Geographic Data Science MSc

COURSE DETAILS

- Full-time: 12 months
- Part-time: 24 months

KEY DATES

- Apply by: 29 August 2025
- Starts: 22 September 2025

Course overview

This course will enable you to develop a high level understanding of quantitative and computational geographical methods. This includes skills in GIS software and statistical programming languages, such as R or Python.

INTRODUCTION

Within an applied setting, you will develop skills in the visualisation, modelling and statistical analysis of conventional and novel sources of data, ranging from censuses and social surveys through to satellite imagery and social media using both web-based and traditional techniques.

MORE ABOUT GEOGRAPHIC DATA SCIENCE

Human activity is increasingly associated with the generation of large volumes of data. For example, transactional data collated by retailers for marketing and store location purposes, administrative data assembled to help with the efficient running of public services, data shadows created through social media use, and an increased prevalence of smart-card linked transport systems record our travel behaviours.

Many grand human challenges concern problems of a geographical nature; be this how we can mitigate the human impact of climate change; ensure global food and water security; design energy systems that are resilient within the context of future population dynamics; or, how to design future cities where spatial inequities in health and wellbeing might be eradicated. The growing volumes of big data about the form, function and dynamics of human activities are providing new opportunities to advance such debates within a framework of Geographic Data Science.

WHO IS THIS COURSE FOR?

This course is for you if you want to understand and analyse the role of geography in everyday life through geographical and computational reasoning.

WHAT YOU'LL LEARN

• How the modern GIS toolkit can be integrated with Data Science tools to solve practical real-world problems

• You'll gain the practical ability to apply GIS in the handling and analysis of spatial data in a context of planning and social sciences

• Research methodology, philosophy, strategy and design, and to the ethical and practical considerations associated with conducting research

• How to analyse of social survey data, covering descriptive and inferential statistics, data visualisation, regression modelling and model diagnostics

• A range of analytical techniques and approaches suitable for the analysis of spatial data

• Some of the major debates of society, environment, space and place and the relationships between them.

Course content

Discover what you'll learn, what you'll study, and how you'll be taught and assessed.

SEMESTER ONE

Our compulsory modules in Geographic Data Science (GDS) will give you a comprehensive introduction to the field where GIS and Data Science intersect. You'll cover programming with Python, the industry-leading language for GIS packages like Arc/GIS and QGIS.

You'll also learn about the importance of GDS for social science applications through a combination of lectures, practical classes, and independent study. Another compulsory module delves into using GIS tools to create digital representations of the world, with a focus on avoiding potential problems. Our qualitative research module covers a range of methods and emphasizes the importance of careful research design.

We'll also introduce you to analysing social survey data through descriptive and inferential statistics, using the R programming language. As for optional modules, we offer a comprehensive overview of key algorithms and approaches for Big Data problems, as well as a focus on database systems and SQL.

Please see below for semester one modules. Select the next tab to view semester two modules.

If ENVS363 or ENVS357 have been taken as part of a first degree, then ENVS563 and ENVS357 cannot be taken and need to be replaced by an additional optional module, subject to the Programme Director's approval.

If an equivalent to ENVS609 has been taken as part of a first degree, then ENVS609 may be replaced by an additional optional module, subject to the Programme Director's approval.

No more than five modules can be taken in one semester.

COMPULSORY MODULES

SOCIAL SURVEY ANALYSIS (ENVS450)

Credits: 15 / Semester: semester 1

An introduction to analysis of social survey data, covering descriptive and inferential statistics, data visualisation, regression modelling and model diagnostics. The module is taught using 'R' – a statistical programming language – to which the module will also provide an introduction.

GEOGRAPHIC DATA SCIENCE (ENVS563)

Credits: 15 / Semester: semester 1

This module will introduce students to the nascent field of Geographic Data Science (GDS), a discipline established at the intersection between Geographic Information Science (GIS) and Data Science. The course covers how the modern GIS toolkit can be integrated with Data Science tools to solve practical real-world problems. Core to the set of employable skills to be taught in this course is an introduction to programming tools for GDS in R and Python. The programme of lectures, guided practical classes and independent study illustrate how and why GDS is useful for social science applications.

APPLIED GEOGRAPHIC INFORMATION SCIENCE (ENVS609)

Credits: 15 / Semester: semester 1

This module introduces how the tools of GIS can be used to create digital representations of the world and, through a framework of Geographic Information Science, reviews the potential problems and pitfalls of doing so. The module is delivered through lectures supplemented by practical labs that develop familiarity and skills in the application of GIS.

APPLIED DATA MANAGEMENT AND WRANGLING (ENVS615)

Credits: 15 / Semester: semester 1

The rapid expansion of data availability across disciplines has created a demand for robust techniques to manage, transform, and analyse diverse datasets. This module introduces students to Data Science tools, from data collection, cleaning, wrangling, and storing, to visualising and analysing using modern machine learning techniques in order to transform data into knowledge. The focus is on practical applications, equipping students with the skills to clean, structure, and analyse complex datasets to extract actionable insights that help in decision-making and addressing real-world challenges. Assessment is based on two pieces of coursework, where students will demonstrate their ability to conduct rigorous and effective data management and analysis on real-world datasets.

OPTIONAL MODULES

DATABASE AND INFORMATION SYSTEMS (COMP518)

Credits: 15 / Semester: semester 1

This module focuses on how databases are used in modern information systems. They are at the heart of almost all systems, such as supermarket checkouts, online banking, home rentals, and much more. One of the most successful data definition and manipulation languages is SQL, which will be covered in detail. The module will also introduce some of the fundamental concepts in computer science, as well as the mathematical underpinnings of relational databases and the techniques used to support concurrency and reliability in large information systems.

BIG DATA ANALYTICS (COMP529)

Credits: 15 / Semester: semester 1

This module provides an initial overview of key algorithms and algorithmic approaches and corresponding software environments used when developing solutions to Big Data problems and explains how to use these to analyse data. A significant portion of statistics, some advanced AI approaches as well as key deterministic and hybrid algorithms are included to support the development of future data analytics and to understand how to develop stochastic, machine learning and hybrid algorithms that can exploit Big Data and can be applied to solve real life problems.

Any optional modules listed above are illustrative only and may vary from year to year. Modules may be subject to minimum student numbers being achieved and staff availability. This means that the availability of specific optional modules cannot be guaranteed.

SEMESTER TWO

You will learn about statistical techniques for handling spatial data and the latest debates in the discipline through seminars and essays. They will also gain knowledge of web-based map visualization and analysis, and an understanding of the importance of time and location in new forms of data.

Optional modules give you the chance to learn about biologically inspired optimization, population science theory, and digital trace data analysis. Another module explores social and spatial inequalities and their inter-relations through four themes, providing insight into government responses to these issues in the UK.

No more than five modules can be taken in one semester.

COMPULSORY MODULES

SPATIAL MODELLING FOR DATA SCIENTISTS (ENVS453)

Credits: 15 / Semester: semester 2

An introduction to a range of statistical techniques specifically designed to handle spatial data, building upon the more generic social survey analysis skills and R programming skills covered and developed in ENVS450, the pre-requisite of Module ENVS453.

THEORISING HUMAN GEOGRAPHY (ENVS416)

Credits: 15 / Semester: semester 2

This is the core theoretical course for all students on a Human Geography Masters introducing students to the latest debates in the discipline. It is taught through a series of staff-led seminars with pre-set readings and assessed through a 4000-word essay through which students identify the session closest to their individual research interests and agree a topic with that member of staff who provides formative guidance and feedback. This enables students to undertake an in-depth piece of work at master's level on the topic that most interests them, and which they may go on to study in more detail later should they undertake doctoral studies. A formative essay plan submission helps support students in the development of their essay.

WEB MAPPING AND GEOVISUALISATION (ENVS456)

Credits: 15 / Semester: semester 2

Through this module students will gain an understanding of how maps can be visualised online through a number of web platforms. Additionally, the internet will be presented both as a source of new data, and provide analytical functionality that can assist when solving geographic problems. Geographic data can be any dataset that can be visualised in a map. The module is taught through a mixture of lectures and practicals, and is assessed through two summative projects.

OPTIONAL MODULES

COMPUTATIONAL INTELLIGENCE (COMP575)

Credits: 15 / Semester: semester 2

Biologically inspired optimisation and introduction to neural networks for artificial intelligence.

POPULATION DATA SCIENCE (ENVS418)

Credits: 15 / Semester: semester 2

The module provides an introduction to fundamental techniques of population data science theory. New forms of data in the way of digital traces are becoming more easily accessible offering a unique opportunity to understand societal population issues at an unprecedented temporal and spatial granularity and a global scale. These data, however, represent a challenge for traditional demographic approaches. This module provides an introduction to the use of novel methods to analyse digital trace data.

SOCIAL AND SPATIAL INEQUALITIES (ENVS357)

Credits: 15 / Semester: semester 2

This module provides insight into social and spatial inequalities, and their inter-relations. The module will consider how and why inequalities might have persisted over time, how social inequalities have specific geographies, and the implications of this unevenness for those who are marginalised. The module is structured through four major themes: for example, inequalities and the labour market; ethnicity and inequalities; spatial understandings of poverty; and theories about inequality. The difficulties in defining and measuring social and spatial inequalities, and how such definitions may relate to broader theories, perspectives or frameworks of relevance are issues covered in the module, as well as how these terms are interpreted and (mis-)represented. The module draws on empirical evidence, theoretical approaches and policy responses. The module provides insight into government responses that aim to combat social and spatial inequalities and related issues in the UK, at the regional and sub-regional level.

Any optional modules listed above are illustrative only and may vary from year to year. Modules may be subject to minimum student numbers being achieved and staff availability. This means that the availability of specific optional modules cannot be guaranteed.

FINAL PROJECT

You'll attend an introductory seminar early on to give you a better understanding of what's expected in writing your dissertation and provide you with some guidance on forming your dissertation ideas and topic.

You'll also have several sessions to discuss your progress and help you focus your topic and define your areas of interest. Additionally, you'll have supervision sessions or pastoral tutorials with your dissertation supervisor to support you in developing and completing your dissertation.

No more than five modules can be taken in one semester.

COMPULSORY MODULES

DISSERTATION - GEOGRAPHIC DATA SCIENCE (ENVS492)

Credits: 60 / Semester: summer

The module is designed around the goal of giving students the opportunity to fully and independently develop a theme in Geographic Data Science. Throughout a self-directed but staff-supported approach, students will identify a relevant topic in Geographic Data Science, will develop it into an academic project, and will complete the research required. By the end of the module, the student should achieve the level of a publishable academic paper.

Any optional modules listed above are illustrative only and may vary from year to year. Modules may be subject to minimum student numbers being achieved and staff availability. This means that the availability of specific optional modules cannot be guaranteed.

HOW YOU'LL LEARN

You'll learn across a variety of teaching methods, like lectures, seminars, and hands-on workshops in the computer lab. Each module usually starts with a brief lecture by the module leader, followed by some independent research or computer-based exercises.

You'll either work on these assignments on your own or in a group project. After that, you'll present your findings to the other students and the module leader, which will lead to a group discussion. This is a formative exercise, so you may even get feedback from your peers on your presentation.

HOW YOU'RE ASSESSED

Assessments in this programme will provide you with the opportunity to pursue avenues of these fields that are relevant to your particular interests and career aspirations. The assessment is therefore designed flexibly to provide student centred, research-led learning.

Assessment takes the form of short (~3000 word) reports, computational essays, oral presentations, computer exercises, examinations and a 12,000 maximum word dissertation.

LIVERPOOL HALLMARKS

We have a distinctive approach to education, the Liverpool Curriculum Framework, which focuses on research-connected teaching, active learning, and authentic assessment to ensure our students graduate as digitally fluent and confident global citizens.

Careers and employability

This program will give you the high-level skills you need to kickstart your career in applied geographical information science, data science with a geographic focus, or research with expertise in spatial analysis, GIS, and data science.

Career support from day one to graduation and beyond

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Career planning

Our Careers Studio and career coaches can provide tailored support for your future plans.

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From education to employment

Employability in your curriculum for a successful transition

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YOUR FUTURE

Your career options after graduation are diverse and exciting. You might pursue a PhD or postdoctoral research, work as a GIS/Data Science consultant, be employed in the commercial or public sector, work in IT consulting, or teach in higher education. With the programming and web development skills you'll gain, you'll be in high demand in the job market for your newer spatial data handling skills, which are more in demand than traditional GIS skills.

Fees and funding

Your tuition fees, funding your studies, and other costs to consider.

TUITION FEES

UK fees (applies to Channel Islands, Isle of Man and Republic of Ireland)	
Full-time place, per year	£12,500
Part-time place, per year	£6,250

International fees	
Full-time place, per year	£28,300
Part-time place, per year	£14,150

Fees stated are for the 2025-26 academic year.
Tuition fees cover the cost of your teaching and assessment, operating facilities such as libraries, IT equipment, and access to academic and personal support.

• You can pay your tuition fees in instalments.
• All or part of your tuition fees can be funded by external sponsorship.
• International applicants who accept an offer of a place will need to pay a tuition fee deposit.

If you're a UK national, or have settled status in the UK, you may be eligible to apply for a Postgraduate Loan worth up to £12,167 to help with course fees and living costs. **Learn more about fees and funding**.

ADDITIONAL COSTS

We understand that budgeting for your time at university is important, and we want to make sure you understand any course-related costs that are not covered by your tuition fee. This could include buying a laptop, books, or stationery.

Find out more about the [additional study costs](#) that may apply to this course.

SCHOLARSHIPS AND BURSARIES

We offer a range of scholarships and bursaries that could help pay your tuition and living expenses.

We've set the country or region your qualifications are from as United Kingdom. [Change it here](#)

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[POSTGRADUATE GLOBAL ADVANCEMENT SCHOLARSHIP – ACHIEVEMENT](#)

o   [International students](#)
[If you're an international student joining a master's course with us, you could be eligible to receive a tuition fee discount of £2,500, based on your prior academic achievement, choice of course, and you not having studied with us before.](#)

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[POSTGRADUATE GLOBAL ADVANCEMENT SCHOLARSHIP – COUNTRY](#)

o   [International students](#)
o   [Antigua and Barbuda](#)
o   [Australia](#)
o   [Bangladesh](#)
o   [Barbados](#)
o   [Belize](#)
o   [Brunei](#)
o   [Canada](#)
o   [China](#)
o   [Cyprus](#)
o   [Dominica](#)
o   [Egypt](#)
o   [Ghana](#)
o   [Grenada](#)
o   [Guyana](#)
o   [India](#)
o   [Jamaica](#)
o   [Japan](#)
o   [Kenya](#)
o   [Malaysia](#)
o   [Mauritius](#)
o   [Mexico](#)
o   [New Zealand](#)
o   [Nigeria](#)
o   [Pakistan](#)
o   [Saint Kitts and Nevis](#)
o   [Saint Lucia](#)
o   [Saint Vincent and The Grenadines](#)

- Singapore
- South Africa
- South Korea
- Sri Lanka
- Tanzania
- Thailand
- Trinidad and Tobago
- Turkey
- Uganda
- Vietnam

If you're an international student joining a master's course with us, you could be eligible to receive a tuition fee discount of £2,500, based on your nationality, choice of course, and you not having studied with us before.

GRADUATE LOYALTY ADVANCEMENT SCHOLARSHIP

- Home and international students

If you're a University of Liverpool graduate starting this master's degree with us, you could be eligible to receive a loyalty discount of up to £2,500 off your master's tuition fees.

CHILEAN NATIONAL AGENCY FOR RESEARCH AND DEVELOPMENT (ANID) SCHOLARSHIP

- International students
- Chile

If you're a Chilean student joining a master's degree, you could be eligible to apply for a 20% discount on your tuition fees with a Chilean National Agency for Research and Development (ANID) Scholarship. Scholarship.

BRACKEN DATA SCIENCE SCHOLARSHIP

- Home students

Studying a data science master's in the School of Electrical Engineering, Electronics and Computer Science? If you live in the Liverpool City Region, with household income below £25,000, you could be eligible to apply for £5,000. One award is available per academic year.

CHEVENING SCHOLARSHIPS

- International students
- Albania
- Algeria
- Anguilla
- Antigua and Barbuda
- Argentina
- Australia
- Azerbaijan
- Bangladesh

- Barbados
- Belize
- Bolivia
- Brazil
- British Virgin Islands
- Brunei
- Canada
- Cayman Islands
- Chile
- China
- Columbia
- Costa Rica
- Cuba
- Dominica
- Ecuador
- Egypt
- El Salvador
- Ghana
- Guatemala
- Guyana
- Honduras
- Hong Kong
- Iceland
- India
- Indonesia
- Iraq
- Jamaica
- Japan
- Jordan
- Kazakhstan
- Kenya
- Libya
- Malaysia
- Mauritius
- Mexico
- Moldova
- Mongolia
- Montserrat
- Morocco
- Nepal
- New Zealand
- Nicaragua
- Nigeria
- Pakistan
- Panama
- Paraguay
- Peru
- Philippines

- Russia
- Saint Kitts and Nevis
- Saint Lucia
- Saint Vincent and The Grenadines
- Serbia
- Singapore
- South Africa
- South Korea
- South Sudan
- Sri Lanka
- Sudan
- Taiwan
- Tanzania
- Thailand
- Trinidad and Tobago
- Turkey
- Turks and Caicos Islands
- Uganda
- Ukraine
- Uruguay
- Venezuela
- Vietnam
- Zimbabwe

If you're an international student from an eligible country, joining a one-year master's course, you could be eligible to apply for a Chevening Scholarship. If your application is successful, you could expect to have your master's fees paid, up to a maximum of £18,000, and receive additional help with living costs.

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CONSEJO NACIONAL DE CIENCIA Y TECNOLOGIA (CONACYT) AWARD

- International students
- Mexico

If you're a Mexican student joining a master's degree, you could be eligible to apply for a 30% discount on your tuition fees with a CONACyT Award.

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FUND FOR THE DEVELOPMENT OF HUMAN RESOURCES (FIDERH) AWARD

- International students
- Mexico

If you're a Mexican student joining a master's degree and you're in receipt of a FIDERH graduate loan, you could be eligible to benefit from a 20% discount on your tuition fees with a FIDERH Award.

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FUNED AWARD

- International students
- Mexico

If you're a Mexican student joining a master's degree and you're in receipt of a FUNED loan, you can apply to be considered for a 20% tuition fee discount. A total of up to 50 awards will be available to master's and PhD students per academic year.

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FUNED SCHOLARSHIP FOR WOMEN IN STEM SUBJECTS

- ○ International students
- ○ Mexico

If you're a female Mexican student joining an eligible master's course in a science, technology, engineering or maths (STEM) subject and you're in receipt of a FUNED loan, you can apply to be considered for a 25% tuition fee discount. Up to five awards are available in each academic year.

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HRH PRINCESS SIRINDHORN UNIVERSITY OF LIVERPOOL SCHOLARSHIP (THAILAND)

- ○ International students
- ○ Thailand

If you're a student from Thailand joining a one-year master's degree, you might be eligible to apply to have your tuition fees paid in full and receive help with living costs. One award is available and only students who are new to the University will be considered.

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HUMANITARIAN SCHOLARSHIPS FOR MASTER'S PROGRAMMES

- ○ International students

Do you have recognised status as a refugee or person with humanitarian protection outside the UK? Or are you a Ukrainian who's sought temporary protection in the EU? You could be eligible to apply for the full payment of your master's fees and additional financial support.

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JOHN LENNON MEMORIAL SCHOLARSHIP

- ○ Home students

If you're a UK student, either born in or with strong family connections to Merseyside, you could be eligible to apply for a fee discount of up to £4,500. You'll need to demonstrate an active interest in global, community and environmental issues to be considered.

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JUVENTUDESGTO SCHOLARSHIP

- ○ International students
- ○ Mexico

If you're a resident of the state of Guanajuato in Mexico joining a master's degree, you could be eligible for a 10% discount on your tuition fees with a JuventudEsGto Scholarship.

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KAPLAN DIGITAL PATHWAYS EXCELLENCE SCHOLARSHIP

- ○ International students

Completed a Kaplan Digital Pathways Pre-Master's? We're offering a £5,000 fee discount off the first year of master's study for a maximum of two high achieving students joining one of our non-clinical master's courses from an online Kaplan Pre-Master's programme.

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MARSHALL SCHOLARSHIP

- ○ International students
- ○ United States

If you're a USA student joining an eligible master's with us, you could be eligible to apply for a Marshall Scholarship. If your application is successful, your master's tuition fees will be paid in full. One Marshall Scholarship for master's study is available in each academic year.

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POSTGRADUATE OPPORTUNITY BURSARY

- ○ Home students

If you're a UK University of Liverpool graduate joining a master's degree with us, you could be eligible to receive £3,000 off your tuition fees. You must have graduated in the last two years and received a widening access scholarship during your undergraduate studies.

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SCOTTISH POWER SCHOLARSHIPS

- ○ Home students

Are you a UK student joining a master's course focused on sustainable energy or environmental protection? You could be eligible to apply for a Scottish Power Scholarship. This award offers full payment of your master's fees and a monthly bursary while you study.

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SPORT LIVERPOOL PERFORMANCE PROGRAMME

- ○ Home and international students

Apply to receive tailored training support to enhance your sporting performance. Our athlete support package includes a range of benefits, from bespoke strength and conditioning training to physiotherapy sessions and one-to-one nutritional advice.

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THE AZIZ FOUNDATION SCHOLARSHIP

- ○ Home students

If you're a British Muslim, active within a Muslim community and dedicated to bringing positive change to society, you could apply to potentially have the full cost of your master's tuition fees covered by an Aziz Foundation Scholarship.

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TURKISH MINISTRY OF EDUCATION SCHOLARSHIP

- ○ International students
- ○ Turkey

If you're a Turkish student joining a master's degree, you could be eligible to apply for a 20% discount on your tuition fees with a Turkish Ministry of Education Scholarship.

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[UNIVERSITY OF LIVERPOOL INTERNATIONAL COLLEGE EXCELLENCE SCHOLARSHIP](#)

- International students

[Completed a Pre-Master's at University of Liverpool International College (UoLIC)? We're offering a £5,000 fee discount off the first year of master's study to some of the highest achieving students joining one of our non-clinical master's courses from UoLIC.](#)

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[UNIVERSITY OF LIVERPOOL INTERNATIONAL COLLEGE IMPACT PROGRESSION SCHOLARSHIPS](#)

- International students

[If you're a University of Liverpool International College student awarded a Kaplan Impact Scholarship, we'll also consider you for an Impact Progression Scholarship. If selected, you'll receive a fee discount worth £3,000 off the first year of your master's course.](#)

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[VICE-CHANCELLOR'S INTERNATIONAL ATTAINMENT SCHOLARSHIP FOR MAINLAND CHINA](#)

- International students
- China

[Are you a high-achieving graduate from the People's Republic of China with a degree from a Chinese university? You could be eligible to apply for a £5,000 fee discount if you're joining an eligible master's course. Up to 15 eligible students will receive this scholarship.](#)

Entry requirements

The qualifications and exam results you'll need to apply for this course.

Your qualification	Requirements [About our typical entry requirements](#)
GCSE	4/C in English and 4/C in Mathematics
Postgraduate entry requirements	We accept a 2:2 honours degree from a UK university, or an equivalent academic qualification from a similar non-UK institution. This degree should be in a relevant subject. Non-graduates with very extensive professional experience and/or other prior qualifications may also be considered.
International qualifications	Many countries have a different education system to that of the UK, meaning your qualifications may not meet our entry requirements. Completing your Foundation Certificate, such as that offered by the [University of Liverpool International College](#), means you're guaranteed a place on your chosen course.

THE ORIGINAL
REDBRICK