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MORSE

Mathematics
Operational Research
Statistics
Economics

BSc Hons • MMORSE

THE UNIVERSITY OF WARWICK

- SCHOOL
  Mathematics
- UNIVERSITY
  MORSE
- CAREER

› **Professions**
- Actuary
- Accountancy
- Finance

› **Statistician**
- Industry
- Civil Service

› **Operational Control**
- Management Consultancy
- Modelling

› **Economics**
- Modelling
- Planning
- Analysis

› **Academic**
- Teaching
- Postgraduate Research

MORSE (BSc Hons • MMORSE)

Honours Degrees in Mathematics, Operational Research, Statistics and Economics

What is MORSE?

MORSE is a single honours degree in mathematics and its practical application to Business, Finance, Economics, and other topics and it is available only at the University of Warwick. Instead of pursuing the more traditional areas of Applied Mathematics, **MORSE** relates Pure Mathematics to the modern application areas described opposite.

MORSE contains a balance of mathematical theory and practical work in order to produce high quality graduates who are mathematically equipped to deal with the practical problems of the modern world.

A Mathematics degree for those interested in pursuing a course which combines theory with modern applications.

- An integrated Single Honours Degree, designed to provide a sound basis leading to a wide variety of careers.
- The theory of pure mathematics is taught with relevance to applications in operational research, statistics, finance, econometrics and mathematical economics.
- No previous knowledge of these areas is necessary.
- Available as a three year BSc (UCAS CODE: GLN0) or as a four year integrated Master's (UCAS CODE: GOL0) in which students specialise in their final two years in one of four possible streams: Actuarial and Financial Mathematics; Operational Research and Statistics; Econometrics and Mathematical Economics; or Statistics with Mathematics.
- Application should be made to only one of these courses. If in doubt, apply for the four year integrated Master's because it is possible to transfer to the three year BSc at the end of the second year.
- If you would like a detailed course guide for MORSE, please write to the **Course Selector,**
  Department of Statistics,
  The University of Warwick,
  Coventry, CV4 7AL *or*
  email: **morse@warwick.ac.uk**

The Composition of MORSE
What is MORSE about?

Pure Mathematics
Including: linear algebra, analysis, metric spaces and functions of several variables.

Operational Research
The application of mathematics to solve problems associated with decision making, e.g. resource allocation, forecasting, optimisation, marketing, system control and simulation.

Statistics
Mathematical theory of probability and of the analysis of data; the study of uncertainty. Forecasting, risk analysis, stochastic modelling in finance and other areas, actuarial mathematics, and decision theory.

Mathematical Economics
The development of mathematical models for the economy; macro- and micro-economic theory. Econometric modelling, competition, and public finance.

The first two years of the BSc and integrated Master's degrees are identical. Students on integrated Master's can transfer to the BSc at the end of the second year. Only those students on the integrated Master's who perform sufficiently well will be allowed to proceed to the final two years of the integrated Master's degree; otherwise they will be required to transfer to the BSc at the end of the second year.

- **First year**

In their first year, students acquire a training in the Pure Mathematics necessary for the remainder of their course, including mathematical techniques, analysis, sets and linear algebra. Work also begins on operational research, probability, practical statistics, and the mathematical formulation of economic problems. Optional courses include introductions to computer programming and various mathematical topics. Approximate division of time for a normal load of ten 30-lecture modules: Maths 40%, OR 10%, Statistics and Probability 30%, Economics 20%.

Many courses deal with applications and contain practical coursework as well as developing the theoretical side of the subject. For example, in the first year there is an optional statistics course with sessions providing students with a feel for the collection and analysis of real data. There are similar activities in Operational Research and Mathematical Economics.

- **Second Year**

In the second year, there is rather more emphasis on the application areas, with further courses on Probability and Statistics. The development of Operation Research and Mathematical Economics continues, supported by further analysis. Approximate division of time: Maths 20%, OR 10%, Statistics 20%, Economics 10%, Options from a wide range of subjects 40%.

Students may choose to spend an "intercalated" year in an approved industry or business between their last two years at Warwick and graduate with an BSc or integrated Master's degree in MORSE (with Intercalated Year).

- **Third and Fourth Years**

In the third and final year of the BSc all courses are optional; students' choices are dictated by their tastes and by their career plans. There are opportunities for specialising in any of the main MORSE subject areas, or students may select a balanced variety of courses. It is also possible to take several courses outside the strict MORSE area.

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At the end of the second year of integrated Master's, successful students will either progress to the third and final year of the BSc programme or remain on the integrated Master's and specialise in one of the following four areas in their final two years:

❶ Actuarial and Financial Mathematics:
Objective: this stream intends to provide students with a sound theoretical and practical basis for careers and research in financial mathematics and to prepare students for an actuarial career by covering a number of Actuarial Examinations.

Possible courses include: Probability Theory, Applied Statistical Modelling, Principles of Finance, Financial Instruments, Stock Market Theory, Financial Analysis, Martingales, Investment Management, Stochastic Models in Finance.

❷ Operational Research and Statistics:
Objective: to prepare students for employment as management scientists, for research in OR and for progression to general managerial positions.

Possible courses include: Bayesian Statistics and Decision Theory, Strategic Information Management, Mathematical Programming III, Process of OR.

❸ Econometrics and Mathematical Economics:
Objective: to prepare students for careers in econometrics, economic consultancy, and research in quantitative economics.

Possible courses include: Mathematical Economics II, Econometric Theory, Public Finance, Game Theory, Applied General Equilibrium.

❹ Statistics with Mathematics:
Objective: to prepare students for employment as statisticians and for research in statistics.

Possible courses include: Measure Theory, Probability Theory, Multivariate Statistics, Medical Statistics, Martingales, Stochastic Models in Finance, Advanced Topics in Statistics.

The MORSE course is extremely flexible, and there are opportunities for incorporating statistical projects, further mathematical, science and computing options, and even music and language courses. Many students in fact opt to take more than the normal load of courses (and receive extra credit for doing so).

Is MORSE suitable for You?

MORSE is designed for good mathematicians who are interested in pursuing sophisticated theory with relevance to modern applications in operational research, finance, statistics and mathematical economics. Admission to MORSE requires a top grade in an A-level or comparable Mathematics course (e.g. Mathematics, Pure Mathematics, Mathematics with Statistics) with experience of Further Mathematics being an advantage. No previous knowledge of Operational Research, Statistics, Economics or Computing is expected or required, but applicants must have an interest in applying their theory to real problems.

MORSE is one of a comprehensive range of mathematically-oriented single honours degrees at the University of Warwick, including:

- MORSE
- Data Science
- Mathematics and Statistics
- Mathematics (Pure)
- Mathematics and Physics
- Computer Science
- Discrete Mathematics

The MORSE degree concentrates on those modern and developing areas of mathematics needed in industry, management, government, finance and so on.

Career Opportunities

MORSE graduates can choose from a wide variety of careers, for example:

The Professions

Actuaries, Cost Accountants, Chartered Accountants, Investment Banking. MORSE is undoubtedly the most suitable degree at Warwick for those students who wish to become actuaries.

Management

Modern managers need to understand mathematical methods like those of operational research and decision theory, and communication skills are vital. The MORSE course, with its project work and report writing, is an excellent degree for prospective managers.

Industry

Industry is consistently short of well qualified people, particularly experts in statistics and operational research. Many MORSE graduates take up such careers, where they can apply their specialist knowledge and also use their broad base of experience to communicate effectively with other specialists.

Teaching

Schools are still desperately short of mathematics teachers, and university careers are also possible after further study.

Research

A significant number of our students go on to take postgraduate degrees and to research posts in industry, medical schools, government departments and elsewhere.

Even when employment prospects are not generally good, the University's Careers Advisory Service classifies MORSE students as being in high demand, particularly for the careers mentioned above.

Mathematics at Warwick

Since its formation as one of the new universities in 1965, Warwick has developed into one of the strongest universities for mathematical sciences in the country. Warwick has a thriving central Mathematics Department with interests in many areas of Pure and Applied Mathematics, and links with other departments concerned with applicable Mathematics. A fully comprehensive range of Mathematical degrees is offered to students.

The Statistics Department was formed in 1972, has expanded considerably since then and has established an enviable reputation in teaching and research. The Centre for Research in Statistical Methodology (CRiSM) is a multi-million pound government initiative which further strengthens this achievement. The excellence of the department research output directly impacts teaching: our lecturing staff are active researchers in a broad range of areas in probability and statistics, from theory of statistics and probability to applications in biology, economics, finance and medicine. Warwick has a large Business School on the campus, and its members contribute to the Operational Research and Finance teaching in MORSE. There are also several mathematicians in the Economics Department and of course the Mathematics Institute has a world-wide reputation.

All four departments contributing to the MORSE degree have consistently been awarded the highest grade in external assessments of their research work.

Students very occasionally find that one or other of the characteristics of MORSE is not, after all, suited to them. For such students it is possible to transfer to another related degree course. For instance, someone having difficulty with (or just disliking) Economics can transfer to Mathematics and Statistics or another mathematically-related degree course. However, students are unlikely to be able to transfer into MORSE except at the start of their degree, because the full range of MORSE subjects will not have been covered.

About the University

Granted a charter in the 1960's, Warwick quickly established itself as a dynamic university and has become known for the quality of its teaching and research. The Government's Teaching Quality Assessment has rated as excellent both the Maths and Statistics Departments.

We want students to enjoy life at Warwick. The beautifully landscaped campus acts as a backdrop for its excellent student accommodation and provides a lively and vibrant base for the more than 12,000 undergraduate students who comprise 60% of the student population.

The Warwick Arts Centre is the focus for student and community entertainment, housing a concert hall, theatres, cinema, art gallery and a bookshop but the University also provides on-campus facilities for many sports and activities. A wide range of shops, restaurants and banks are on-hand to add to the quality of student life.

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For further information contact:

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