Software Engineering

What is Software Engineering?

Software Engineering is the discipline of building computer software systems, i.e. the set of programs that support computer applications. Any programmer can write software, but writing good software is a challenging task, requiring a wide range of skills. A good software system has to do what people want it to do, but establishing the precise specification can be difficult - for example, foreseeing all the requirements of a medical database. The software must perform the task correctly, reliably and within appropriate time and processing constraints - for example, speed and safety are critical for an air-traffic control system. It must fit well into a given computing and human environment - for example, to be a successful game that runs on average home computers without frustrating users. It must be cost-effective to produce, maintain and update.

Software engineers thus have to know how to deal with design, implementation and validation issues. A degree in Software Engineering will provide both the practical and theoretical knowledge to enable you to build effective software systems, skills that are becoming more and more important as computer systems grow rapidly in size, complexity, and ubiquity in our everyday lives.

Why study Software Engineering at Edinburgh?

The School of Informatics is a large and long-established centre for computing that covers many areas, from novel hardware to intelligent software, and thus has experience of software engineering issues from many perspectives. Research problems studied at Edinburgh include: how to program parallel computers, supercomputers and computer clusters; how to engineer very large and complex systems such as the National Science Grid; how to ensure (and potentially prove) the dependability of computer systems for industry and commerce; and the safety implications of intelligent automated decision-making systems. Thus you will be taught by researchers actively engaged in making the key advances in this field. As the largest centre for computing research in the UK we can offer a wide range of specialist options and project topics.

You will also have access to excellent computing facilities. The School of Informatics received an 'excellent' rating in the latest Teaching Quality Exercise, and our courses are recognised by The British Computer Society as a professional qualification for computing.

The University of Edinburgh is a leading international academic centre, with graduates and staff whose quality is recognised worldwide. The latest Research Assessment Exercise showed that Informatics at Edinburgh delivers more world-leading research in Informatics than anyone else in the UK - 69% more than our nearest competitor. It has a large student population and offers excellent and extensive facilities and support services, from accommodation to sports. Students particularly enjoy life in the city of Edinburgh, widely recognised as one of the most beautiful in Europe, with an exciting and cosmopolitan atmosphere.

What does the degree involve?

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

In 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; one will be a Mathematics course tailored to the subject. For combined honours degrees with other Schools you will also study a first year course in this subject. For other degrees, your third subject choice can be from any in the University, subject to availability.

In the second year you will have specific Informatics courses that lay the foundations of Software Engineering (such as computer architectures, the process of software design, tools for developing large programs, testing and usability issues), further courses in Mathematics, and either your combined degree subject or the possibility to continue an additional subject.

In the third and fourth year (and fifth year for MInf) your studies will be focused on the discipline(s) of your chosen degree. You will choose courses from the wide range we offer in Computer Science (for example Software Testing, Compiling Techniques, Software Engineering with Objects and Components, Computer Communications and Networks, Computer Graphics, Parallel Programming, Operating Systems, Database Systems). In the third year you will participate in a major group project, and in the fourth year (and fifth year for MInf) complete an individual project. Some examples of projects include: visualisation of algorithms; an analyzer for recursive game graphs; computing roots of univariate polynomials; vectorised video coding; conference management system; certifying resource bounds for programs; an e-Science experiment builder; and an interactive execution tracer for Java.

What can I study Software Engineering with?

You can study Software Engineering as a single honours subject, or as a joint honours degree with Artificial Intelligence, Electronics or Management. Issues in intelligent software range from designing systems that interact with and support human reasoning, to those with more human capabilities, including computers that design their own software! The combination of software and electronic hardware design is critical to many technological developments, such as mobile communications, and graduates combining these skills are highly sought after. Combined with management, software engineering is an obvious route to an IT career, but is also relevant to anyone interested in how computers relate to people, organisations and their environment.

For more information on the MInf Informatics degree log onto: www.inf.ed.ac.uk
See also separate sheets on Artificial Intelligence, Cognitive Science and Computer Science

Dependability of computer systems for industry and commerce.

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What sort of teaching and assessments 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 to 12 students) offer the opportunity to ask questions and receive personalised explanations.

We recognise that understanding and skills in Software Engineering 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 Personal Tutor who oversees their progress and advises on course choices. 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 helpdesk staffed by Informatics course tutors and graduate students known as InfBase. InfBase offers support and advice on all Informatics taught courses, particularly non-honours courses and the mathematics courses taught in graduate students known as InfBase. InfBase will write a dissertation on a major practical project on which you will 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.

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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 gain familiarity with a different culture and 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 and 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 in or near 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). These scholarships are sponsored by the global software company, KAL and the Bank of America. There are prizes sponsored by The British Computer Society, Citigroup, Microsoft, Google, JP Morgan, Accenture, FreeAgent and Netcraft. In addition, the University has a range of additional support schemes. For more information please visit: www.scholarships.ed.ac.uk

What can I do after my degree?
Computers are now everywhere in modern life. Some of the most interesting - and best-paid - opportunities in the future are open to those who really know about computing, software and information systems. The advent of pervasive ‘big data’ is changing the way every company works and Informatics is at the heart of this revolution. Graduates with degrees in software engineering have good prospects of employment. Most of our graduates make direct vocational use of their degree and work in the IT industry but our graduates are also in demand across many other sectors including finance, media and entertainment, mobile systems, user-friendly technology and healthcare. Recent employers included: FDM Group, Roborus, Shell International, the Civil Service and Logica. We are also proud to say that nearly a fifth of our graduates who are passionate about the subject go on to further training and study.

What are admissions staff looking for?
You will find our most up to date entry requirements at: www.ed.ac.uk/studying/undergraduate/degrees

The simple rule is that we require Higher or A Level Mathematics (or equivalent), at grade A. 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. Well qualified students may also be offered the possibility of direct second year entry. If you are made an offer, 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 out more?
Visit our website: www.inf.ed.ac.uk
Or contact: Informatics Teaching Organisation (ITO) School of Informatics The University of Edinburgh Appleton Tower Crichton Street Edinburgh, EH8 9LE Tel: 0131 650 5194 Email: ito@inf.ed.ac.uk

Typical degree curriculum: BEng Honours in Software Engineering

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