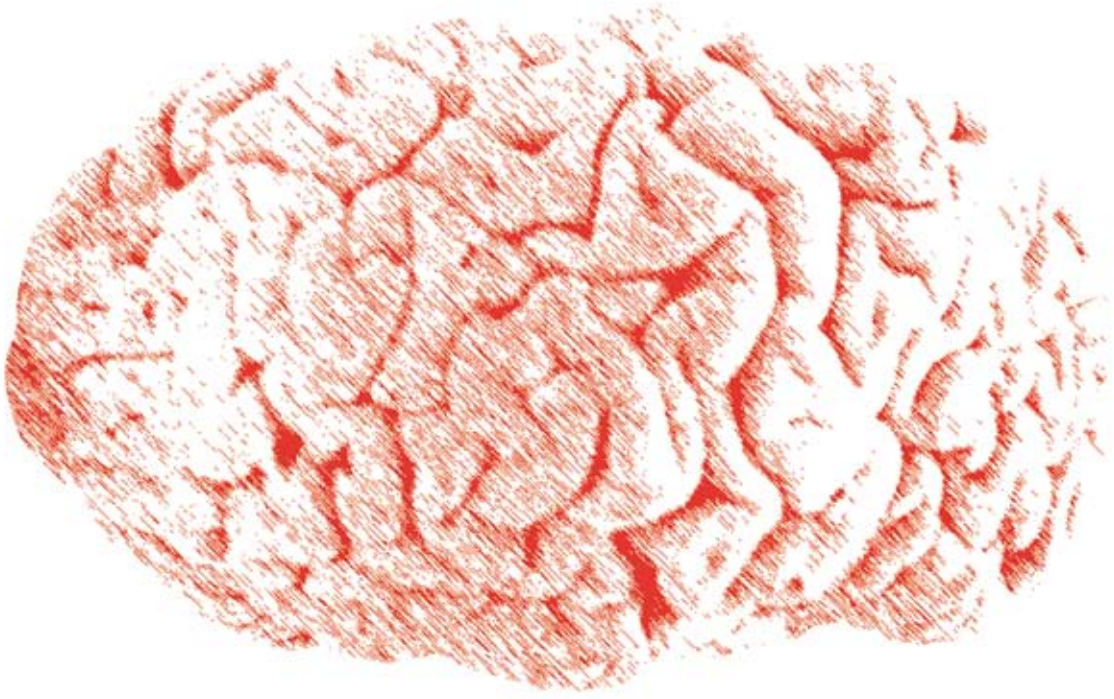

What is artificial intelligence?

ANDREW TUSON answers the question, and describes how a degree in artificial intelligence can lead to varied careers in the fields of science, engineering, computing, neuroscience and linguistics

Artificial Intelligence, or AI, involves building computer systems to study the nature of intelligence, and the applying these insights in solving real-world problems. AI can therefore be described as both a science and as engineering, depending on the aim of the work. AI is often considered as part of computing, but it has links with many other fields such as psychology, philosophy, engineering, neuroscience and linguistics.

Looking at real life

Robotics is a part of AI. For example, researchers have adapted principles from real life, such as the coordinated aggregate behaviour of a large number of individual organisms, called flocking, which defines the behaviour of groups of objects. This can be applied to groups of unmanned vehicles - the US government is currently looking at this technology for use in groups of satellites; and in robots with swarm intelligence software designed to enable them to mimic the organised behaviour of insects. It is hoped that this will allow them to undertake dangerous missions such as minesweeping and search and rescue operations, with minimal assistance from humans.

As a graduate discipline, AI a field of study in of itself, which interacts with a number of other disciplines. has many "sub-fields" and advanced technologies, for example:

- Neural networks simulate the working of neurons in the brain.
- Natural language processing aims to produce computer systems that can understand, translate and communicate in human languages.
- Theorem provers allow computers to solve mathematical problems and discover new mathematical concepts.
- Evolutionary computing simulates biological evolution to solve problems.
- Knowledge based systems encode human expert knowledge in such a way that a computer can reason with it.
- Case-based reasoning simulates how humans reason from past experience.
- Robotics focuses on the construction of intelligent robots that adapt to their environment.
- Vision focuses on tasks such as face recognition.

'A graduate discipline, AI interacts with a number of other disciplines'

This is just a sample: new technologies are being developed constantly. AI has found many applications in the real world, for example:

- Fraud detection systems use neural networks to detect stolen credit cards
- Financiers use neural networks to predict stock market trends and genetic algorithms to optimise their portfolios
- Evolutionary computing is used in scheduling to find the most efficient way to roster staff or allocate resources
- Medical Knowledge Based Systems can advise on medical treatment
- Call Centres and Help Desks often use case-based reasoning to provide instructions on how to deal with common problems

- Computer Games are using AI increasingly to improve the game's challenge and playability.
- Forensic analysis of CCTV images using AI vision technology is being developed to recognise criminals.

One interesting point to note is that AI is, more often than not, transparent to its users – most people are not aware that they are using AI in everyday life.

Careers in AI

There are many routes into AI, and this field especially values people with a variety of backgrounds. Even if you have chosen an unrelated career it may be possible to move into AI. In fact many successful AI researchers have first degrees in subjects such as psychology, philosophy, mathematics and science as well as computing. The usual route into AI is to take a degree at either honours or masters level.

'Employers want graduates who can communicate and problem-solve: AI study develops these skills'

What do AI Graduates Do?

Official graduate destination data does not record AI as a category - data is subsumed within categories such as computer science and IT, and psychology. Discussions with careers advisors who deal with AI graduates reveal the following trends:

- Overall it appears that more AI graduates go on to further study than computer science/IT graduates.
- Most of this further study is in AI or computing-related areas, with more interest in applying what they have learnt in research and development or academic careers.
- Many AI graduates enter the mainstream IT industry where their combination of general computing knowledge and specialist knowledge is valued.
- Psychology-orientated graduates tend towards "soft" IT roles, such as systems analysis and consultancy.
- Computing-orientated graduates tend towards "hard" IT roles, such as programming and software development.
- Robotics-orientated graduates also find employment as electrical and control engineers.
- AI graduates also find employment in other sectors such as finance and management.

Employers want graduates who can communicate and problem-solve – AI study develops these skills, and if there is another degree specialisation from a joint honours degree, this can open additional options. A degree in AI therefore opens up a wide range of career options.

AI Research and Development and Academic Careers

Research and development posts usually require additional study at least at masters level. AI researchers typically work in universities though some companies such as BT and Sony have sizable industrial laboratories. There are also a number of small spin-off companies: a former director of a successful AI company has stated what he looks for in employees within AI research and development.

Undergraduate AI Study

AI degrees are popular: they have approximately twice the applicant-places ratio to conventional IT degrees. There is a good choice of courses too. UCAS lists around 150 courses at over 40 universities under "Artificial Intelligence". Other relevant UCAS keywords for course searches are: "Intelligent Systems" (an alternative name for AI), "Cognitive Science", "Robotics" and "Cybernetics".

AI AI degrees broadly fall into three types:

- Computing-focused degrees, e.g. "Intelligent Systems" and "Computer Science and/with AI".
- Psychology-focused degrees, e.g. "Psychology and/with AI" and sometimes "Cognitive Science".
- Engineering-focused degrees, e.g. "Robotics" and "Cybernetics".

There are relatively few fully interdisciplinary single honours AI degrees; joint honours combinations or specialisations of computing, engineering and psychology degrees are the norm. As with all degrees you should not assume degrees with similar names will necessarily have similar content. Many computing degrees also contain AI modules as electives, and AI can sometimes be found as part of degrees in related fields such as psychology.

'A degree in AI opens up a wide range of career options'

Professional Recognition

The British Computer Society (BCS) is the professional body for IT and Computing in the UK. It offers professional membership (MBCS) and progression to chartered status (CITP – Chartered IT Practitioner) for members who achieve high standards of professional practice. The BCS also offers routes to become a Chartered Engineer or Chartered Scientist. The BCS also represents the IT profession to the wider world, including government.

There are other organisations that offer recognition. Notable examples include the Institution of Electrical Engineers (IEE) for those with a robotics focus; those taking a psychology-focused AI course may find recognition by the British Psychological Society (BPS) appropriate.

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Useful websites

www.bcs.org.uk
British Computer Society (BCS) - careers leaflets online
www.aisb.org.uk
Society for Artificial Intelligence and Simulation of Behaviour (SSAISB)
www.iee.org.uk
Institute of Electrical Engineers (IEE)
www.bps.ors
British Psychological Society (BPS)