



University of
Leicester

Faculty of Science

UNDERGRADUATE COURSES IN
Interdisciplinary Science



www.le.ac.uk/iscience



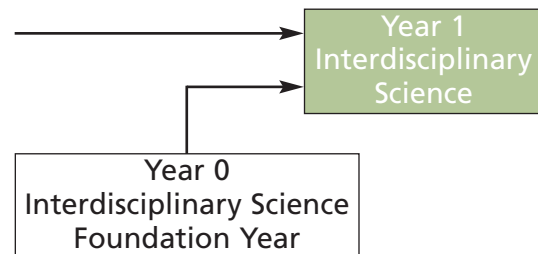
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Contact

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The Interdisciplinary Science Pathway

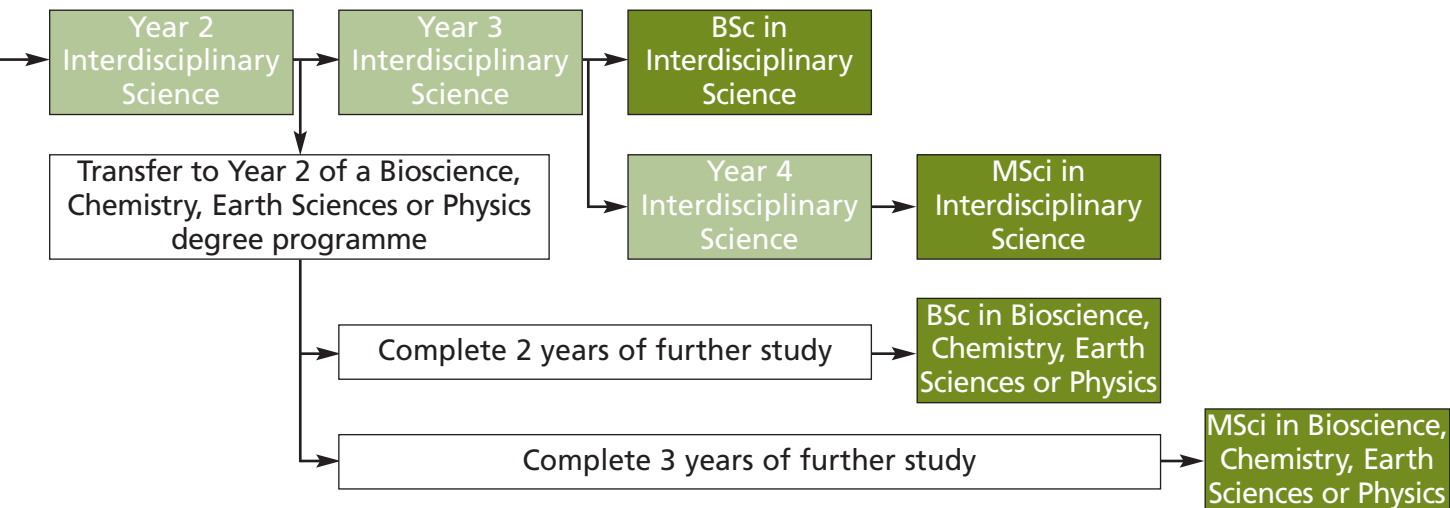
Welcome to the Centre for Interdisciplinary Science

Many of the key contemporary scientific challenges are interdisciplinary. The education we offer needs to prepare you for these challenges. To meet this need the University of Leicester has developed the new Interdisciplinary Science programme as part of a national project.

Interdisciplinary Science offers you the opportunity to study major current scientific issues. Areas such as climate change, sustainable development and biodiversity will require policy makers, managers, educators and researchers, who can work effectively across different disciplines. The specially written modules that make up the University of Leicester's degree cover

the key concepts from Physics, Chemistry, Biology and Earth Sciences. You will engage in a research-led programme which will give you a wide-ranging understanding, specialist subject knowledge, and highly employable professional science skills.

Interdisciplinary Science offers a full interdisciplinary degree programme or leads to specialisation in a single discipline after two years. Students taking the Interdisciplinary Science pathway to single subject degrees acquire a broader foundation and more varied experience before specialising that enables them to appreciate their chosen discipline in a wider context.



About Interdisciplinary Science at Leicester

Leicester has a strong culture of research in Interdisciplinary Science from green chemistry to biophysics, climate change to archaeoastronomy. So, as you would expect in a research-led University, you will be taught by experts in their fields.

Leicester is a leader in developments in higher education: three National Centres of Excellence in Teaching and Learning are connected with the Interdisciplinary Science degree and many of the Interdisciplinary Science lecturers have won prestigious teaching awards.

The programme was developed to reflect modern approaches to education that take account of the needs and aspirations of individual learners.

Graduates are especially equipped for careers in commerce, industry, government and teaching or for academic research.

The Centre for Interdisciplinary Science provides you with a home Department and dedicated Interdisciplinary Science student support staff.

To guarantee the high status of the degree, the work of the Centre is supported by an external Steering Committee and Advisory Board, some of whom have contributed the quotations in this booklet.

The National Picture

Interdisciplinary Science was developed at Leicester as a key initiative in science education. It aims to build on our students' multidisciplinary backgrounds at A-level in order to provide a sound basis for later specialisation or cross-disciplinary research and employment. This has led to a major new national programme in university science education called Integrated Sciences now being offered at a number of leading universities.

Year 1

“ I feel I am learning more than I would have on a pure single-science course, and I feel that my employability after this course will be very high ”

DANIEL STRINGER
BSc Interdisciplinary Science
1st Year Student

Customise your degree

Each module takes you from an introduction to the important frontiers of research. Within each module there are opportunities for you to specialise in particular areas of interest.

There is a choice of pathways that lead to an MSci or BSc degree in Interdisciplinary Science or to specialisation in a particular discipline, as detailed on the following pages.

In each year students also chose an option from the list on the next page which runs throughout the year.

There is a wide choice of interdisciplinary and discipline-based projects in years 3 and 4 (page 8 & 9).

“ A degree that reflects the way science is ”

PROFESSOR STEVE SWITHENBY
(Former Dean of Science, Open University)
Interdisciplinary Science Steering Committee

There are eight core modules in year one. Five of these are each of five weeks duration and are taken successively. Other modules run throughout the year to provide training in laboratory science, IT, mathematics and professional skills (see page 9).

The five main modules include introductory material in biology, chemistry, earth sciences and physics using a problem-based approach that will engage both those students who have studied these subjects previously and those who have not.

The five modules are:

1 **Prophets and Powers**

The Scientific Method from Ancient Astronomy to Modern Physics

This module shows how modern science can be applied to understand ancient cultures and the origins of astronomy. It also serves to introduce you to problem-based learning (see page 10)

2 **Science of the Invisible**

Molecules in Chemistry, Biology and Physics

You explore the structure of matter from the atomic scale through macromolecules to living cells

3 **Biosphere**

An Introduction to Ecology

Ecology involves the co-evolution of species and their relation to the environment

4 **Braining IT**

Computer Science and the Human Brain

You investigate the limits to computability and the way that information is coded and processed differently by computers and humans

5 **Near Space**

Earth, Ocean and Atmosphere

This module introduces the physics, chemistry, biology and geology behind the climate and climate change

You will be offered the choice of one option from the following

Management

The option offers an introduction to the concepts and techniques of management. During the course you will have many opportunities to practice the various aspects of management including leadership skills, team working, negotiation and planning. The course will give you the ability to demonstrate these skills.

Mathematical Modelling

This provides an opportunity for students with a mathematical background to explore more mathematically demanding scientific content to a high level. You will learn how to set up and solve mathematical representations of a variety of problems such as population dynamics, climate systems and fractals and chaos.

Sustainable Development

Sustainable development is a key area of education for the survival of the planet. The first year programme covers climate, biodiversity, complex physical and social systems and communications.

Science Communication

In this course you will learn both about how to communicate science effectively in different media and about the technologies of communication including print, audio and video.



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FAQ

How employable are Interdisciplinary Science Graduates?

You will graduate with a broad understanding of science and technology, and with the skills to solve a wide range of problems. You will have experience in research, and be able to develop arguments and present a case for your findings. You will have engaged in teamwork and project management. These are the skills that are highly valued by employers.

“As a science teacher I welcome a course that sees science as a whole as I do. If it is fun as well – even better”

DEIDRE CAWTHORNE
(Head of Science, DeLisle Science College)
Interdisciplinary Science Steering Committee

Year 2

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FAQ

What does a typical Interdisciplinary Science day involve?

Most days begin with a facilitation session in which you will share with your tutor and your group the results of your research so far and organise the work for the day.

Most afternoons include a supervised session in IT, mathematics or transferable skills (page 9).

Some days each week will also include timetabled sessions with experts on individual topics and laboratory sessions.

For the rest of the time you will be engaged in individual research or group discussion.

“The future of science and the future of learning”

PROFESSOR KEN FOGELMAN
 Founder, British Educational Research Association

In year 2 you chose your progression route. You can complete the Interdisciplinary Science programme in three or four years leading to a BSc or an MSci **or** you can progress to a single discipline degree in Biological Sciences,

Chemistry, Earth Sciences or Physics for a further two or three years.

Your second year programme will be designed to prepare you for the transition.

Core Modules for the Interdisciplinary Science pathway:

1

Time and Energy

Dynamics and Thermodynamics in Physics and Chemistry

This module develops the key ideas from physics and physical chemistry

2

Habitable Worlds

Cosmology from the Big Bang to the Origin of Life

The search for extraterrestrial life involves cutting edge astronomy, biology, chemistry, earth sciences and physics

3

Molecules by Design

Organic Chemistry and Pharmaceutical Chemistry

This module covers the main areas of organic chemistry

4

Forensics

Detective Science

You will solve a crime using physical, chemical and biological tools and be called on as an expert witness in court

5

Man and Machines

Physiology and Biophysics

Seeing the human body as a system involves key concepts from physics, chemistry and biochemistry

You also continue to take an option module and laboratory, mathematics, IT and professional skills modules (see page 9).



Pathways

To prepare to specialise in a single discipline following year 2 of Interdisciplinary Science you follow a related pathway:

Biological Sciences Pathway:

- Evolution
- Nanoscale Science
- Communication Science
- Forensics
- Man and Machines

Chemistry Pathway:

- Time and Energy
- Nanoscale Science
- Molecules by Design
- Forensics
- Man and Machines

Earth Sciences Pathway:

- Evolution
- Habitable Worlds
- Molecules by Design
- Forensics
- Earth through Time

Physics Pathway:

- Time and Energy
- Nanoscale Science
- Communication Science
- Forensics
- Man and Machines

These modules are described on pages 6 and 8.



FAQ

Will I be qualified to do a traditional PhD?

The four year MSci course will prepare you for a PhD programme in areas of interdisciplinary science such as geophysics, biophysics, environmental science, astrobiology and so on. It is not a substitute for those PhD programmes that require specific qualifications, for example in organic chemistry or elementary particle physics. The route to postgraduate study in such areas is via the discipline specific pathway in year two followed by two or three years of the study of that discipline.

“We all know the boundaries between sciences laid down in the early 19th century are in their death throes. Leicester has shown the vision to stage a science course for the 21st century”

MARTIN JONES
George Pitt-Rivers
Professor of Archeological Science,
University of Cambridge

Year 3

Projects

Year 3

Project: You will carry out an individual 30 credit project under the supervision of a member of the teaching staff (see page 9).

Other opportunities

The Undergraduate Ambassadors Scheme is aimed at students who might wish to go into teaching to allow them to gain some experience in schools. Students assist with classroom activities as part of the credited programme.

Vacation work experience at graduate level between years two and three can be undertaken for credits as part of the degree.

The mentoring scheme offers you the opportunity of acting as a mentor to school pupils who are thinking of going on to higher education.

Field trips have included the opportunity to carry out a research project in Kenya as part of a University team.

Students are elected to serve on the Staff-Student Committee where they represent their fellow students in discussions about the programme with the Interdisciplinary Science academic management team.

1

Evolution

Genotypes and Phenotypes

Modern genetics, developmental biology and paleobiology

2

Nanoscale Science

From Quantum Dots to Cellular Organelles

The new nanoscience and nanotechnology crosses quantum physics, chemistry and biology

3

Communication Science

Chemical and Electromagnetic Signalling

Electrical and chemical signalling in cells combines physics and biochemistry

4

Earth Through Time

Earth Systems Science and Climate Change

To understand the long term behaviour of the interlocking systems that make up the Earth's climate combines geology, physics and chemistry

You also continue to take an option module and laboratory, mathematics, IT and professional skills modules (see page 9).



Year 4

1

Virtual Worlds

Scientific Computing

Programming in high level languages and numerical methods

2

Complex systems

The Science of Emergent Properties

Modelling of complex patterns of behaviour in physics, chemistry, biology and social science

“ I wish Interdisciplinary Science had been available when I was choosing my subject at university ”

PROFESSOR MICK BROWN FRS
(Former Chair of the Education Committee of
the Royal Society)
Interdisciplinary Science Steering Committee

What else will I learn?

Laboratory Science

There is a practical module in each year which includes both a laboratory skills component and experiments related to the current module.

Methods and Techniques

This module in each year provides training in IT and relevant transferable skills. For example, before you are required to do a major presentation you will discuss what makes a successful presentation and analyse a video of yourself giving a brief talk. The IT programme forms the other part of the module. This covers the full Microsoft Office Suite, including Visual Basic programming, as well as MAPLE (a symbolic mathematical software package), the high level programming language C and a range of module-specific software.

Mathematics for Science

This is provided by workshop sessions which cover the full range of mathematics for scientists. There are further classes for students with less background in mathematics. In addition online videos are available explaining key points.

Projects

Year 4

Research Methods: This is a 20 credit module in which you will research a topic of current interest from books and scientific journals and give a lecture on it.

Research Project: You will carry out a 60 credit (half year) project under the supervision of an academic researcher.

Examples of previous projects in years 3 and 4 include:

- An Antarctic climate palaeothermometer from fossil molluscs
- Modelling autocatalytic networks
- Distribution of soil respiration
- Effect of mobile phone radiation on photochemical reaction rates
- Communicating ethics
- An ultrasound radar simulator

“ I chose Leicester for its reputation of being at the cutting edge of science research. The enthusiasm of the lecturers is infectious ”

DAN JARRAM
Graduate 2008
MSci Interdisciplinary Science



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FAQ

How is the course assessed?

For each module you will be marked for your participation in group discussions by your facilitator who will judge this by the research you bring to the group. There is a mark for work you will do individually and a mark for the work produced by your group. At the end of the module there is a short examination.

In the mathematics and IT modules you are required to demonstrate a high level of competency in all areas. This means that you will not be held up on topics that you already know, and that you will be given all the necessary support with topics that you find challenging.

Your learning experience

This degree is about active investigation – it is in effect an undergraduate degree by research

Interdisciplinary Science is taught by problem-based learning. Each module poses one or more “real-world” problems. You work individually to research the problem with support from lecturers and facilitators. You will also carry out practical investigations in the faculty laboratories and use specialist software.

Once you have covered the core learning objectives you have the opportunity to research areas of individual interest more fully. There is no single correct response to the problem, which therefore allows scope for students with different prior experiences and different interests to contribute fully. You will bring the results of your research to the daily meetings of your group where you will evaluate your progress towards solving the problem under the guidance of a facilitator. The group produces a joint presentation or a report on the problem.

New groups are formed for each module so you will gain a varied experience of working with other students.

You obtain your degree through guided research – the way professional scientists practice science.



“ I chose to study Interdisciplinary Science at Leicester for the opportunity to work with leading experts from across the disciplines of science ”

SALLY SHAW
Graduate 2007
BSc Interdisciplinary Science

Resources

Interdisciplinary Science laboratory facilities are provided within the Centre and, where necessary, in the contributing Departments. Most of the equipment has been newly acquired for the Interdisciplinary Science programme. The Centre has a video edit suite and video conferencing facilities. Although you will normally use your tablet PC (see panel) you have access to several computer rooms in the building should the need arise, in addition to the central University computer suites.

The Centre has a library of the key textbooks for group use within the Centre. This means you always have access to the books you need while you are in the Centre. Additional recommended books for Interdisciplinary Science are kept within the separate Departmental collections in the main University library.

You will have access to several study areas which are available at all times for group or individual work. There are seven tutorial rooms which are equipped with computers and interactive whiteboards. These rooms can be booked for private group study when not in use for class teaching.

A café style Common Room where you can meet both staff and other students is shared with Physics.

Pastoral support is provided both through your personal tutor and through the Interdisciplinary Science team of administrator, learning advisor and secretary who are always available to answer queries.

A 'paperless' degree

The Interdisciplinary Science degree is a largely paperless programme. You are provided with a tablet PC for the duration of the course. This is used to deliver extensive support materials electronically and gives you individual access to the software you will need. The Centre for Interdisciplinary Science is equipped with a wireless network so you have access to electronic resources on the web at all times and you can work collaboratively on documents. Your notes are kept electronically and work is submitted and returned electronically. This means you are never without copies of all your work. An automatic back-up facility is provided.

“ A most important development
in Higher Education Science ”

PROFESSOR LORD WINSTON
Interdisciplinary Science Advisory Board

Visiting Leicester

Open Days

Each year the University of Leicester hosts several days on its campus where Departments, including the Centre for Interdisciplinary Science, are open to potential students and their families. Please feel free to sign up for one of these and come to meet us and our students. For a complete list of Open Days, please follow the links from the University home page www.le.ac.uk/

Visits Days

On receipt of your UCAS form we will offer you a chance to visit the Department. The tours are similar to those provided on Open Days, but the visit will also include an interview with a member of staff. Offers of a place may be based on the interview.

“ This is an excellent initiative that
will benefit industry ”

CEDRIC BROWN
(Former CEO, British Gas)



Who are we?

The Centre has its own director and is staffed by a specialist learning advisor, manager, educational developers, outreach support staff and a secretary. Their advice is available to you at all times. Teaching is provided by facilitators and academic staff drawn from across the Faculties of Science and Biological Sciences.

The work of the Centre is overseen by a Steering Committee of distinguished academics from outside the University and is supported by its Advisory Board.

Careers

Graduates are uniquely placed to enter employment in science-based industry and commerce in roles of policy-making, management, personnel and marketing. Our graduates have a unique contribution to make to teaching across the sciences and to developing the enthusiasm of young people for science. You will also be equipped for roles in science communication and the media.

The programme has received widespread support from employers who recognise the high level of skills and knowledge of its graduates.

The MSci (4 year) programme is designed to prepare you for a research career.

The first cohort of students who graduated in 2007 all went into further education or obtained graduate level employment in areas including teaching, scientific support and the IT industry.



Student Support

In addition to the support provided by the Centre the University provides central facilities. These include:

Student Learning Centre

Support for the development of independent learning skills is provided by this centre. There is a year round programme of study workshops, a wide range of written study guides, and a drop-in advisory centre.

Welfare Services

The University has a professional welfare service where the staff are available to assist with a wide range of issues from managing your money to dealing with landlords. Consultations are in the strictest confidence.

Careers Service

Guidance from the start of your degree is available on the importance of skills development, work experience and career planning. The Careers Centre houses an information room and hosts workshops, practice interviews and a drop-in careers advice centre.

Accommodation

Our accommodation provides you with a flexible and enjoyable living experience. You are guaranteed a room in University managed accommodation if you confirm an offer of a place at Leicester by 1st September.

“An innovative approach to providing businesses with multi-skilled talented scientists who know how industry ticks”

SUE KIRBY
(East Midlands Development Agency)

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FAQ

How is Interdisciplinary Science different from Combined Science?

Combined science courses are made up of a mixture of modules taken from single-subject programmes. Students often do not belong to any one Department and integrating the work can be troublesome.

Interdisciplinary Science has been designed around cross-disciplinary modules developed exclusively for Interdisciplinary Science students. These modules cover the key parts of each subject in the light of the current research frontiers. You have your own teaching programme, resources and support from personnel of the Centre for Interdisciplinary Science.

About the City of Leicester

Leicester is a lively diverse city with a huge choice of pubs, clubs, restaurants, cinemas and theatres, including the new Curve Theatre opening in autumn 2008.

Shopping wise, Leicester has all the big shops that you could need, with a new shopping development opening in late 2008. The Highcross Leicester development will also include a 12-screen cinema, restaurants, cafés and apartments. Leicester also has many smaller individual shops in 'The Lanes.' where you can pick up unique items.

The New Walk Museum and Art Gallery is one of many museums and art galleries within the city and boasts permanent displays including the Ancient Egyptians and the Dinosaurs, and visiting exhibitions such as a recent Picasso exhibition.

In addition to their usual club nights, most clubs and bars hold student nights with special prices. The University works closely with the clubs in Leicester and there is usually at least one big student night at the clubs each night.

For live music Leicester is excellent. The Venue at the University has recently attracted acts such as Feeder, Pendulum, Scratch Perverts, The Subways, Arctic Monkeys, We Are Scientists and Reverend And The Makers. De Montfort Hall is a bigger venue attracting bigger acts. There is also The Charlotte which is a smaller venue, for about 300 people, where acts like Snow Patrol and Thrice have played.

Leicester has four big festivals throughout the year, which are all great for students. The Summer Sundae Weekender, has included Cold War Kids; Mystery Jets; Macy Gray; Guillemots; Morcheeba; Amy Winehouse; Mr Scruff; Magic Numbers; The Divine Comedy; The Pigeon Detectives and Kate Nash. Leicester also holds an International Music Festival, bringing international jazz and concerts to Leicester. The Caribbean Carnival offers a mixture of Caribbean music, food and costumes and is a great weekend out. Finally there is the Leicester Comedy Festival. Held in Leicester in February it lasts ten days and has included acts such as Russell Brand.



About the University

The University of Leicester is a leading UK university with a proud past and an exciting future. We deliver high quality undergraduate, postgraduate and professional education and create research that has impact internationally.

Leicester was ranked joint first among mainstream English universities in the 2005, 2006 and 2007 National Student Surveys for overall student satisfaction.

We are ranked in the UK's top 12 universities by the Good University Guide and 14th in the Guardian University Guide. The research conducted by the University has the strongest impact of any Midlands university and the tenth greatest impact in the UK according to the Guardian. Our students benefit from being taught by staff at the cutting edge of their disciplines and the vibrant and exciting learning atmosphere this creates.

The University Library is a major research library, providing access to over a million printed volumes and a wide range of electronic journals and information resources via the web.

The inspirational David Wilson Library building on the main campus, which opened in April 2008, forms a central part of the University's ambitious development programme. The building, contemporary in design, combines state-of-the-art technology with the strengths of a traditional research library and over 1,500 study places.

Useful Websites:

UCAS: (Search for "Interdisciplinary Science")	www.ucas.com
The Centre for Interdisciplinary Science, University of Leicester	www.le.ac.uk/iscience
Institute of Physics	www.integratedsciences.org.uk/

Entry requirements

Offers are usually made on the basis of interview. We are looking for evidence of enthusiasm for and commitment to science as well as formal qualifications. We have accepted students from a wide range of educational backgrounds. However, as a guide, a typical A-level offer for the BSc programme is BBB or equivalent including two science subjects and for the MSci AAB including two sciences. Accepted sciences include Applied Science, Biology, Chemistry, Environmental Science, Geology, Mathematics, Physical Geography and Physics. A GCSE grade A in mathematics is normally required for the MSci and a grade B for the BSc.

Transfer between BSc and MSci is possible up to the start of year 3.

Progression to year 2 of a single subject degree (Biological Sciences, Chemistry, Earth Sciences or Physics) following two years of Interdisciplinary Science is available to suitably qualified students (normally a good second class performance or better in years 1 and 2).

For current details of other accepted qualifications please consult the University Prospectus or Interdisciplinary Science web site.

Foundation Year

Students who do not meet the entry requirements for the degree programme can apply to study for a preliminary year on the foundation programme. A minimum of two A-levels or equivalent is required.

Scholarships

All students gaining ABB or better in their best 3 A-levels are awarded a £1000 scholarship.

“We're continually challenged with exciting problems that are on the forefront of science and are given the latest tools such as tablet PCs to do so”

PRASHANT AMAR
BSc Interdisciplinary Science
2nd Year Student

UCAS Codes

The UCAS code for the University of Leicester LEICR L34

All students enter Interdisciplinary Science, either BSc or MSci

UCAS code for Interdisciplinary Science BSc
FCGO BSc/i-S
Duration 3 years, full-time

UCAS code for Interdisciplinary Science MSci
GFCO MSci/i-S
Duration 4 years, full-time

Progression to single subject degrees is made through the University.

If you have any questions regarding the suitability of your qualifications please contact the Centre for Interdisciplinary Science.

For further information please contact

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Discover your Passion

for university education

The very best way to find out about us is to visit in person. We offer visits to all UCAS applicants. In addition, you may attend one of our regular open days. More details of open days can be found at www.le.ac.uk/admissions/aopen.html



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UK

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