Mathematics, Operational Research, Statistics and Economics (MORSE)
Undergraduate Degrees 2023
Welcome

I am delighted you are considering joining us in the Department of Management Science. We have a worldwide reputation for our excellence in Business Analytics, Operational Research, Information Systems and Operations Management. That status is built from first-year students to our most experienced professors.

Our courses are perfect for those who have excelled at Mathematics or Statistics at school, and those with a thirst for knowledge and understanding about how things work in business – and why they work that way. We will provide you with in-demand skills that will allow you to solve real-world problems in business and industry.

Our diverse international student body carry their Lancaster experience with them throughout their careers. Our degrees are ideal preparation for careers in general management or consultancy, as well as for more specialist roles in industry, finance, the public sector or government. Our graduates have gone on to work for companies such as United Utilities, PwC and Deloitte.

Our researchers have a distinguished history of helping organisations solve real problems. You learn from internationally-renowned scholars with knowledge in areas including Transport and Logistics, Marketing Analytics and Forecasting, Supply Chain Management, Optimisation for organisations such as hospitals and Information Systems. Lancaster University Management School is rated the number one business school in the UK for both our research power and research environment, and you feel the benefit of this in the classroom.*

Our courses are designed to be flexible. You can focus on your interests and broaden your knowledge to put you in a better position to achieve your career ambitions. Our excellent careers teams can also help prepare you for interviews and assessment centres, build your CV and make you attractive to potential employers.

Whichever degree you are interested in, you will graduate with lifelong memories and skills.

Thank you for considering study at Lancaster as you make this important decision for your future life and career.

Professor Linda Hendry
Head of the Department of Management Science

*REF 2021, Business and Management Studies, first for Research Power, equal-first for research environment.

Use numbers to solve real-world problems

Shifting markets and an ever-changing political landscape make for a complex world. Every organisation – industrial, financial or governmental – needs to embrace technology and data to optimise their performance.

Smartphone use, the role of social media data, risk planning, retail patterns; all of these can be counted and analysed. They can also help forecast the future, deciding where to invest or what route to take. This needs creative, technically competent and business-savvy people; the kind of graduates our MORSE degree produces.

BSc Mathematics, Operational Research, Statistics and Economics (MORSE) is a coherent degree ideal for mathematically-gifted students who want to use numbers to solve real-world problems in business and industry. The combination of these highly influential subjects and the way we have structured the programme means that from year two onwards, you take increasing ownership over your studies, choosing modules to keep pace with your interests and strengths.

Lauren Yarwood

The course structure for MORSE is unique in that during the first 2 years, your course structure is already set but then your 3rd year is completely free allowing you to choose what you want to specialise in. You can tailor it to your interests.
How your degree is structured

Your degree is made up of two main parts: the first year, which is referred to as Part I and the second and third year, which are called Part II. If you are taking a four-year degree the fourth year is still within Part II.

You will study a range of modules in each Part. Some are taken by all students on your degree programme, some are optional modules focused on your major subject area, and some could be options from outside of your major subject area.

This structure offers you the chance to devise a more flexible degree programme that reflects your interests.

What you’ll study

This programme combines the highly influential subjects of Mathematics, Operational Research, Statistics and Economics into one coherent degree ideal for mathematically-gifted students who want to use numbers to solve real-world problems in business and industry.

Taught across our world-class departments of Management Science, Mathematics and Statistics, and Economics, the focus is on practically applying mathematical theory. In addition to mathematics, you will learn business modelling, economic theory, statistics and analytics, and how all these skills can come together to create better solutions to intricate problems.

In your first year you will gain a strong foundation in mathematics, operational research, statistics and economics. You then tailor your programme, developing a broad knowledge base or specialising in topics relevant to your future career.

Year 1 Core Modules

Calculus

An understanding of functions, limits, and series, and knowledge of the basic techniques of differentiation and integration.

Economic Principles and Applications

Learn the theory of micro and macroeconomics, including monetary theories, business cycles and inflation.

Further Calculus

Extends ideas of MATH101 from functions of a single real variable to functions of two real variables.

Linear Algebra

Introducing the theory of matrices together with some basic applications. You’ll also learn how to express a linear transformation of the real Euclidean space using a matrix.

Probability

This module will introduce students to some simple combinatorics, set theory and the axioms of probability.

Statistics

Achieve a solid understanding of the broad role that statistical thinking plays in addressing scientific problems.

Year 2 Core Modules

Business Modelling and Simulation

Covers the skills needed to improve business process by modelling and simulation.

Linear Algebra

Learn the foundational results and language of linear algebra, which you will be able to build upon in Part II.

Macroeconomic Analysis

Use macroeconomic models to understand real-world economic phenomena.

Microeconomic Analysis

Covers aspects of microeconomics relevant to general management, and also emphasises techniques and tools of analysis alongside relevant theory.

Optimisation

This module describes a variety of optimisation algorithms and how business problems can be modelled using these techniques.

Probability

Revisits basic concepts from first-year probability and extends them to encompass continuous random variables.

Statistics

Recognise the role, and limitations, of the linear model for understanding, exploring and making inferences concerning the relationships between variables and making predictions.

Optional module example:

Applied Economics

Analyze some of the major national and global challenges that face us all.

You will work through examples such as investigating the causes and consequences of crime for individuals and society, the relationship between economic development and population migration, and the economic effects of climate change and the progress made towards net-zero carbon emissions.

Year 2 Optional Modules

Applied Economics

Games and Strategic Behaviour

Introduction to Operations Management

IT in Organisations: Introduction to ERPs

Managing Business Information Systems

Project Management Tools & Techniques

Spreadsheet Modelling for Management Supply Chain Management

Optional module example:

Machine Learning

Using the classical problem of data classification as a running example, this module covers mathematical representation and visualisation of multivariate data; dimensionality reduction; linear discriminant analysis, and Support Vector Machines. While studying these theoretical aspects, students will also gain experience of applying them using R.

An appreciation for multivariate statistical analysis will be developed during the module, as will an ability to represent and visualise high-dimensional data. Students will also gain the ability to evaluate larger statistical models, apply statistical computer packages to analyse large data sets, and extract and evaluate meaning from data.

Year 3 Core Modules

Likelihood Inference

Reinforces the likelihood approach from second year Statistics and extends this to problems where the probability for the data depends on more than one unknown parameter.

Optional module example:

Generalised Linear Models

Development Economics

Data Mining for Direct Marketing and Finance

Business Forecasting

Monetary Macroeconomics

Mathematics for Stochastic Finance

Time Series Analysis

Optional module example:

Bayesian Inference

International Trade

Industrial Organisation

Health Economics

Growing and Decaying Populations

Mathematics of Stochastic Finance

Machine Learning

Advanced Spreadsheet Modelling

Business Forecasting

Medical Statistics: Study Design and Data Analysis

Project Management: Negotiation and Decision Support

Public Policy Analysis

Stochastic Processes

Structuring Complex Problems

Year 3 Optional Modules

For more information, please visit lancaster.ac.uk/study
Entry requirements

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<th>A Level</th>
<th>GCSE</th>
<th>IELTS</th>
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<td>AAA including A Level Mathematics or Further Mathematics OR ABB including A Level Mathematics and Further Mathematics</td>
<td>English Language grade C or 4</td>
<td>6.5 overall with at least 5.5 in each component.</td>
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<th>International Baccalaureate</th>
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<td>35 points overall with 16 points from the best 3 Higher Level subjects including 6 in Mathematics HL (either analysis and approaches or applications and interpretations)</td>
<td>Considered alongside A Level Mathematics grade A</td>
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We welcome applications from students with a range of alternative UK or international qualifications. Applicants with a TMUA test score are advised to contact us.

Find out more here: lancaster.ac.uk/study/undergraduate/how-to-apply

Typical contact hours
10 to 15 per week

Typical assessment
Modules include a mixture of coursework and exams. Weighting varies by module.

Industry option
This degree has the option to spend a year on placement as part of your degree. Entry requirements for this four-year degree may differ. Please check the website.

Life at Lancaster

Where future leaders are made
LUMS is a place of collaboration and creativity. It's a place where ideas are exchanged, talent is nurtured and bright futures begin. You will be part of a diverse student community that benefits from world-class facilities and a supportive learning environment.

Our brand new five-storey Management School building is a space to think and collaborate with three new lecture theatres, two executive teaching suites and a large atrium. This cutting edge facility provides an inspiring setting for the whole community, with large open spaces designed to enhance collaboration.

We are also home to a diverse, thriving and international community with a network of over 40,000 alumni.

Nine colleges, one home
Colleges are central to your University experience. They are where your social journey will start and one of them is very likely to be your home in Year 1. They're where you can study and socialise and it's almost like stepping into a ready-made set of friends. For 'collegiate' read 'supportive', 'friendly', 'fun' and 'open'.

Future career options
You will graduate with an enviable array of quantitative and analytical skills in high demand by industry, commerce, finance, the public sector, consulting and the government.

By combining the four disciplines of Mathematics, Operational Research, Statistics and Economics, our graduates leave with the skills to make a difference at the core of business. They have gone on to work in consultancies like Accenture and McKinsey, as well as large multinationals. MORSE graduates are highly sought after for their analytical thinking and wide range of technical skills.

LUMS has an award-winning careers team who provide you with a dedicated careers and placement service. We also attract a wide range of leading global employers to campus offering you the opportunity to interact with graduate recruiters from day one of your degree.

You'll not only gain a highly reputable degree, you’ll also graduate with life- and work-based skills. Every student is eligible to participate in The Lancaster Award, which offers you the opportunity to complete key activities such as work experience, employability awareness, career and social development.

For more information, please visit lancaster.ac.uk/study

UK top 10
LUMS is ranked amongst the UK’s top 10 and Europe’s top 50 business schools Financial Times European Business School Rankings 2021

My Lancaster experience has given me lots of professional connections that I wouldn’t have had otherwise. The team within the LUMS career service were a huge help when I was searching for my placement.

Laura Conchie
How to apply

All the up-to-date information you need before you submit your application is online:

lancaster.ac.uk/study

Get in touch

E: lums@lancaster.ac.uk
lancaster.ac.uk/asklums

The information in this leaflet relates to 2023 entry to the University and every effort has been taken to ensure the information is correct at the time of publication (June 2022). The University will use all reasonable effort to deliver the course as described but reserves the right to make changes after publication.

Further legal information may be found at: www.lancaster.ac.uk/compliance/legalnotice.