School of Mathematical and Computer Sciences

COMPUTING 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 innovative technology 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.

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

Graduates from any discipline start by learning the art of software engineering, study some key computing topics and develop relevant research and technical English skills that prepare them for advanced study of Computer Science in the following year.

Admission in September requires a good degree of 3 years duration, numeracy and some prior ability at programming. The English level required is IELTS 5.5.

At the end of year 1 students may progress to year 2 or graduate instead with a Graduate Diploma in Computer Science and switch to a 1 year MSc we offer such as

- Artificial Intelligence
- Data Science
- Human Robot Interaction
- Network Security

if they have taken suitable options in year 1.

### Year 1

Year 1 teaches software engineering, research and technical language skills, and some topics in Computer Science:

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<tr>
<th>Semester 1</th>
<th>Semester 2</th>
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<tbody>
<tr>
<td>F21SF  Software Engineering Foundations</td>
<td>F21AS  Advanced Software Engineering</td>
</tr>
<tr>
<td>C69RP  Research Preparation in English I</td>
<td>C69RQ  Research Preparation in English II</td>
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<td>2 options:</td>
<td>2 options:</td>
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<tr>
<td>F29AI  AI and Intelligent Agents</td>
<td>F20AD  Advanced Interaction Design</td>
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<tr>
<td>F29DC  Data Communications and Networking</td>
<td>F28CD  Creative Design Project</td>
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<td>F21DF  Database and Information Systems</td>
<td>F20EC  e-Commerce Technology</td>
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<tr>
<td>F27ID  Introduction to Interaction Design</td>
<td>F29OC  Operating Systems and Concurrency</td>
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### Year 2

Year 2 teaches Computer Science at Masters level with a focus on software engineering, security and systems issues:

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<tr>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Semester 3</th>
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<tbody>
<tr>
<td>F21CN Computer Network Security</td>
<td>C11PA  Project Management</td>
<td>F21MP  Masters Project</td>
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<tr>
<td>F21SC  Industrial Programming</td>
<td>F21RP  Research Methods and Project Planning</td>
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<td>2 options:</td>
<td>2 options:</td>
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<tr>
<td>F21GA  3D Graphics and Animation</td>
<td>F21AN  Advanced Network Security</td>
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<td>F21BC  Biologically Inspired Computation</td>
<td>F21BD  Big Data Management</td>
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<td>F21RO  Intelligent Robotics</td>
<td>F21GP  Computer Games Programming</td>
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<td>B31TF  Sensors, Actuators and IoT</td>
<td>F21DV  Data Visualisation and Analytics</td>
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YEAR 1 COURSES

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

**F21AS Advanced Software Engineering** covers advanced Java programming, the design of algorithms for key types of data and for managing threads 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.

**F20EC 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.

**F27ID Introduction to Interaction Design** explores requirements gathering, design theory and techniques in interaction design. It covers common design methods and patterns and imparts key skills and methods in working with users.

**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 research impact studies. It also enhances technical English skills for Computer Scientists.

**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.

YEAR 2 COURSES

**F21GA 3D Graphics and Animation** introduces 3D computer graphics concepts, algorithms and processing and applies them to physical and behavioural animation.

**F21AN Advanced Network Security** develops critical analysis skill in computer network security and covers threat analysis, penetration testing, vulnerability exploitation and countermeasure deployment.

**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.

**F21GP Computer Games Programming** covers computer games concepts, design, modelling techniques, principles and implementation techniques. It includes use of 2D and 3D tools and AI and graphics programming.

**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.

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

**F21SC Industrial Programming** develops advanced skills in two programming languages in widespread practical use in industry. One is C# and the other is Python. It also covers relevant tools and development environments.

**F21RO Intelligent Robotics** covers the fundamentals of manipulators, the basics of mobile robots, sensing techniques, behaviour based robotics and cognitive robotics.

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

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

**F21RP Research Methods and 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.

**B31TF Sensors, Actuators and IoT** explores the principles and hardware for sensing and actuating devices in use by current AI systems. It also explores the techniques, practices and challenges of the Internet of Things providing skills in using such devices and networking for smart systems development.
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 one of our MSc programmes can expect to be employed by software houses, IT companies, research and development divisions of companies, financial services organisations, defence contractors or government IT agencies and as researchers or research students within universities.

Entry Requirements

Applicants require a good degree (3 or 4 years) or its equivalent, numeracy and experience of programming. They must also have a minimum English level of IELTS 5.5 in all 4 parts.

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

Applicants may also have 3 year ordinary degrees on the EU’s Bologna model or have done 3 year diplomas in China or India and wish to strengthen their relevant academic knowledge by one further year of undergraduate study while enhancing their English before Masters level study in their second year.

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.

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. Living costs in Edinburgh are estimated at £10800 per year.

Transfer to other 1 year MScs

Satisfactory progress in the first year of this MSc allows students to exit early with a Graduate Certificate or Diploma instead of progressing to the second year.

Such students may then study one of our 1 year MSc degrees instead depending on the options they have taken in year 1 of the MSc Computing

MSc Artificial Intelligence
MSc AI with Speech and Multimodal Interaction
MSc Business Information Management
MSc Computer Systems Management
MSc Data Science
MSc Human Robot Interaction
MSc IT (Business)
MSc IT (Software Systems)
MSc Network Security
MSc Software Engineering

Entry to the MSc in Software Engineering requires that the student’s first degree major be in Computer Science or its close equivalent.

English Study

Non-native English speakers with less than IELTS 5.5 may take 6, 10 or 14 weeks of English study with our English Language Department before starting this MSc programme.

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

Contact information

Postgraduate Admissions
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