Programme Structure

The first two semesters (September-May) are spent studying taught courses in software engineering. Research skills are also developed as a preliminary for work on an MSc project. Exams take place at the end of each semester.

In the third semester (May-August) students undertake a specialist project which is written up as a dissertation. It enables further development and consolidation of skills introduced in the taught courses, applying them to a challenging practical problem.

Aim of Programme

The aim of this MSc programme is to impart the understanding and skills to engineer software at an advanced level to professional standards. Students can specialise in areas like dependable systems, mobile applications, advanced interactive systems like games or using artificial intelligence techniques.

Duration of Programme

The full-time MSc programme starts in mid September and lasts 1 year. The Postgraduate Diploma starts at the same time but only lasts 8 months. Students completing the PG Diploma at MSc level may transfer to the MSc.

Part-time study for the MSc over 2 years is also possible by special arrangement with the programme director.

Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>F21SC</td>
<td>Industrial Programming</td>
</tr>
<tr>
<td>F21RS</td>
<td>Rigorous Methods for Software Engineering</td>
</tr>
</tbody>
</table>

2 options:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>F21GA</td>
<td>3D Graphics and Animation</td>
</tr>
<tr>
<td>F21BC</td>
<td>Biologically Inspired Computation</td>
</tr>
<tr>
<td>F21CN</td>
<td>Computer Network Security</td>
</tr>
<tr>
<td>F21DL</td>
<td>Data Mining and Machine Learning</td>
</tr>
</tbody>
</table>

Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>F21AS</td>
<td>Advanced Software Engineering</td>
</tr>
<tr>
<td>F21RP</td>
<td>Research Methods and Project Planning</td>
</tr>
</tbody>
</table>

2 options:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>F21AD</td>
<td>Advanced Interaction Design</td>
</tr>
<tr>
<td>F21BD</td>
<td>Big Data Management</td>
</tr>
<tr>
<td>F21GP</td>
<td>Computer Games Programming</td>
</tr>
<tr>
<td>F21DP</td>
<td>Distributed and Parallel Technologies</td>
</tr>
<tr>
<td>C11PA</td>
<td>Project Management</td>
</tr>
</tbody>
</table>

The project is carried out under the supervision of an academic who is an expert in the field. In some cases the project can be carried out in collaboration with an outside industrial or academic organisation.

The table shows essential and optional courses in the first 2 semesters. Full time students do 4 courses each semester.
SEMESTER 1 COURSES

F21GA 3D Graphics and Animation
- To investigate 3D graphics concepts including lighting, materials, modelling, occlusions, projections, reflections, rendering, scene graphs, shading, texture mapping, transformations and viewpoints.
- To explore animation including blending, clipping, poses, skeletons and skinning.
- To develop programming skills in 2D/3D graphics and animation.

F21BC Biologically Inspired Computation
- To impart an appreciation of why traditional computation finds it difficult or impossible to perform certain key tasks in pattern recognition, problem solving and autonomous intelligence.
- To show how a range of natural, mainly biological systems approach these tasks.
- To introduce the main biologically-inspired algorithms and techniques which are researched and applied.
- To establish a practical understanding of the real-world problems to which these techniques may be fruitfully applied.

F21CN Computer Network Security
- To impart critical understanding of key concepts, issues, theories and principles of computer network security.
- To develop detailed theoretical and practical knowledge of foundational issues in computer network security.
- To provide detailed understanding and practical experience with key services and tools used for network security.
- To give practical experience of analysing requirements, designing, implementing and testing secure network applications.

F21DL Data Mining and Machine Learning
- To introduce the fundamental concepts and techniques used in machine learning.
- To develop a critical awareness of the appropriateness of different methods.
- To provide familiarity with common applications such as data mining.

F21SC Industrial Programming
- To develop proficiency in the modern industrial programming languages C# and Python.
- To enable the elaboration and combination of system components in different languages;
- To enable an agile and flexible response to changes in industrial practices;
- To enable participation by industrial practitioners to provide context and applicability.

F21RS Rigorous Methods for Software Engineering
- To address the challenges of developing high quality software including specification, static analysis, formal verification and abstract interpretation.
- To impart understanding of processes, standards and quality metrics for rigorous software engineering.

SEMESTER 2 COURSES

F21AD Advanced Interaction Design
- To develop extensive, detailed and critical knowledge of requirements gathering, design and evaluation techniques in interaction design.
- To develop awareness of current research and emerging issues in the field of interaction design.
- To impart a range of specialised skills, and research methods involved in working with users.

F21AS Advanced Software Engineering
- To consolidate skills in concurrent, procedural and team software development.
- To develop further object oriented programming and design methods.
- To instil understanding of the concepts and benefits of advanced software engineering methods.
- To enable the deployment of patterns and UML in software engineering.

F21GP Computer Games Programming
- To instil a grasp of design, history and theory of computer games.
- To give understanding of physics, obstacle avoidance, path planning, group movement and learning and adaptation in games.
- To impart knowledge of computer games tools and environments.
- To develop programming skills and techniques in 2D and 3D games.

F21DP Distributed & Parallel Technologies
- To explore technologies and techniques underlying advanced distributed and parallel software development including distribution technologies, parallel program design and performance analysis.

C11PA Project Management
- To develop an appreciation of the knowledge and skills of a professional project manager.
- To develop competence in using a generic set of quantitative and qualitative project planning and control tools and techniques.
- To enable recognition of the limitations and appropriateness of approaches to project management.
- To study project progression from strategy formulation to execution.
- To define the role and current issues faced by project managers in the context of project control.

F21RP Research Methods and Project Planning
- To develop skills in critical thinking, research planning, academic writing and experimental design appropriate for a MSc programme.
- To impart skills in project planning and awareness of legal, social ethical and professional issues relevant to IT.
- To enhance employability via job seeking and career planning skills.

We may alter the courses offered at any time. Some courses may not run every year. Not every course combination may be possible to take. Students must satisfy each course’s prerequisites and their course choice must be agreed with the programme’s director.
Entry Requirements

Applicants require a 1st or 2nd class honours degree in Computer Science or its equivalent. Graduates with a little less than this may sometimes be admitted to the Postgraduate Diploma programme. If their exam and coursework performance is MSc level by May, they may then be recommended for transfer to the MSc.

Non-native English speakers must also satisfy the university’s requirements for competency in English. This can be done with an IELTS score of 6.5, an ECCE certificate, Pearson Test of Academic English 58, Cambridge First Certificate in English A or B, level C in academic English from our own English language teachers or by proving they have studied wholly in English at university level. A full range of English language training courses can be taken at Heriot-Watt University before starting a programme.

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 the programme can expect to be able to get employment with software houses, IT companies, R+D divisions of companies, financial services organisations, defence contractors or government IT agencies and as researchers or research students within universities.

Scholarships and Awards

International students can apply for a variety of scholarships from the Scottish executive, other bodies and our school. Please visit www.macs.hw.ac.uk/cs/pgcourses/finance.htm#international

Scottish and EU citizens can apply for SAAS loans covering most of the fees. Please visit www.saas.gov.uk

Other scholarships may be available from the university. Please visit www.hw.ac.uk/study/scholarships/postgraduate-taught.htm

Employment

First destinations of some of our recent MSc graduates:
- Software Engineer, Logica
- Software Engineer, Thales (UK)
- PhD Computer Science, Heriot-Watt University
- IT Specialist, IBM Helix SA
- Database Administrator, Pension Fund Commission
- System Specialist, UBS AG (Bank)
- Software Engineer, Ion Concept Systems
- Systems Engineer, GEC Marconi Avionics
- Graduate Software Engineering, Thomson Marconi Sonar Ltd
- Computer Programmer, Bull Europe

Cost

The Scots/UK/EU fee for this one year full time MSc programme at Heriot-Watt university in Edinburgh starting in September 2019 is £7168. The overseas fee is £18680. The cost of living during one year of study in Edinburgh is estimated at £10800. The Dubai campus fee is AED 81900 for 2019/20.

Professional Accreditation

This MSc programme is accredited by the Chartered Institute of IT or BCS and should fulfil its further education requirements for a Chartered IT Professional. It also partially fulfils membership requirements for the CEng and CSci professional bodies.