Control
- Linking Group Project
- Mechanics and Actuators
- Principles of Project Management
- Problem Solving in Project Teams
- Renewable Energy

**Entry requirements**
A second class honours degree level, or equivalent, in an Engineering or technical subject.

**Duration**
12 months, full-time or 24 months, part-time

**Assessment**
Relevant further learning and experience is preferable, but not essential

**Director of Studies**
Dr Elina Ioannou

“**This MSc has provided me with knowledge in project management and leadership, in addition to advanced mechanical engineering skills, which I am confident are a passport to successful entry to many jobs in the future.”**

**Elina Ioannou, MSc Mechanical Engineering with Project Management**
Graduate School for the Environment

Lancaster’s new Graduate School for the Environment harnesses the power of three of the world’s foremost research organisations to give students the best possible chance of enjoying productive, impactful and influential careers.

Students at the Graduate School benefit from the expert knowledge and experience of world-leading staff from Lancaster Environment Centre, Rothamsted Research and the Centre for Ecology and Hydrology. Together this amounts to a support framework of unparalleled breadth and depth.

As a student at the Graduate School, you are a valued member of a stimulating international community of researchers with a diverse range of backgrounds, interests and specialisms. What unites us all is the excellence of our teaching and a shared focus on the world’s environmental challenges.

At the Graduate School you will be encouraged to look outwards rather than inwards, focusing on real-world challenges and developing the research, practical skills and connections you need to address them.

Research areas

Research is organised into ten research groups:

- Atmosphere, Climate and Pollution
- Critical Geographies
- Earth Science
- Ecological Modelling
- Environmental and Biogeochemistry
- Geospatial Data Science
- Political Ecology
- Soil, Plant and Land Systems
- Water Science
- Plant and Crop Science

Taught programmes

- Biological Science PhD
- Environmental Science PhD
- Geology PhD
- Ecology (by Research) MSc
- Environmental Science (by Research) MSc
- Plant Sciences (by Research) MSc
- Conservation and Biodiversity MSc
- Environment and Development MA/MSc
- Environment and Law LLM
- Environmental Management MSc
- Human Rights and the Environment LLM
- Sustainable Water Management MSc
- Volcanology and Geological Hazards MSc
- Flood and Coastal Risk Management PgCert/PgDip
- Food Challenges for the 21st Century PgCert/PgDip

The combined international reach of Lancaster Environment Centre, Rothamsted Research and the Centre for Ecology and Hydrology opens up a world of opportunity for you as a Graduate School student – both during and after your studies.

Research bodies, government agencies and businesses – small, medium and large – are all woven into the fabric of the Graduate School. We are home to 20 environmental consultancies and the Environment Agency. As one of our students this means you will enjoy access and exposure to potential employers from day one.

You can enrol in one of our popular taught Masters programmes, or you can help us design a Masters by Research programme specifically to suit your interests.

Our Graduate School has one of the largest communities of PhD students in the country, with the broad remit of our three central partners ensuring an unparalleled range of possible subject areas.

So good is the reputation of the Graduate School and so practical is our focus that businesses look to us to provide specific postgraduate training programmes from Certificate level upwards for their current and future employees.

Every day you spend at the Graduate School can take you a step closer to the job you want, thanks to the variety of ways that we provide quality training and supervision plus access to potential employers via our extensive networks.

Contact us

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Professor Phil Barker
+44 (0)1524 593795
fst-pg-admissions@lancaster.ac.uk
www.lancaster.ac.uk/gse

For more information please visit www.lancaster.ac.uk/sci-tech
Graduate School for the Environment

Research degrees

Biological Science PhD
Environmental Science PhD
Geography PhD

Overview
A great strength of the Graduate School for the Environment is its ability to share expertise and ideas from many disciplines in order to provide a flexible approach, which is so important in the dynamic, rapidly developing discipline of environmental science. Although the work is often organised within themes and research groups, there is much collaborative activity transcending these boundaries.

Duration
36-48 months, full-time or 48-84 months, part-time

Entry requirements
A 2:1 honours degree, or its equivalent, in a relevant subject
Original research and thesis/collection of published papers

Ecology (by Research) MSc
Environmental Science (by Research) MSc
Plant Sciences (by Research) MSc

Overview
These programmes are suitable for those wishing to carry out a short, in depth research project, and not attend taught programmes. The MSc by Research programmes consist of induction courses, an eight-month research project and a period to write it up. These degrees are carefully tailored to your interests, and can be particularly suitable for people undertaking research in a work-based context wishing to gain an academic qualification.

Duration
12 months, full-time or 24 months, part-time

Entry requirements
A 2:1 honours degree, or its equivalent, in a relevant subject. Industry-based experience will be considered, with demonstration of appropriate skills
Original research and dissertation

“"I chose Lancaster University because the Lancaster Environment Centre has such a strong reputation in the environmental science field, and most importantly, my supervisor is one of the most famous scientists in our field.”
Dr Chang’er Chen PhD

Taught programmes

Conservation and Biodiversity MSc

Overview
Our Conservation and Biodiversity Masters offers great flexibility, with a wide choice of topics from across many disciplines, enabling you to construct a programme that suits your individual interests and career ambitions in this increasingly important field.

You will have the opportunity to gain a solid foundation in key theoretical issues, such as wildlife population dynamics and conservation biology, and learn how these are applied to real-world problems, such as managing habitats or dealing with wildlife-human conflicts.

Your project forms a substantial part of your degree. It will enhance your practical and analytical skills and give you the opportunity to apply your learning to a real-world challenge. This may involve doing a project with a government agency or conservation organisation through our award winning Centre for Global Eco-innovation, which uses our excellent links with the environmental and conservation sectors.

Graduates have gone on to careers in the environmental and conservation sectors, as well as further study for a PhD.

Modules
- Conservation Biology
- Data Analysis and Interpretation
- Environmental Governance and Management
- Food Security, Agriculture and Climate Change
- Geoinformatics
- Habitat Management
- Lake Ecology
- Sustainable Soil Management
- Using the National Vegetation Classification
- Wildlife Monitoring Techniques
- Wildlife Population Ecology

Other modules available can be found on our website.

Director of Studies
Dr Ian Hartley

Duration
12 months, full-time or 24 months, part-time

Entry requirements
A 2:1 honours degree, or its equivalent, in a relevant subject. We can also consider applicants with a 2:2 degree, or equivalent, if they have relevant work experience (including voluntary work)

Assessment
Coursework, presentations, examinations and dissertation

Environment and Development MA/MSc

Overview
The need for sustainable development is a global concern. This scheme aims to prepare you to address the challenges faced in safeguarding the planet’s ecosystems while improving the environments of impoverished communities. You can take either the MA or MSc, depending on your choice of dissertation. The scheme has a broad choice of optional modules, combined with the specialisation of the dissertation project, which includes the option of overseas fieldwork. This programme provides the ideal education for anyone interested in a career that will address environment and development issues, in the private, public, or not-for-profit sectors.

Modules
- Behaviour of Pollutants in the Environment
- Conservation Biology
- Data Analysis and Interpretation
- Habitat Management
- International Environmental Law
- Perspectives on Environment and Development
- Sustainable Soil Management
- Wildlife Population Ecology

Other modules available can be found on our website.

Director of Studies
Professor Simon Batterbury

Duration
12 months, full-time or 24 months, part-time

Entry requirements
A 2:1 honours degree, or its equivalent, in a relevant subject. We can also consider applicants with a 2:2, or equivalent, if they have relevant work experience (including voluntary work)

Assessment
Coursework, presentations and dissertation

For more information please visit www.lancaster.ac.uk/sci-tech
**Graduate School for the Environment**

**Taught programmes**

### Environment and Law LLM

**Overview**

This joint programme with the Law School is intended to appeal to students who wish to study the environmental aspects of law and human rights or the legal regulation of the environment through human rights at Masters level. The programme has a flexible pathway of study with students taking three modules from Law and three modules from the Graduate School for the Environment as well as a dissertation.

**Modules**

- + Chemical Risk Assessment
- + Climate Change and Society
- + Corporations in International Business Law
- + Either Environmental Law or European Union Law
- + European Law
- + Food Security, Agriculture and Climate
- + Gender, Sexualities and Human Rights
- + Perspectives on Environment and Development

**Director of Studies**

Dr Sohia Kopela

**Duration**

12 months, full-time

**Entry requirements**

A 2:1 class honours degree, or equivalent

**Assessment**

Coursework and dissertation

### Environmental Management MSc

**Overview**

The Earth’s resources are under strain from a growing population. Now, more than ever, we need to monitor, manage and maintain our environment. This vocationally relevant Masters provides you with an in-depth critical understanding of today’s major environmental challenges.

You can keep your learning broad or you can specialise in one of four areas: water, energy, food security or pollution. There are specific core modules for each specialist area:

- **Water:** Lake Ecology plus a choice of five others
- **Energy:** Low-Carbon Energy Use plus a choice of five others
- **Food security:** Food Security, Agriculture and Climate Change; Crop Protection; Sustainable Soil Management plus a choice of three others
- **Pollution:** Chemical Risk Assessment; Contaminated Land and Remediation; Behaviour of Pollutants in the Environment plus a choice of three others

All options include a dissertation project, which will enhance your practical and analytical skills and give you the chance to apply your learning to a real-world challenge. Our many research projects and partners across the globe provide exciting possibilities when you are choosing your dissertation subject. Alternatively you can do a six-month research placement with a private sector company, government body or voluntary sector organisation instead of a traditional dissertation.

This very popular course will equip you to pursue a broad range of careers including environmental monitoring, resource management and consultancy.

**Modules**

- + Climate Change and Society
- + Environment and Culture
- + Environmental Auditing
- + Environmental Governance and Management
- + Environmental Law
- + Geoinformatics
- + International Environmental Law
- + Perspectives on Environment and Development

Plus a wide choice of modules. Please see our website for more information.

**Director of Studies**

Dr Andrew Jarvis

**Duration**

12 months, full-time or 24 months, part-time

**Entry requirements**

A 2:1 honours degree, or its equivalent, in a relevant subject. We can also consider applicants with a 2:2 degree, or equivalent, if they have relevant work experience (including voluntary work)

**Assessment**

Coursework, presentations and dissertation/research placement

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For more information please visit [www.lancaster.ac.uk/sci-tech](http://www.lancaster.ac.uk/sci-tech)
Graduate School for the Environment

Taught programmes

Human Rights and the Environment LLM

**Overview**
This joint programme with the Law School is intended to appeal to students who wish to study the environmental aspects of law and human rights or the legal regulation of the environment through human rights at Masters level.

The programme has a flexible pathway of study with students taking three modules from Law and three modules from the Graduate School for the Environment as well as a dissertation.

**Modules**
- Chemical Risk Assessment
- Either Environmental Law or International Environmental Law
- Food Security, Agriculture and Climate
- International Human Rights
- Perspectives on Environment and Development
- Rights of Peoples
- The Right to Adequate Food as a Human Right

**Director of Studies**
Dr Sophia Kopela

**Duration**
12 months, full-time

**Entry requirements**
A good second class honours degree, in an appropriate discipline

**Assessment**
Coursework and dissertation

Sustainable Water Management MSc

**Overview**
This programme is designed to deliver the essential professional training you will require for a rewarding career as a practitioner or researcher with a water consultancy, water regulator, water company or research organisation.

The unique aspect of our programme is that it is taught jointly by University staff and professionals from leading environmental consultancy JBA Consulting, the Environment Agency and the Centre for Ecology & Hydrology, which has a one of its major research facilities based at Lancaster.

The jointly-taught modules have been professionally accredited by the Chartered Institution of Water and Environmental Management.

You will join our active volcanology research group, conducting a research project alongside internationally recognised experts and participating in many seminars, workshops and discussions.

This MSc is ideal preparation for PhD research or work in the environment sector, and suitable for students with a wide range of first degrees including Geography, Geology, Environmental Science and Physics.

**Modules**
- Catchment Protection (field course)
- Environmental Governance and Management
- Forecasting and Extreme Event Response
- Groundwater Resources and Protection
- Integrated Systems for Sustainable Surface Water Management
- Lake Ecology
- Modelling Environmental Processes

**Director of Studies**
Dr Nick Chappell

**Duration**
12 months, full-time or 24 months, part-time

**Entry requirements**
A 2:1 honours degree, or its equivalent, in a relevant subject. We can also consider applicants with a 2:2 degree, or equivalent, if they have relevant work experience (including voluntary work)

**Assessment**
Coursework, presentations, examinations and dissertation

Volcanology and Geological Hazards MSc

**Overview**
Volcanoes threaten millions worldwide and improved hazard mitigation is a high priority. Our MSc provides training in field, theoretical and laboratory volcanology, including a highly popular field course on Etna.

Alongside specialist taught modules on volcanic and other geological hazards, additional modules provide broader training in environmental science, management and data analysis.

You will join our active volcanology research group, conducting a research project alongside internationally recognised experts and participating in many seminars, workshops and discussions.

This MSc is ideal preparation for PhD research or work in the environment sector, and suitable for students with a wide range of first degrees including Geography, Geology, Environmental Science and Physics.

**Modules**
- Data Assimilation and Integration
- Environmental Governance and Management
- Geoinformatics
- Geological Hazards
- Modelling Environmental Processes
- Physical Volcanology
- Volcanic Process Field Course

**Director of Studies**
Dr Hugh Tuffen

**Duration**
12 months, full-time or 24 months, part-time

**Entry requirements**
A 2:1 honours degree, or its equivalent, in a relevant subject. We can also consider applicants with a 2:2 degree, or equivalent, if they have relevant work experience (including voluntary work)

**Assessment**
Coursework, presentations, examinations and dissertation
Graduate School for the Environment

Taught programmes

**Flood and Coastal Risk Management PgCert/PgDip**

**Overview**
As the UK recovers from the impact of flooding and coastal storms, following some of the wettest winters in almost 250 years, the importance of understanding and managing risks to our environment in the face of increased frequency of extreme weather and climate change is becoming recognised. The course is accredited by the Chartered Institution of Water and Environmental Management (CIWEM) and provides flexible and accessible postgraduate training, which is focused on the practical application of skills and best practice industry standard techniques in the context of the latest legislation, guidance and policy.

You will benefit from industry leading technical expertise as the course is delivered in partnership with JBA Consulting, a specialist water environment and flood risk management consultancy.

A PgCert will be awarded on completion of four modules, or a PgDip will be awarded on completion of eight modules.

**Director of Studies**
Dr Nick Chappell

**Duration**
2-3 years, part-time

**Entry requirements**
We recognise prior learning and experience, and you don’t necessarily need a degree to apply

**Assessment**
Coursework

**Modules**
- Catchment Hydrology and Assessment
- Catchment Protection
- Coastal Erosion and Flood Risk Management
- Forecasting and Extreme Event Response
- Groundwater Resources and Protection
- Integrated Systems for Sustainable Surface Water Management
- River Hydraulics: Processes, Structures and Modelling
- Sustainable Floodplain Management and Restoration

**Food Challenges for the 21st Century PgCert/PgDip**

**Overview**
One of the most significant challenges currently facing humankind is to make enough food for an active healthy lifestyle, available to a population which will probably rise beyond nine billion within the next 30 to 40 years. There are many factors that combine to impact food availability and the access that people have to food. Food production is prominent among these factors, but we can also feed more people if we distribute food more effectively and waste less food. In addition, other factors such as the state of the economy, climate change and the effects of the food production system on the environment need to be taken into account when considering the future sustainability of our food system.

This professional training course provides an opportunity for flexible and accessible postgraduate learning and professional development, for those who are unable to commit to full-time study. It is delivered by blended learning, which consists largely of online material to allow flexible working, together with short residential elements. Successful completion of the PgCert/PgDip modules may permit progression to a MSc in Food Security.

A PgCert will be awarded on completion of four modules, a PgDip will be awarded on completion of eight modules, and a MSc on completion of eight modules (including Literature Review) and a dissertation project.

**Director of Studies**
Professor Bill Davies

**Duration**
2-3 years, part-time

**Entry requirements**
Professional experience of working in the food chain. We recognise prior learning and experience, and you don’t necessarily need a degree to apply

**Assessment**
Essays, online discussions and short answer worksheets

For more information please visit [www.lancaster.ac.uk/sci-tech](http://www.lancaster.ac.uk/sci-tech)
Mathematics and Statistics

We are one of the UK’s top departments for world-leading research, ranked joint 5th in the Research Excellence Framework 2014. We offer a variety of opportunities for postgraduate study in pure mathematics and statistics, including taught Masters (MSc), Masters by research (MRes) and PhDs. We have a vibrant community of academics, support staff and students from around the world. Our excellent facilities include dedicated teaching, learning, computing and research spaces.

Our established research links with business, industry and government provide expertise in pure mathematics, statistics, medical statistics and social statistics. We are part of the North West Hub for Trials Methodology Research and a founder member of several national PhD training consortiums in statistics, social statistics, mathematics and operational research.

In 2010, we were awarded funding to develop a Centre for Doctoral Training (STOR-i) combining statistics, operational research and industrial applications. We are producing a new generation of researcher, capable of creating an impact in these areas. This Centre has fully funded 40 students since 2010 and is due to fully fund at least 60 further students entering the Centre for Doctoral Training in 2014 - 2019. We are also part of the North West Doctoral Training Centre (NWDTfC) and offer a pathway of study in social statistics.

Research degrees
- Applied Social Statistics (NWDTfC) PhD
- Mathematics PhD
- Statistics PhD
- Statistics and Operational Research (in partnership with industry) (STOR-i) PhD/MRes

Taught programmes
- Data Science MSc
- Quantitative Finance MSc
- Statistics MSc/Pgdip

Research areas
Statistics
The Statistics Group is interested in the development of novel statistical models and methods motivated by applied problems, with particular emphasis on environmental, biomedical and social sciences. Methodological strengths include change point methods, computationally intensive methods, design and analysis of clinical trials, epidemic modelling, extreme value methods, locally stationary processes, longitudinal models, spatial statistics, spatial genetics, statistical learning stochastic modelling, survival analysis and time series modelling.

There is a strong emphasis on the interface between theory and application, and the group has close research links with other university departments, government departments and research institutes, a wide range of industries including multinationals and SMEs, hospitals, and pharmaceutical companies within the UK and overseas.

Pure Mathematics
Research interests are broad and cover areas of algebra, geometry, analysis, probability and combinatorics. There is also research that interfaces algebra, geometry and rigidity theory.

Specific topics include: Algebraic Topology, Banach Algebras, Discrete Geometry, Group Theory, Graph Theory, Homological Algebra, Lie Theory, Mathematical Physics, Operator Algebras, Probability Theory (including Noncommutative Probability), Quantum Algebra, Quantum Field Theory, Random Matrix Theory, Representation Theory, Spectral Theory and Stochastic Analysis.

Business engagement
Gaining experience and skills
Gaining work experience while you are at university is crucial to achieving a good graduate job. Students and recent graduates can apply for relevant paid work experience through the Faculty of Science and Technology Internship Programme.

Internships offer you the opportunity to apply your academic knowledge in real-world situations – and get paid for it! They will help you develop transferable skills such as such as team working, time management, leadership, networking and commercial awareness.

Many employers use internships to test out a new role and frequently offer graduate roles to interns.

Contact us
Head of Department
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Postgraduate Coordinator
Jane Hall
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www.lancaster.ac.uk/maths

For more information please visit www.lancaster.ac.uk/sci-tech
Research degrees

**Applied Social Statistics (NWDTC) PhD**

**Overview**

This scheme, with funding from the North West Doctoral Training Centre, draws upon the acknowledged strengths of social science and social statistics. The balance between the statistics and substantive components of the research is tailored to your interests and background.

We encourage joint supervision by the Department and a social science or related department across the three North West universities (Lancaster, Liverpool and Manchester), thus increasing the scope and potential focus of your research.

**Director of Studies**

Professor Brian Francis

**Entry requirements**

3 years, full-time (PhD) or 4 years, full-time (MSc and PhD). Part-time study is also possible.

**Assessment**

A 2:1 degree, or its equivalent, in Statistics, Social Science or a relevant related discipline, or relevant professional qualification or experience.

Original research and thesis.

**Applied Social Statistics (NWDTC) PhD**

**Overview**

This programme is suitable for a range of purposes, notably social science graduates interested in quantitative empirical work and statistics graduates wishing to develop applicable expertise in social statistics.

Depending upon prior statistical learning, there is an option of studying for an MSc before progressing to the PhD.

**Director of Studies**

Professor Brian Francis

**Entry requirements**

A 1st class honours degree, or its equivalent, in Mathematics, Statistics, or a combination of the two.

**Assessment**

Original research and thesis.

**Statistics and Operational Research (in partnership with industry) (STOR-i) PhD/MRes**

**Overview**

This unique programme offers a ground-breaking approach to statistics and operational research, developed in conjunction with leading industrial partners. There are typically over ten fully funded places annually.

Collaboration with our industrial partners, such as BT, Rolls Royce and Shell, ensures that we produce a generation of highly skilled researchers prepared for careers in academia or industry.

Commencing with an MRes, which provides a robust grounding and the development of research skills, you will identify a topic and plan your PhD research. You will also develop a versatile skill set including: advanced problem solving, programming, and a broad range of presentation and dissemination skills.

The remaining three years will be spent working on the PhD project guided by appropriate supervisory teams, whilst undertaking a range of training programmes and experiencing visits to world-leading universities.

**Director of Studies**

Professor Jonathan Tawn

**Entry requirements**

A 1st class honours degree, or its equivalent, in an undergraduate course with a substantial mathematical content.

**Assessment**

MRes: coursework and exam; PhD: original research and thesis.

**Mathematics and Statistics**

“...The distinctive feature of statistics research at Lancaster is that methodological innovations are motivated by, and fed back into, substantive applications in the natural, biomedical and social sciences. We have particular strengths in computational statistical methods, extreme value theory and changepoint methods; and a strong group working at the interface of statistics and machine learning.”

Professor Paul Fearnhead
**Taught programmes**

### Data Science MSc

**Overview**
Building upon data science fundamentals, this programme allows for specialism in computing or statistical inference with designated pathways spanning, for example, technologies, statistical modelling, business analytics, health and society. For further information please see the entry under Computing and Communications.

**Modules**
- + Bayesian Inference
- + Computational Intensive Methods
- + Generalised Linear Models
- + Likelihood Inference
- + Statistics in Practice

**Optional modules (choose five from)**
- + Adaptive/Bayesian Methods in Clinical Research
- + Clinical Trials
- + Environmental Epidemiology
- + Extreme Value Theory
- + Longitudinal Data Analysis
- + Pharmacological Modelling
- + Principles of Epidemiology
- + Statistical Genetics and Genomics
- + Survival and Event History Analysis

### Quantitative Finance MSc

**Overview**
This one-year interdisciplinary MSc programme delivered by the Management School and the Faculty of Science and Technology is designed to give you in-depth knowledge of the problems and issues in the financial sector, and enables you to develop advanced analytical, problem-solving and technical skills.

The programme gives you access to expertise and facilities in different but related areas, and offers a wide range of potential topics for your summer dissertation. Optional modules also allow you to develop particular specialisms.

You will acquire skills in data and financial analysis, forecasting, optimisation, and computer programming. You’ll also become proficient in various statistical and econometrics packages.

**Modules**
- + Derivatives Pricing
- + Financial Econometrics
- + Financial Markets
- + Financial Programming
- + Financial Stochastic Processes
- + Microeconomics for Money, Banking and Finance
- + Optimisation
- + Statistical Methods for Financial and Economic Applications

**Director of Studies**
Dr Sandra Nolte

**Duration**
12 months, full-time

**Entry requirements**
A 2:1 honours degree in a numerate subject. Students will need to be familiar at undergraduate level with topics such as probability and statistics, calculus and linear algebra.

**Assessment**
Coursework, examination and dissertation

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**Statistics MSc/PgDip**

**Overview**
This MSc has a strong theoretical and methodological component to supplement a focus on applications of statistics to real-life scientific problems. You can opt to follow pathways in medical, pharmaceutical or environmental statistics, depending on your field of interest. Graduates tend to enter careers as practising statisticians, university research assistants or go on to study for a PhD.

For each pathway, you will follow a set of compulsory modules covering core theory and methods, applied statistical modelling and practical skills in topics such as statistical computing, scientific writing, presentation and consultancy. You will also study optional modules tailored to your research interests and career aspirations. Your studies are completed with a supervised, in-depth, dissertation aimed at solving a substantive research question.

**Modules**
- + Bayesian Inference
- + Computational Intensive Methods
- + Generalised Linear Models
- + Likelihood Inference
- + Statistics in Practice

**Optional modules (choose five from)**
- + Adaptive/Bayesian Methods in Clinical Research
- + Clinical Trials
- + Environmental Epidemiology
- + Extreme Value Theory
- + Longitudinal Data Analysis
- + Pharmacological Modelling
- + Principles of Epidemiology
- + Statistical Genetics and Genomics
- + Survival and Event History Analysis

**Director of Studies**
Dr Deborah Costain

**Duration**
- MSc: 12 months, full-time or 24 months, part-time
- PgDip: nine months, full-time

**Entry requirements**
Second class honours degree, or its equivalent, in a subject with a strong mathematics or statistics component.

**Assessment**
Coursework, examination and dissertation
Physics

With over 200 staff and postgraduate students from across the world, we are one of the top departments for research, ranking 2nd in the UK (REF 2014) for the number of research outputs judged as internationally excellent (4 star). Our research is concentrated on the experimental and theoretical aspects of astrophysics, condensed matter physics, ultra-low temperature physics, particle and accelerator physics, and theory/mathematical physics. It is supported by over 100 grants of approximately £30m. There are numerous funded collaborations with overseas laboratories, as well as major European networks.

As a postgraduate student in the Physics Department you will be provided with opportunities for internships, training in transferrable and research skills, and the technical training applicable to your research area. We provide dedicated outreach training to enable you to communicate your science to a broad community, from school children through to subject experts. These training opportunities are provided by your research group, as well as by the Department, Faculty and University. These skills will equip you for an international career in science.

Research degrees

- Nanoscience PhD
- Physics PhD
- Physics MSc (Research)

For more information please visit www.lancaster.ac.uk/sci-tech

The Physics department has just undergone a major refurbishment, providing a world-class teaching and research environment including state-of-the-art teaching labs and study spaces. The four large teaching labs have been modernised, bringing them up to the highest contemporary standards. These labs have become the showpieces for the department. One of the highest priority goals of the redevelopment was to create a social learning hub, thereby creating an environment to facilitate group working and enable remote studying.

Work has recently been completed on a £2m suite of ultra-low noise laboratories, IsoLab, which provides the most advanced environments in the world for the expanding field of quantum technology. IsoLab houses three isolated laboratory spaces where vibration, noise and electromagnetic disturbance are drastically reduced to give an “ultra-clean” experimental environment. The building is embedded in the ground and separated from other buildings to ensure that the three 50 tonne experimental platforms are as completely isolated as possible from the surrounding environment.

We have a state-of-the-art Quantum Technology Centre with molecular beam epitaxy facilities, specially equipped laboratories for III-V semiconductor nanostructures and devices, and micro and nanofabrication clean-room equipment with e-beam lithography. Characterisation facilities include a FEG SEM, picosecond lasers covering visible and mid-IR range, photo and electro-luminescence in magnetic fields and a unique nanomechanical and nanothermal scanning probe microscopy suite. The new ultra-isolation lab will enable most sensitive measurements in the absence of spurious electromagnetic field and mechanical vibrations.

Our computing facilities include Linux workstations, grid networking, and a £1.1m Beowulf class computer. The University also has a high-end computing service with 5000 CPU cores and the capability for GPU-accelerated computation.

The Experimental Particle Physics group has access to accelerators at Fermilab (USA) and the Large Hadron Collider (LHC) at CERN (Geneva). Our Ultra-Low Temperature Laboratory (ULT) allows experiments to be performed over the millikelvin and microkelvin range through liquid 4He and 3He. Dilution refrigerators and nuclear demagnetisation to well below 100k are available as well as high magnetic fields from superconducting solenoids (up to eight Tesla).

Our Astrophysics Division has access to international ground-based and space-based telescopes, such as the European Southern Observatory and Hubble Space Telescope. We are also involved in space missions across the solar system, such as NASA’s Cassini-Huygens mission to Saturn, and European Space Agency missions exploring Earth, Mars and beyond. We are active in the development of new telescopes and space missions, such as the European Extremely Large Telescope, Euclid, and the JUICE mission to Jupiter.

Contact us

Head of Department
Professor Roger Jones

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fst-pg-admissions@lancaster.ac.uk
www.lancaster.ac.uk/physics
Physics

Research areas

Observational Astrophysics
Research in the astrophysics group is primarily observational and broadly centred on understanding the formation and evolution of galaxies and the properties of the Universe itself.

Theoretical Particle Cosmology
Lancaster is at the leading-edge of research in theoretical cosmology and astrophysics. Our research concerns with the application of new theories of particle physics and gravitation to understand the evolution of the Universe from the earliest time to the present day.

Space and Planetary Physics
Research in the space and planetary physics group probes the fundamental physics that underpins the space environment of the Solar System from the Sun, through interplanetary space to the atmospheres of Earth, planets, rings and moons. We also undertake research into space weather.

Experimental Particle Physics
The particle physics group addresses fundamental questions about the building blocks of matter and the basic forces of nature with a diverse programme of activities at international facilities such as the LHC, SNO and T2K. Work in the group contributed to Nobel Prizes in 2013 and 2015.

Accelerator Physics
Particle accelerators not only lie at the heart of research into particle physics, but also play major roles in fields such as medicine. Current accelerators are limited in the energy and intensity of the particle and light beams they are able to produce. Our research uses our expertise in particle physics and mathematical physics to address these limitations.

Low Temperature Physics
We have a strong international reputation for performing state-of-the-art experiments at the lowest achievable temperatures with advanced in-house cryogenic engineering and expertise in ultra-sensitive measurement techniques. The group has performed ground-breaking research on a wide range of topics from superfluid analogues of cosmological processes to quantum turbulence.

Quantum Nanotechnology
Our research ranges from the fundamental physics of nanostructured structures to practical applications with industrial partners. Potential applications of our work include quantum computing and quantum simulation, quantum encryption, quantum metrology, novel sensors operating beyond the standard quantum limit, new types of lasers, memories, solar cells and batteries.

Nonlinear and Biomedical Physics
We apply ideas and methods from nonlinear and stochastic dynamics to study the fundamental physical properties of living systems. We investigate oscillatory behaviour on all scales and levels of complexity, from the cell membrane potential to cardiovascular and brain dynamics.

Condensed Matter Theory
Condensed matter theorists at Lancaster have a worldwide reputation for expertise in employing quantum-mechanical methods to uncover phenomena in low-dimensional systems and devices, and determining the characteristics of novel and artificial materials.

Mathematical Physics
Our broad research programme reflects our extensive range of interests; for example, it connects the theoretical investigation of matter in extreme conditions, such as ultra-powerful laser fields and strong-field environments of magnets, with ubiquitous fluid-structure interactions of utmost importance to the oil industry.

Physics PhD

Overview
We welcome applications from those seeking to perform research for a PhD in Physics. Research opportunities are available within each of our research areas, which cover both theoretical and experimental aspects, and are grouped into the four broad research divisions of Astrophysics, Accelerator and Particle Physics, Experimental Condensed Matter, and Theory.

There is vigorous cross-disciplinary activity, which includes studies of new materials such as graphene and molecular nanowires, cosmological experiments in liquid helium, nonlinear dynamics of biological rhythm and IR spectroscopy, and nanoscale probe microscopy of biological objects.

Postgraduate Academic Adviser
Dr Jaroslaw Nowak

Duration
36 months, full-time (or pro-rated part-time)

Entry requirements
A 2:1 BSc or MPhys degree in Physics, or its equivalent, in a relevant subject

Assessment
Original research and thesis

Business engagement

Working in partnership
We have collaborations with major international manufacturing and ICT corporations such as BP Exploration, IBM, Alcatel, Pilkington Glass, Varia, Fiat and a range of medium-sized research intensive companies within the UK and across Europe.

Spin out companies
You’ll learn from experts who have also started their own businesses. We actively commercialise our research, and have spun out several companies, Lancaster Material Analysis Limited, quantum technology company Quantum Base, and cryogenics consultancy Lancaster Cryogenic Limited.

“Studying physics at Lancaster is a complete experience: top-quality research environment including high-level facilities and dynamic researchers, a super-efficient department composed of sympathetic staff and overall a mixed atmosphere of excellence and cheerfulness. Working here is also about collaborations with national and international leading groups. In short, Lancaster is a very good choice both for the professional and personal experiences.”

Jean Spiece
PhD student

For more information please visit www.lancaster.ac.uk/sci-tech
This PhD offers research in nanoscience and nanotechnologies which is excelled by the experimentalists in the Quantum Technology Centre and theorists in the Centre for Nanoscale Dynamics at Lancaster.

In experimental nanoscience we offer projects in quantum technologies and development; studies of superconductor and semiconductor qubits and quantum circuits; quantum metrology; development of quantum dot systems for quantum key distribution; studies of atomic two-dimensional materials including graphene, boron nitride, hexagonal metal chalcogenides and their heterostructures; development and applications of new scanning mechanical and thermal microscopy techniques; development of novel nanostructured materials for telecommunications and for energy applications. We study nanostructures at the record-breaking low temperatures, in a sub-mK range.

In theoretical nanoscience, we offer projects in quantum transport and quantum Hall effect; mesoscopics and fundamentals of nanoelectronics; single-molecule electronics; quantum optics; quantum information processing. We develop theories of new atomic two-dimensional materials using the first principles density functional theory, quantum Monte Carlo modelling, and phenomenological theories. We develop theories of dynamics and kinetics in quantum systems in strongly non-equilibrium conditions using field theory methods. On the side of applied nanoscience, we model devices for electronics and optoelectronic applications.

We collaborate with world-leading companies including Bruker, Fiat, and Oxford Instruments. The programme is supported by a selection of training courses providing skills in modern research techniques, special scientific training and transferable skills courses.

Postgraduate Academic Adviser
Dr Benjamin Robinson

Duration
36 months, full-time (or pro-rated part-time)

Entry requirements
A 2:1 BSc or MPhys degree in Physics, or its equivalent, in a relevant subject

Assessment
Original research and thesis

Nanoscience PhD

Overview

For more information please visit www.lancaster.ac.uk/sci-tech

Postgraduate Academic Adviser
Dr Jaroslaw Nowak

Duration
12 months, full-time or 24 months, part-time

Entry requirements
A 2:1 honours degree, or its equivalent, in a relevant subject

Assessment
Original research and dissertation

Physics MSc (Research)

Overview

You can begin this programme at any time of the academic year, as agreed with your supervisor. You will define and manage an independent research project which will equip you for more sustained and original work at the doctoral level, or for advanced level applied research positions in a range of organisations.

The programme is flexible to support learning in a variety of educational and practical research contexts: either on campus or in industry.

There is a period of induction with a project supervisor where you will complete a learning plan and assess your research training development needs. At the end of the third month (full-time) or sixth month (part-time) you will submit a report which will enable your supervisor to offer formative feedback on your writing skills, progress to date and ability to synthesise information. Finally, you will complete a dissertation based on your research.

“The MSc by Research facilitates well focused, bespoke and novel research projects which are ideal for solving specific fundamental or applied physics problems, or for students who wish to gain independent research skills without a three year commitment.”

Oleg Kolosov
Professor of Experimental Condensed Matter Physics
Our research is internationally recognised as being at the cutting-edge of developments in psychology. Our team of well-known researchers, who form our teaching staff, ensure that your studies are driven by the latest findings.

We are home to one of the largest developmental centres in the world, and boast a wide range of facilities to support and enhance your independent work. Our expertise is strengthened by our relationships with key institutions such as The Leverhulme Trust and ESRC North West Doctoral Training Centre who invest time and money in research at Lancaster.

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### Research areas

#### Infancy and Early Development
We are one of the largest groups world-wide working on development in babies, from before birth through to toddlers, including the investigation of how language is learned and how early communication leads to understanding of words. We explore how infants learn about the permanence of the physical world around them, how they learn to categorise objects, and how these categories support early word learning. Another focus is early social development: how do babies develop an understanding of others as human beings, and how do they develop the ability to interact with them?

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#### Language and Literacy
We explore language and literacy at multiple levels from phonemes to paragraphs, and beyond. Our research aims to advance the understanding of a broad range of topics encompassing: mental representations of written and spoken language; language and literacy development across the lifespan from preschool through to older adults; the causes of reading and communication difficulties; the effects of different writing systems on reading development; and the cognitive resources that underpin language processing.

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#### Perception and Action
Our research investigates human interactions with the world via sensory and motor processes. We examine auditory neural coding, visual processing in complex environments, representation of time and space, sensorimotor grounding of concepts, and links between sensory systems and more central processes such as language, music, cognition, decision making, and emotion. We explore the role of sensory processes in deficits due to ageing and Alzheimer’s Disease, and in the use of sensory and motor measures as biomarkers for disease progression.

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#### Social Processes
Our research examines the social and cognitive factors that shape our everyday lives at the individual and group levels, and through this aim to address contemporary social issues and challenges. This includes examining how our individual actions are shaped by non-conscious processes, how social identities, attitudes and categories affect our perceptions of others, how our values, beliefs, trust and emotions affect our decision making and social interactions, and the study of goals and motivation.

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### Contact us

Head of Department
Professor Kate Cain

Enquiries
+44 (0)1524 593795
fst-pg-admissions@lancaster.ac.uk
www.lancaster.ac.uk/psychology

“Doing a Masters degree is simultaneously one of the most demanding and rewarding experiences you can have, and Lancaster’s Psychology Department provides a world-class teaching and research environment so our students can really make the most of their time here.”

Dr Dermot Lynott
Director of PG Studies
A PhD consists of an extensive and coherent research programme, typically involving three to four years of full-time study. We welcome proposals for PhD research that offer programmatic ideas connected with staff research projects and interests. We think of PhDs as student-led yet collaborative research projects.

We provide extensive support and training to ensure that PhD students are well equipped to make their work productive, effective and influential, ultimately leading to a successful and timely submission of a PhD thesis.

**Psychology**

**PhD Overview**
A PhD consists of an extensive and coherent research programme, typically involving three to four years of full-time study. We welcome proposals for PhD research that offer programmatic ideas connected with staff research projects and interests. We think of PhDs as student-led yet collaborative research projects.

**Director of Studies**
Professor Charlie Lewis

**Entry requirements**
A 2:1 honours degree, or its equivalent, in a relevant subject. We often recommend that applicants have a Masters degree as foundational experience for a PhD programme, although this is considered on a case by case basis.

**Assessment**
Original research and thesis

**PhD**

**Overview**
We provide extensive support and training to ensure that PhD students are well equipped to make their work productive, effective and influential, ultimately leading to a successful and timely submission of a PhD thesis.

**Director of Studies**
Professor Charlie Lewis

**Entry requirements**
A 2:1 honours degree, or its equivalent, in a relevant subject. We often recommend that applicants have a Masters degree as foundational experience for a PhD programme, although this is considered on a case by case basis.

**Assessment**
Original research and thesis

**Entry requirements**
A 2:1 honours degree, or its equivalent, in Psychology or a related discipline

**Assessment**
Coursework and dissertation

**Taught programmes**

**Developmental Disorders MSc**

**Overview**
In this programme, we aim to promote students’ knowledge of developmental psychology with a focus on atypical development across the lifespan. The degree builds on the Department’s research strengths in this area, with core material from course team members who specialise in Autism Spectrum Disorder, cognitive development in atypical populations and language and literacy development.

You will acquire advanced knowledge of the theories and major findings in this field, and develop expertise in the methods and analytic techniques used in research.

The course is aimed at graduates wishing to enter an applied or research career in developmental disabilities, and is beneficial for students who wish to progress to a PhD in clinical, educational, or experimental psychology. It is also suited to those who wish to boost their research skills en route to, or after, behavioural therapy or clinical or educational psychology training. The course is accredited by the Economic and Social Research Council (ESRC).

**Modules**

**Compulsory modules**
- Analysing and Interpreting Data
- Conducting and Presenting Psychological Research
- Developmental Disorders
- Developmental Psychology
- Research Dissertation

**Optional modules (choose from topics in the following areas, which vary year-to-year and are aligned with our expertise)**
- Applied Aspects of Psychology
- Cognitive Psychology
- Developmental Psychology
- Neuroscience
- Social Psychology

**Developmental Psychology MSc**

**Overview**
Lancaster is one of the largest centres for developmental psychology research in the world. This programme provides students with knowledge of advanced methods, analytical techniques, theories and major findings across a range of areas.

The course is delivered through a variety of teaching methods, including lectures, interactive discussion sessions, plus the gathering, analysing and presentation development data.

This course provides Economic and Social Research Council (ESRC) accredited training and is aimed at graduates who wish to progress to a PhD in Developmental Psychology, or seek to boost their research skills en route to clinical or educational psychology training, or for graduates who require additional developmental knowledge to apply to their work environment.

**Modules**

**Compulsory modules**
- Conducting and Presenting Psychological Research
- Developmental Psychology
- Research Dissertation
- Statistics for Psychological Research (two modules)

**Optional modules (choose from topics in the following areas, which vary year-to-year and are aligned with our expertise)**
- Applied Aspects of Psychology
- Cognitive Psychology
- Developmental Psychology
- Neuroscience
- Social Psychology

**Director of Studies**
Dr Dina Lew

**Duration**
12 months, full-time or 24 months, part-time

**Entry requirements**
A 2:1 honours degree, or its equivalent, in Psychology or a related discipline

**Assessment**
Coursework and dissertation

**Director of Studies**
Dr Dina Lew

**Duration**
12 months, full-time or 24 months, part-time

**Entry requirements**
A 2:1 honours degree, or its equivalent, in Psychology or a related discipline

**Assessment**
Coursework and dissertation
Psychology

Taught programmes

Psychological Research Methods MSc

Overview
This Economic and Social Research Council (ESRC) recognised research training course provides students with knowledge of, and experience in, a wide range of research methods used in psychological research.

In addition, it provides students with training in the practical skills involved in conducting research, and in reporting research effectively both orally and in written forms of communication.

It is especially suited to applicants who are considering doing a PhD, or wish to develop their research skills in the preparation for further professional training (e.g. Clinical, Forensic, Educational, Health, Occupational Psychology), or who require additional training in psychological research methods to apply to their work environment.

Modules

Compulsory modules
- Analysing and Interpreting Data
- Conducting and Presenting Psychological Research
- Research Dissertation

Optional modules (choose from topics in the following areas, which vary year-to-year and are aligned with our expertise)
- Analysing Talk and Text
- Decision Making
- Social Psychology

Psychology of Advertising MSc

Overview
Advertising is everywhere. Always transient, sometimes trivial, yet it can be incredibly powerful in changing our perceptions, our beliefs and our behaviour.

The ambition of this unique course is to provide an interface between theory and practice, understanding and skills, by giving a thorough grounding in the psychology underpinning persuasion in the context of how it is applied - and how it might be applied more radically - in the communications industry.

The course combines small-group ‘knowledge-exchange’ with innovative student-led teaching, built around: outstanding expertise in cognitive, developmental, social and neuropsychological aspects of advertising, perspectives and contributions from both relevant academic researchers and seasoned advertising practitioners, original commercially-oriented research in groups, and hands-on experience within an optional commercial/third sector work placement.

This course is designed for graduates who come from a wide range of disciplines and plan to pursue a career in advertising or communications, or who wish to refresh their skills or shift focus to a more planning-based trajectory. It is also suitable for those who wish to undertake further research into the psychology of advertising and related fields at PhD level, being Economic and Social Research Council (ESRC) recognised.

Modules

Compulsory modules
- Advanced Advertising Theory
- Analysing and Interpreting Data
- Conducting and Presenting Psychological Research
- Practical Advertising Research and Planning
- Psychological Aspects of Advertising
- Research Dissertation

Optional modules (choose from the following)
- Analysing Talk and Text
- Decision Making
- Social Psychology

Director of Studies
Leslie Hallam
12 months, full-time or 24 months, part-time
A 2:1 honours degree, or its equivalent, in Psychology or a related discipline including marketing, media or business studies; a wide range of undergraduate subjects and/or relevant experience will be considered.

Assessment
Coursework and dissertation

“This Masters degree is a unique opportunity for those who are interested in how psychology can provide insight that drives advertising strategy to hone their skills and experience in preparation for this career path.”

Rebecca Strong
MSc Psychology of Advertising
## Course index

We offer a range of other subjects including Arts, Humanities, Social Sciences, Health, Medicine and Management. To find out more please see our website.

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For more information please visit [www.lancaster.ac.uk/sci-tech](http://www.lancaster.ac.uk/sci-tech)