What is Artificial Intelligence?

Artificial Intelligence (AI) is the attempt to build artificial systems that have intelligent behaviour. There are two main directions of research. One is to understand natural intelligence by the use of computer models. The other provides techniques and technology for building systems capable of intelligent decisions and actions. Thus AI is both a science and an engineering discipline. Applications of AI range from ‘smart’ controllers for household devices, to computers that can converse in English, play games, do intelligent web searches or act as the brain of a robot. These are fascinating and challenging subjects for people with a wide range of interests, and the continuous expansion of AI in all areas of technology means AI graduates are always in demand.

AI has links with many other subjects including computer science, psychology, philosophy, engineering, and linguistics. Adopting a computational approach to understanding human cognitive processes such as thought, language and memory has emerged as a new field of study called Cognitive Science. This is novel synthesis of experimental study of these processes in nature, a theoretical framework drawn from the study of artificial computer systems, and the use of computer software to build sophisticated models. It is thus closely connected to Artificial Intelligence, but with a greater focus on understanding natural systems.

Another example area of special interest in AI is Computational Linguistics, in which the aim is to make computers both use and understand everyday language, which could have revolutionary applications for human computer interaction, mobile devices, and aids for translation or the visually impaired. It includes mathematical approaches to linguistics, the use of computational models in linguistics, computer speech and language processing, and natural language engineering.

“Although AI involves some programming, it’s not programming for the sake of programming, it’s task oriented. AI has connections with many disciplines, and often involves practical hands-on project work. Some of the projects I’ve done include: designing and implementing genetic algorithms, and a big group project on building robots which have to sweep a mine field. One of the big advantages of studying at Edinburgh is that you often find yourself studying things that have been invented by the person lecturing it. If you’re looking for a core book in the field, it’s often by an Edinburgh lecturer.”

Fiona Love, BSc Artificial Intelligence and Computer Science student.

Why study these courses at Edinburgh?

Degrees in Artificial Intelligence, Cognitive Science and Computational Linguistics are offered by the School of Informatics, the largest centre in Europe for the study of these subjects. The University of Edinburgh was one of the first places in the world to see the potential of computers and to introduce the study of Artificial Intelligence, and much of the fundamental work in this area was done at Edinburgh. It is still at the forefront of this field, so you will be taught by the researchers who laid the foundations and are still making key advances. The course content is regularly reviewed to ensure our students learn about current developments.

The School of Informatics came top in the UK in the last Research Assessment Exercise, and received an ‘excellent’ rating in the latest Teaching Quality Exercise. As well as a thorough grounding in the fundamentals, we offer you a large range of specialist topics, and the opportunity to participate in leading-edge research projects. We have excellent and extensive facilities, both for computing and for the related AI research activities, from robotics to language analysis. We also have many connections to users who require working applications, and you will gain experience in the skills necessary to transform ideas to real systems.

What does the course involve?

Our degrees are 4 years long and flexible in structure (see sample curriculum overleaf). There is also a possibility of direct second year entry for qualified students.

In the first year you will study a general course in Informatics that includes programming, logic, the theory of computation, and the nature of information processing. You will study two other subjects in parallel. For most degrees this includes a Mathematics course tailored to the subject. For joint honours courses with other Schools you will also study a first year course in this subject. For most degrees, your third subject choice can be from any within the University, subject to availability.

In the second year you will have specific Informatics courses that lay the foundations of Artificial Intelligence (such as reasoning, search, planning, inference learning, and language processing), further courses in Mathematics or your joint degree subject, and the possibility to continue with an additional subject.

In the third and fourth year your studies will be focused on the discipline(s) of your chosen degree. You will choose 6-10 courses from the wide range we offer in Artificial Intelligence, Cognitive Science and Computational Linguistics (for example Automated Reasoning, Genetic Algorithms and Genetic Programming, Cognitive Modelling, Intelligent Autonomous Robotics or Machine Translation). In the third year you will participate in several group projects, and in the fourth year complete an individual research project. Some examples of recent fourth-year projects include: bagpipe music transcriber; detecting emotions in email text; face detection; mimicking the visual pathway; extending a geometric theorem prover; and star/galaxy classification.

For more detailed information on degree structure and content, please see table overleaf or: www.sra.ed.ac.uk/drps
Artificial Intelligence and Cognitive Science

What sort of teaching and assessment methods are used?
You will be taught by a mixture of lectures, tutorials, practical classes and projects. Lectures enable an efficient transfer of information from staff to students, and usually include demonstrations of running systems and discussion of extended examples, to complement the presentation of theoretical ideas. Tutorials in small groups (typically 8-12 students) offer the opportunity to ask questions and receive personalised explanations. We recognise that understanding and skills in Artificial Intelligence are often best acquired by doing, and hence throughout the course you will have practical classes and project work to complete. You will thus develop your analytical and problem-solving skills, be trained in good practice in programming, and learn to present your work in written reports and verbal presentations. Assessment is by a mixture of examinations and coursework.

Typically, in the first two years, your week will contain around 20 timetabled hours of lectures, tutorials and practicals, and you will need about 15 to 20 hours private study to consolidate the material from lectures, prepare for exams, and to work individually on tutorial and practical assignments. In later years the balance tips more towards private study (e.g. with 10 to 15 timetabled hours per week) as you develop independence in thinking and working. You will have individual supervision for your final year project.

The School of Informatics provides a number of support mechanisms to enhance your learning, organised by the Informatics Teaching Organisation (ITO). Each student is assigned a Director of Studies who oversees their progress and advises on course choices. Course lecturers can be approached outside the lecture times to answer questions, and maintain a mailing list or news group to inform and support the students on the course each year. Course materials, including lecture notes, assignment details, and past exam papers and solutions, are always available online. We also have a student-led peer-support system called ‘Cascade’, in which experienced students offer an advice service to new students with problems or questions.

Are there any opportunities to study abroad?
The School of Informatics encourages students to consider the possibility of spending one year of their undergraduate degree course (typically the third) at a university in another country. We believe this will help you learn a new language and open new employment markets for you. The School has some specific exchange schemes with foreign universities, but we will consider any other university you wish to attend, as long as certain curriculum requirements are met.

Are there any links with industry or commerce?
The School of Informatics has many links with industry, stemming from its research work. The Scottish economy boasts a strong IT sector, with many companies located a short distance away from Edinburgh. These companies sponsor scholarships, work placements and prizes, and offer jobs to our students.

Are there any bursaries or scholarships available?
The School of Informatics awards merit scholarships (i.e. based on your course performance). The scholarships are sponsored by Barclays’ Capital, IBM, KAL and MYSiS. We also have paid work placements sponsored by IBM and Sun Microsystems. In addition, there are prizes sponsored by Agilent Technologies, The British Computer Society, Citigroup, Microsoft, Google, Barclays Capital, Unilever, Xerox, Real Time Engineering and Sun Microsystems. The University has a range of additional support schemes.

What can I do after my degree?
Studies indicate that demand for graduates will outstrip supply over the next ten years. Computers are now ubiquitous in modern life. The most interesting - and best-paid - opportunities in the future are open to those who really know about computing, software and information systems. Graduates with degrees in Artificial Intelligence have excellent prospects of employment, in fields that will shape our society, such as economics, entertainment, user-friendly technology, mobile systems, manufacturing, health, to name but a few. And Edinburgh graduates are very highly regarded by employers, so the choice is yours!

In a recent survey of first destinations carried out by the University’s Careers Service, over 90% of Informatics graduates were in employment and a further 7% went into further study. Employers included: Cadence, Civil Service Fast Track, Ingenico Fortronic, Shell International, VIS Entertainment, Credit Suisse First Boston, Citigroup, and the British Council. Some graduates have set up their own companies.

What are admissions tutors looking for?
The entrance requirements for Artificial Intelligence and Cognitive Science degrees can be found in the current edition of the Undergraduate Prospectus. The simple rule is that we do require Higher or A-Level Mathematics. We do not generally expect or require prior study of computer science or related topics; it is more important that you have an interest in this area, and the ability to think logically and creatively.

If you meet the entry requirements, you are likely to be made an offer. Well qualified students may also be offered the possibility of direct second year entry. You will be invited to visit us and you will have a one-to-one informal chat with one of our members of staff.

How do I find more?
Visit our website: www.inf.ed.ac.uk

Or contact:
Informatics Teaching Organisation (SRA)
School of Informatics
The University of Edinburgh
Appleton Tower
Crichton Street
Edinburgh, EH8 9LE

Telephone: 0131 650 9970
Email: r+ito@inf.ed.ac.uk.

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Typical degree curriculum: BSc Honours in Artificial Intelligence and Psychology

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<tr>
<th>Year of study</th>
<th>Curriculum</th>
<th>Topics</th>
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<tbody>
<tr>
<td>1st year</td>
<td>Informatics Psychology Course of your choice</td>
<td>Computation; logic; data; programming; cognitive psychology; learning perception; research methods.</td>
</tr>
<tr>
<td>2nd year</td>
<td>Informatics Psychology Course of your choice</td>
<td>Computer systems; algorithms and data structures; problem solving, learning and planning; neuropsychology; socio-biology; statistics</td>
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<tr>
<td>3rd year</td>
<td>Artificial Intelligence and Psychology Honours courses and projects</td>
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<tr>
<td>4th year</td>
<td>Artificial Intelligence and Psychology Honours courses and projects including a major practical project on which you will write a dissertation</td>
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Every effort has been made to ensure the accuracy of this leaflet at the time of going to press. However, it will not form part of a contract between the University and a student or applicant and must be read in conjunction with the Terms and Conditions of Admission set out in the Undergraduate Prospectus.