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 its 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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<tr>
<th>Semester 1</th>
<th>Semester 2</th>
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<tbody>
<tr>
<td>F29AI AI and Intelligent Agents</td>
<td>F21AS Advanced Software Engineering</td>
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<tr>
<td>F21DF Databases &amp; Information Systems</td>
<td>F20NA Network Applications</td>
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<tr>
<td>F21SF Software Engineering Foundations</td>
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<td><strong>2 options:</strong></td>
<td><strong>2 options:</strong></td>
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<tr>
<td>F29DC Data Communications &amp; Networking</td>
<td>F20AD Advanced Interaction Design</td>
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<tr>
<td>F29KM Knowledge Management</td>
<td>F29OC Operating Systems &amp; Concurrency</td>
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<td>C69RP Research Preparation in English I</td>
<td>C69RQ Research Preparation in English II</td>
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<td>F29SS Sociotechnical &amp; Soft Systems</td>
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### Year 2
Teaches Data Science at Masters level:

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<tr>
<th>Semester 1</th>
<th>Semester 2</th>
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<tr>
<td>F21DL Data Mining &amp; Machine Learning</td>
<td>F21BD Big Data Management</td>
<td>F21MP Masters Project</td>
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<td>F21SA Statistical Modelling &amp; Analysis</td>
<td>F21RP Research Methods &amp; Project Planning</td>
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<td>F21BC Biologically Inspired Computation</td>
<td>F21CA Conversational Agents &amp; Spoken Language Processing</td>
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<td>F21CN Computer Network Security</td>
<td>F21DE Digital &amp; Knowledge Economy</td>
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<td>F21DV Data Visualisation &amp; Analytics</td>
<td>F21DP Distributed &amp; Parallel Technologies</td>
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<td>F21SC Industrial Programming</td>
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YEAR 1 COURSES

F20AD Advanced Interaction Design covers the principles, research and good practice in requirements capture, design and evaluation in interacting with computer based systems. It also introduces some research.

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 & 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.

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

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

F29KM Knowledge Management overviews information and knowledge management and critically evaluates strategies for exploiting the value of knowledge and IT for competitive advantage.

F20NA Network Applications covers the principles and craft of Internet application development with an emphasis on a range of state-of-the-art web technologies. It also covers email and textual conferencing.

F29OC Operating Systems and Concurrency introduces operating systems, their basic principles and shell programming as well as the theory and practice of concurrent hardware and software systems.

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.

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.

F29SS Sociotechnical & Soft Systems introduces soft systems methodologies, systems thinking in information systems and techniques like rich pictures in their analysis.

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

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

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

F21DV Data Visualisation & 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 & Knowledge Economy covers e-business, commercial leverage of technical advancements and business exploitation of IT using analytic, knowledge and process models and methodologies.

F21DP Distributed & Parallel Technologies covers the design and coding of parallel and distributed systems including abstractions, methods and techniques with special reference to heterogeneous architectures including GPUs.

F21SC Industrial Programming develops skills in programming in C# and Python with an emphasis on advanced features, concurrency control, frameworks, and the use of computer aided software engineering environments and libraries.

F21MP MSc Project is a 15 week full-time exercise in applying knowledge acquired in the MSc. It is academically supervised and assessed by a 15000 word dissertation. Students prepare for it in F21RP.

F21RP Research Methods & Project Planning prepares student 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 & 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 2018 is £5360 in both years for UK and EU students. Overseas students pay £12800 in the first year and £18120 in the second. The cost of living during one year of study in Edinburgh is estimated at £10500.

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.

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)

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