School of Mathematical and Computer Sciences

DATA SCIENCE
MSc (2 years)

Full-Time
Distinctly Ambitious
www.hw.ac.uk
Heriot-Watt University offers a first-rate environment for postgraduate study and research. We are one of the UK’s leading universities, recognized internationally for excellent teaching and technological innovation in our specialist areas of science, engineering, business management, languages and textile design.

Heriot-Watt became a university in 1966 and our origins go back to the foundation of the School of Arts in Edinburgh in 1821. We are Scotland’s most international university. Over 30% of our students come from outside the UK.

We introduced the first Computer Science degree in Scotland in 1966, have taught MSc degrees in this subject from 1970 and are part of the world class SICSA research cluster that aims to sustain and expand Scotland’s research excellence in Informatics and Computer Science.

This MSc in Data Science is a 2 year postgraduate degree. The first year imparts the knowledge and skills needed to study Data Science at Masters level in the second year.

Students acquire the theory and skills for managing and analysing very large and complex data sets. They learn how to model, store and process them using the latest algorithms and techniques as well as modern methods and tools for visually exploring them.

The programme is research led and students will benefit from interaction with staff who are involved in internationally leading research projects in the field.

Graduates from any discipline start with an introduction to databases, study the art of software engineering and learn relevant topics in computing. Those, who need to, may also enhance their technical English and research skills.

Admission in September requires a good honours degree, numeracy and some prior ability at programming. The English level required is IELTS 6.0.

**Year 1** introduces databases and information systems and teaches software engineering, AI and Computer Science:

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<th>Semester 1</th>
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<tr>
<td>F29AI AI and Intelligent Agents</td>
<td>F21AS Advanced Software Engineering</td>
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<tr>
<td>F21DF Database and Information Systems</td>
<td>F28CD Creative Design Project</td>
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<td>F21SF Software Engineering Foundations</td>
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<td>1 option:</td>
<td>2 options:</td>
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<tr>
<td>F29DC Data Communications and Networking</td>
<td>F17SC Discrete Mathematics</td>
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<td>C69RP Research Preparation in English I</td>
<td>F27CS Introduction to Computer Systems</td>
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<td>F28WP Web Programming</td>
<td>C11PA Project Management</td>
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<td>C69RQ Research Preparation in English II</td>
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**Year 2** teaches Data Science at Masters level:

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<th>Semester 1</th>
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<tr>
<td>F21DL Data Mining and Machine Learning</td>
<td>F21BD Big Data Management</td>
<td>F21MP Masters Project</td>
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<td>F21SA Statistical Modelling and Analysis</td>
<td>F21RP Research Methods and Project Planning</td>
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<td>2 options:</td>
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<td>F21BC Biologically Inspired Computation</td>
<td>F21CA Conversational Agents and Spoken Language Processing</td>
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<td>F21CN Computer Network Security</td>
<td>F21DV Data Visualisation and Analytics</td>
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<td>F21SC Industrial Programming</td>
<td>F21DE Digital and Knowledge Economy</td>
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<td>F21IF Information Systems Methodologies</td>
<td>F21EC e-Commerce Technology</td>
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YEARS 1 COURSES

F21AS Advanced Software Engineering covers advanced Java programming, the design of algorithms for key types of data and thread management, as well as advanced techniques in software project management.

F29AI AI and Intelligent Agents covers fundamental concepts and techniques in AI including planning, search and knowledge representation as well as the use of some AI programming languages.

F28CD Creative Design Project explores multimedia scenarios, prototyping and teamwork and employs them to provide experience of collaborative design and implementation of a realistic multimedia project.

F29DC Data Communications and Networking introduces the principles of computer and data communications with a focus on the Internet's TCP/IP protocols.

F21DF Database and Information Systems covers the principles of modern database systems, information systems methodologies and interactive and programmed use of SQL and NoSQL databases.

F17SC Discrete Mathematics covers maths needed for computer science such as set algebra, combinatorics, probability theory, recurrence relations and matrices.

F27CS Introduction to Computer Systems presents the fundamentals of modern computer systems architecture covering both the hardware and the operating system. It also imparts an appreciation of logical design and data representation.

C69RP Research Preparation in English I covers Computer Science literature search and its summarisation, research planning and assessing research impact. It also enhances technical English skills in Computer Science.

C11PA Project Management covers professional practice, project planning, strategy formulation, project control, scheduling and leadership. It also addresses Agile project management.

C69RQ Research Preparation in English II continues the themes of C69RP and also covers critically appraising Computer Science research, evaluating such research and presenting it with posters.

F21SF Software Engineering Foundations covers the principles and practice of object-oriented programming in Java as well as introducing the art of software engineering.

F28WP Web Programming provides familiarity with current techniques and paradigms in web programming to enable students to design and implement robust and effective client server web based applications.

YEARS 2 COURSES

F21BD Big Data Management covers the storage and handling of complex and large data sets, the semantic web and data integration issues with relational and NoSQL databases.

F21BC Biologically Inspired Computation covers limitations of traditional approaches to computation that are addressed within and among biological organisms by means such as evolutionary algorithms, swarm intelligence, neural networks and cellular automata.

F21CN Computer Network Security covers computer security concepts, principles and technology. It addresses both symmetric and public key cryptography and the use of a variety of network security assurance methods and tools.

F21CA Conversational Agents and Spoken Language Processing covers theory and current practices in the design, implementation and evaluation of conversational agents and speech processing applications.

F21DL Data Mining and Machine Learning covers DM and ML concepts and techniques, critical awareness of their relative merits and common applications of them.

F21DV Data Visualisation and Analytics covers intuitive graphical and interactive applications that let users search, explore, reveal, partition, understand, discover and communicate the structure and information in large data sets.

F21DE Digital and Knowledge Economy covers e-business, commercial leverage of technical advancements and business exploitation of IT using analytic, knowledge and process models and methodologies.

F21EC e-Commerce Technology explores key services, techniques and tools for realising e-business systems and puts their operations and strategies in an information systems framework.

F21IF Information Systems Methodologies explores advanced contemporary methodological approaches to information systems development. to develop critical faculties and skills in selecting and applying these approaches.

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F21MP MSc Project is a 15 week full-time exercise in applying knowledge and practical skills acquired in the MSc. It is academically supervised and assessed by a 15000 word dissertation.

F21RP Research Methods and Project Planning prepares students for their MSc project. It covers research planning, literature review and critique, requirements analysis, evaluation design and professional and normative issues raised.

F21SA Statistical Modelling and Analysis covers statistical modelling and analysis techniques for data review and presentation and demonstrates their practical application.
Entry Requirements

Applicants require a good honours degree or its equivalent, numeracy and some knowledge of programming. They must also have a minimum English level of IELTS 6.0.

Suitable applicants include UK honours graduates or international graduates from 4 year degree programmes in any numerate area that wish to retrain as Data Scientists.

Applicants requiring sponsorship for a tier 4 visa to study in the UK via a CAS letter must demonstrate they satisfy the UK Borders Agency’s minimum English language requirements i.e. IELTS 5.5 in reading, writing, speaking and listening.

How to apply

Apply online at

www.hw.ac.uk/study/apply/uk/postgraduate.htm

Supporting documents including 2 academic references, degree certificates, transcripts of marks and English test results can be uploaded digitally to the online application facility.

Contact information

Postgraduate Admissions
Room 1.24
Earl Mountbatten Building
School of Mathematical & Computer Sciences
Heriot-Watt University, Riccarton
Edinburgh EH14 4AS, SCOTLAND

+44 (0) 131 451 8444
+44 (0) 131 451 3327
MACSpgenquiries@hw.ac.uk
www.macs.hw.ac.uk/cs/pgcourses

Post-Study Work Opportunities in Scotland

Good opportunities exist for students who graduate in a specialism in demand in the Scottish economy to get employment here. The Scottish government is keen to help talented individuals from around the world come to study, work and live here. More information can be found at www.talentscotland.com

Career Prospects

Graduates from this MSc programme can expect to be employed by data warehouse s, software companies, IT organisations, research and development divisions of businesses, financial services operations, defence contractors or government IT agencies and as researchers or research students within universities.

Fees

The fee for this 2 year MSc programme at Heriot-Watt University in Edinburgh starting in September 2019 is £7168 in both years for UK and EU students. Overseas students pay £13200 in the first year and £18680 in the second. The cost of living during one year of study in Edinburgh is estimated at £10800.

English Study

Non-native English speakers with less than IELTS 6.0 may take 6, 10 or 14 weeks of English study with our English Language Department before starting.

Scholarships and Awards

Students can apply for a variety of scholarships from the Scottish executive, other bodies and our school. Please visit www.hw.ac.uk/study/scholarships/postgraduate-taught.htm

Employment

First destinations of some of our recent MSc graduates:

- Software Engineer, Ion Concept Systems
- Software Engineer, Logica
- PhD Computer Science, Heriot-Watt University
- IT Manager, NCS
- Database Administrator, Pension Fund Commission
- System Specialist, UBS AG (Bank)
- Test Engineer, IBM
- Systems Engineer, GEC Marconi Avionics
- Graduate Software Engineering, Thomson Marconi Sonar Ltd
- Computer Programmer, Bull Europe
- Software Consultant, Absoft
- Software Engineer, Thales (UK)

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