![HERIOT WATT UNIVERSITY]

School of Mathematical and Computer Sciences

ARTIFICIAL INTELLIGENCE
MSc / PG Diploma

Full-Time / Part-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.

Aim of Programme

The aim of this MSc programme is to impart the understanding and skills to develop intelligent software applications, such as those involving evolutionary computation and learning. Students will develop skills in specialist areas with clear applications in industry - including data mining, machine learning, and pattern recognition.

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.

Programme Structure

The first two semesters (September-May) are spent studying taught courses in artificial intelligence. At the same time research skills are 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 in AI.

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 the essential and optional courses in the first 2 semesters. Full time students must study 4 courses each semester.

Semester 1	Semester 2
F21BC Biologically Inspired Computation F21DL Data Mining and Machine Learning	F21RP Research Methods and Project Planning
2 options: F21GA 3D Graphics and Animation F29AI Artificial Intelligence and Intelligent Agents F21RO Intelligent Robotics F21SF Software Engineering Foundations	**3 options**: F21AD Advanced Interaction Design F21AS Advanced Software Engineering F21BD Big Data Management F21GP Computer Games Programming F21CA Conversational Agents and Spoken Language Processing

SEMESTER 1 COURSES

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

F29AI Artificial Intelligence and Intelligent Agents
- To introduce the main concepts and techniques of AI, including planning, search and knowledge representation.
- To introduce the scope, subfields and applications of AI, topics to be taken from a list including natural language processing, expert systems, robots and autonomous agents, machine learning and neural networks, and vision.
- To develop skills in AI programming in appropriate languages.

F21BC Biologically Inspired Computation
- To impart why traditional computation finds it hard or impossible to perform key tasks in pattern recognition, problem solving and autonomous intelligence.
- To show how some natural and 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.

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.

F21RO Intelligent Robotics
- To introduce concepts and techniques used in robotics and applications ranging from industrial automation to robotic companions.
- To impart understanding of the basic concepts used in evolutionary, swarm and other bio-inspired robotics.
- To impart understanding of the basic concepts used in developmental robotics and human-robot interaction.
- To give exposure to the main issues involved in building intelligent robot controllers.

F21SF Software Engineering Foundations
- To impart understanding of the object oriented paradigm and the process of object oriented design.
- To support the development of object oriented programs in Java.
- To convey object oriented design from specification, document the design using appropriate techniques, implement the design in Java and evaluate the results.
- To develop an understanding of windows-based systems and their development.

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 imperative software development.
- To develop further object oriented programming and design methods.
- To develop an understanding of concurrent programming techniques.
- To instil understanding of the concepts and benefits of advanced software engineering methods.
- To give practical experience of developing a substantial software engineering team project.
- To explain how to use patterns and UML in software engineering.

F21BD Big Data Management
- To review principal abstractions, methods and techniques for the management of large and complex data sets ("Big Data").
- To develop an understanding of the foundations and tools of the Semantic Web.
- To impart the ability to appreciate critically a range of data integration solutions.

F21GP Computer Games Programming
- To develop appreciation of the history and types of computer games and the elements of game design and theory.
- To give an understanding of games physics, obstacle avoidance, path planning, group movement and learning and adaptation in games.
- To impart knowledge of current computer games tools and environments.
- To develop programming skills and techniques specific to the area of 2D and 3D computer games.

F21CA Conversational Agents and Spoken Language Processing
- To impart extensive, detailed and critical knowledge of the design, implementation and evaluation techniques for conversational agents and spoken language processing.
- To develop an awareness of current research and emerging issues in the field of conversational agents and spoken language processing.
- To introduce a range of interdisciplinary research methods and specialised practical skills involved in building working conversational interfaces.

F21RP Research Methods and Project Planning
- To enable students to develop skills in critical thinking, research planning, academic writing and experimental design appropriate for a post-graduate programme.
- To enable students to gain skills in project planning and an awareness of legal, social and professional issues relevant for IT professionals.
- To enhance students' employability by development of job seeking and career planning skills.

Post-Study Work Opportunities in Scotland

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 programme can expect to get employment with AI businesses, 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.

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.

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, 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)

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.
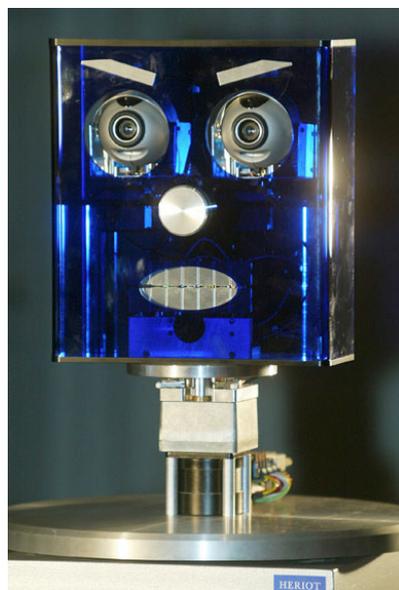
Entry Requirements

Applicants require a 1st or 2nd class honours degree or its overseas equivalent with a substantial academic component of computing or IT. 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.

Honours graduates without relevant computing knowledge, who wish to retrain and become AI professionals, may like to consider doing our 2 year MSc in AI instead.

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 and in other ways. English language training can also be undertaken at Heriot-Watt University before starting the MSc.

Applicants requiring sponsorship for a tier 4 visa to study in the UK via a CAS letter must satisfy the UK Borders Agency's minimum English language requirements. They are 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

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