School of Mathematical and Computer Sciences

ARTIFICIAL INTELLIGENCE 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 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 Artificial Intelligence is a 2 year postgraduate degree. The first year imparts the knowledge and skills needed to study AI at Masters level in the second.

Students acquire the understanding and know-how to develop intelligent software applications, such as those involving evolutionary computation and learning. Students gain knowledge and experience of data mining, machine learning and human machine interaction.

Graduates from any discipline start with an introduction to AI, 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 AI and teaches software engineering, interactive design and relevant topics in Computer Science:

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>F29AI</td>
<td>F20AD</td>
</tr>
<tr>
<td>F21SF</td>
<td>F21AS</td>
</tr>
</tbody>
</table>

2 options:

- F21DF  Databases & Information Systems
- F29KM  Knowledge Management
- C69RP  Research Preparation in English I
- F21SA  Statistical Modelling & Analysis

<table>
<thead>
<tr>
<th>Semester 2</th>
<th>Semester 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>F21BD</td>
<td>F21MP</td>
</tr>
<tr>
<td>F21GP</td>
<td></td>
</tr>
<tr>
<td>F21CA</td>
<td></td>
</tr>
<tr>
<td>F21DP</td>
<td></td>
</tr>
<tr>
<td>C11PA</td>
<td></td>
</tr>
</tbody>
</table>

### Year 2

Teaches Artificial Intelligence at Masters level:

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Semester 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>F21BC</td>
<td>F21RP</td>
<td>F21MP</td>
</tr>
<tr>
<td>F21DL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F21GF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 options:

- F21GA  3D Graphics & Animation
- F21DV  Data Visualisation & Analytics
- F21SC  Industrial Programming
- F21RO  Intelligent Robotics

3 options:

- F21BD  Big Data Management
- F21GP  Computer Games Programming
- F21CA  Conversational Agents & Spoken Language Processing
- F21DP  Distributed & Parallel Technologies
- C11PA  Project Management
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.

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.

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.

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

F21SM Software Engineering Master Class is an academically supervised exercise in researching, developing and presenting two master classes in a technical topic in Computer Science.

YEAR 2 COURSES

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

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 game concepts, design, modelling techniques, principles and implementation techniques. It includes 2D and 3D tools and AI and graphics programming.

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 allow users to search, explore, reveal, partition, understand, discover and communicate the structure and information in large data sets.

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 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 knowledge acquired in the MSc. It is academically supervised and assessed by a 15000 word dissertation. Students prepare for it in F21RP.

C11PA Project Management teaches the knowledge and skills of a professional project manager including quantitative and qualitative techniques and tools, strategy formulation and project scheduling.

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.
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 EU or overseas graduates from 4 year programmes in any degree area that wish to retrain as AI professionals.

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