

Computer Science

www.cs.york.ac.uk

Programmes	UCAS code
BSc/BEng degree programmes (3 year)	
Computer Science	G400 Mix/CS
Computer Science with Embedded Systems	G410 BEng/CSES3
Computer Science/Mathematics (Equal)	GG41 BSc/CSM
BSc/BEng degree programmes (4 year sandwich)	
Computer Science	G401 Mix/CS4
Computer Science with Embedded Systems	G411 BEng/CSES4
Computer Science/Mathematics (Equal)	GGK1 BSc/CSM4
MEng/MMath degree programmes (4 year)	
Computer Science with Embedded Systems	G412 MEng/CSES4
Computer Science and Software Engineering	G460 MEng/CSSE4
Mathematics / Computer Science (Equal)	GG14 MMath/MCS4
MEng/MMath degree programmes (5 year sandwich)	
Computer Science with Embedded Systems	G413 MEng/CSES5
Computer Science and Software Engineering	G461 MEng/CSSE5
Mathematics / Computer Science (Equal)	GG1K MMath/MCS5

Key facts

ADMISSIONS TUTOR

Dr Nick Pears
Telephone: +44 (0)1904 432761
Website: www.cs.york.ac.uk
Email: admissions@cs.york.ac.uk

Typical offers

MATURE STUDENTS

Mature students are welcomed and considered individually

A LEVELS

AAB

INTERNATIONAL BACCALAUREATE

30 points including HL 6 in essential subjects

SCOTTISH QUALIFICATIONS

AAABB at Higher level and AB at Advanced Higher level

BTEC

DDD in National Diploma + A level Mathematics

OTHER QUALIFICATIONS

For details of other acceptable qualifications go to www.cs.york.ac.uk/admit/EntryReqs.php

Essential subjects

Mathematics

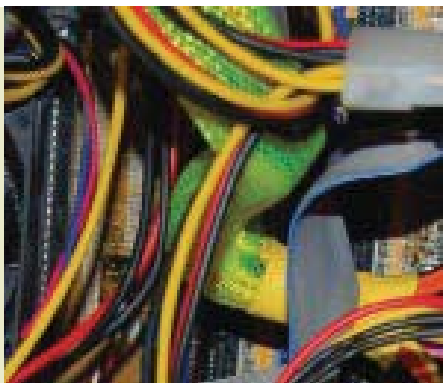
English as a foreign language

IELTS 6.5 with at least 6.0 in all units

Accreditation

All our MEng programmes are fully accredited, and all our BEng programmes are partially accredited, by both the Institution of Engineering and Technology (IET) and the British Computer Society (BCS)

In 2006, 96% of our graduates gained professional, managerial and technical employment compared with an average of 75% across all UK higher education Computer Science programmes



Far left The Department is well connected

Left Students work on a graphical animation of a submarine in a fishtank

www.cs.york.ac.uk

Studying Computer Science

For some people, use of computers starts and ends with the web, email and games. For others, it may extend to spreadsheets and databases. But Computer Science is so much more than this and involves a broad range of topics, techniques and applications relating to the science and engineering of computer systems and computation. In addition to learning how to program computers in a principled way, you learn how typical computers are structured internally, how electronic circuits can implement computation, how operating systems such as Microsoft Windows can schedule several programs to run at the same time and how computers communicate with each other over networks, such as the Internet.

In more advanced study, you can learn how to embed computing devices into larger systems to make them operate more efficiently (for example, a car engine management system) or intelligently (for example, a microwave oven that senses when an item is cooked). Such systems are called 'embedded systems'. You can learn about artificial intelligence for games, robots or expert systems that can, for example, perform medical diagnosis from a pattern of physical symptoms. You can learn about designing

computer systems with digital camera inputs, which can recognise images, such as an image of your face, or with microphone inputs, which can recognise and understand what you are saying. You can learn how to build better human-computer interfaces, which don't use a keyboard or mouse, or ubiquitous devices, where the interface is invisible to the user.

There are endless possibilities to exercise your technical ability and creativity and, at the end of your programme, you will be well qualified for a career not only in the IT sector, but also in science and engineering and other sectors, such as the financial sector, where your sharpened numeracy and analytical skills will be invaluable.

Computer Science at York

The Department of Computer Science at York is one of the most highly regarded in the UK. It holds the highest possible ratings for both teaching (Excellent) and research (5* twice in succession) in the external assessment exercises. As a successful Computer Science graduate of York, you will be highly sought after by a wide variety of employers. In 2006, 96% of our graduates gained professional, managerial and technical employment, or engaged in further study, compared with an average of 75% across all UK higher education

Computer Science programmes.

We have a long-standing record of extensive collaboration with industry. Our programmes are accredited to the maximum extent possible by the relevant professional bodies, which include the Institution of Engineering and Technology and the British Computer Society. For our new 'embedded systems' programmes, we are seeking accreditation at the earliest possible opportunity.

At York, Computer Science is taught as a broad subject, where you cover theory as well as practice, and hardware (electronics) as well as software (programs), which are integrated in the design of systems. We encourage you to develop your professional competence as well as your intellectual adventure. The early part of each of our degree programmes is core Computer Science, which gives you a solid foundation in the subject. The structure in later years allows you to select from a set of modules that are closely related to the research activity in the Department. This allows you to sharpen your focus on to what interests you and allows a greater exercise of your creativity. This is especially true of the final year individual project in which your own particular interests can be given full rein. During your time with us, we will provide you with excellent computing and other laboratory facilities and we will update them regularly.

Our programmes

We provide both single subject Computer Science programmes, taught entirely by the Department of Computer Science, and combined Computer Science/Mathematics programmes, where your time would be split, initially equally, between the Department of Computer Science and the Department of Mathematics. When you apply to us, perhaps the first decision you should make is to decide whether you prefer a single subject Computer Science programme or a combined Computer Science/Mathematics programme. There are then further questions that you can ask: for example, (i) should I choose a Masters or Bachelors programme and (ii) should I choose



"I'd never studied computer science before, but after coming to the Open Day I was left with a really good impression of what it was like here. I liked the fact that you can choose from a wide range of modules and decide how much of each to do. I selected a sandwich course with a year working in industry so I'd have a better idea of what I wanted to do when I graduated."

Helen, Maths and Computer Science, 3rd year

“My course provided me with a good foundation to pick up the skills that I needed to do my job at IBM”
(Former student)

www.cs.york.ac.uk

a sandwich programme, with an industrial placement, or a non-sandwich programme? Let us look at the options first for single subject Computer Science and then we will look at the combined Computer Science/Mathematics programmes.

Masters or Bachelors programme?

A Bachelors programme is a standard three years of study incorporating core topics in the first two years and more advanced elements in the third year. A Masters programme provides the benefit of a fourth year of study with us, allowing you to study more topics at a deeper level, thus connecting you with the state of the art in terms of current research in selected areas. Currently we have Computer Science Masters programmes as follows:

- Computer Systems and Software Engineering (CSSE, MEng), where there is an emphasis on large-scale software design and development
- Computer Science with Embedded Systems (CSES, MEng), where there is an emphasis on the design and development of encapsulated computing systems dedicated to the control of specific devices, appliances or machinery.

At Bachelors level we offer the following single subject programmes:

- Computer Science (BEng/BSc), which is our standard three-year programme
- Computer Science with Embedded Systems (CSES, BEng), which is the Bachelors level variant of the CSES Masters programme described above.

Note that only MEng programmes are eligible for full accreditation by the Institution of Engineering and Technology (IET) and by the British Computer Society (BCS), while BEng programmes can carry only partial accreditation. Our MEng CSSE and Computer Science BEng programmes are accredited to the greatest extent possible by both institutions. Our CSES programmes are new and we are seeking accreditation at the

earliest possible opportunity.

We are intending (subject to approval) to run a degree programme entitled 'Computer Science with Enterprise Systems' from 2009. The structure will be similar to our existing MEng degrees, with an initial solid foundation in Computer Science. Later parts of the programme will focus on very large-scale, distributed and highly complex software systems, such as those which drive modern businesses and government, and will require the study of the principles and practices behind building and managing them. For further information, please see our web pages or contact the Admissions Tutor.

A combined Computer Science/Mathematics programme?

We offer both a Masters (MMath) and a Bachelors (BSc) combined programme, as follows:

- Mathematics/Computer Science (MMath)
- Computer Science/Mathematics (BSc).

In the first two years of study, the split across Computer Science modules and Mathematics modules is equal. In later years, there is choice both in the ratio of each subject (which can vary between 60:40 either way, or be 50:50) and in the options that are chosen from each entry. See also the Mathematics entry on page 129.

Sandwich or non-sandwich programme?

Sandwich programmes offer rewarding (and paid) work experience, for a period of one year between your second and third years of study, where you can exercise your technical skills in a professional environment. In addition, this can lead to final year sponsorship and ideas for your final year project. The sandwich option can be



A final year project in robotics

taken with all of our Masters and Bachelors programmes and the year in industry is called an industrial placement. All placements are salaried and the salary varies from company to company, but is currently in the range of £14,000 to £18,000 p.a. For a list of companies that have recently placed our students see www.cs.york.ac.uk/admit/Companies.php.

We positively encourage you to undertake a placement. The industrial experience that students gain on placement, when added to the academic experience gained at university, gives them an advantage in their studies which is frequently reflected in their examination grades.

We have an Industrial Placements Tutor who both helps students with their applications for placements and visits and supports them during their year in industry. The placement is a structured training programme, recorded by the University, which

counts for part of the training you would need in becoming a Chartered Engineer (CEng). Note that, while we cannot guarantee to find you a placement, every effort is made to identify suitable employers.

So what should I choose?

We strongly recommend that you apply for one of the Masters and/or sandwich programmes, although you may not wish to select either of these if you wish to complete within three years. For example, you may be a mature student who already has work experience and who is keen to get back to the job market. If you are not sure which programme to apply for, apply for a longer programme and you can always transfer to a shorter programme later, as the whole of the first year is common to all courses (with the exception of transfers between single subject Computer Science and combined Computer

Science/Mathematics programmes). Note that an initial application to a longer programme is preferable, simply because of your financial planning considerations.

What you study

For single subject Computer Science (CS) students, the first year consists of four main themes or 'strands', which include Programming, Architectures (how computer systems are structured), Electronic Design and Mathematics. Combined Computer Science/Mathematics (CS/M) students study Programming and Architectures and two strands from the Department of Mathematics.

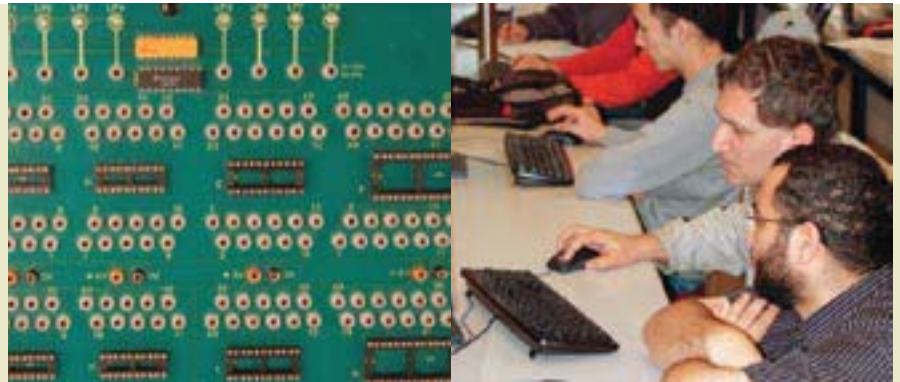
In the second year, CS students study four of six possible strands, which include (1) Software Engineering, (2) Systems Software, (3) Hardware Systems, (4) Computation and Artificial Intelligence, (5) Computation and Control, and (6) User Interfaces. The MEng Computer Systems and Software Engineering programme covers strands 1, 2, 3 and 4; the MEng/BEng Embedded Systems programmes cover strands 1, 2, 3 and 5 and the BEng/BSc Computer Science programme covers strands 1, 2, 4 and either 3 or 6, according to your selection. Again, CS/M students study two strands from each department, where the Computer Science selections are non-hardware based and can be any two of strands 1, 2, 4 and 6.

In the third and fourth years of our programmes, there is a wide variety of modules to choose from, in areas such as artificial intelligence, advanced architectures, computer vision, human-computer interaction, programming languages, pattern recognition, information systems, non-standard computation, real-time systems and high integrity systems, all of which are closely related to research activity in the Department. This guarantees both the academic excellence of the content, due to our high (5*) research rating, and the freshness of delivery. Finally, both individual and group project work form an important part of your final year of study.



The atrium in the Department of Computer Science

Right A logic tutor board
Far right A programming class with graduate teaching assistants



www.cs.york.ac.uk

Some recent individual final year project titles include: 'Survival of a Lego Robot', 'Real-Time Hand Gesture Recognition from Video' and 'Recognising Bots in First-Person Shooter Games'.

There is so much on offer that there is not enough space here to explain it all. Please see our website for further details.

Teaching and learning

Our programmes are based on a series of one-hour lectures, with associated laboratory practical classes, programming classes and tutorials. In a typical week, you may have about 20 contact hours of study, which typically would break down as 13 hours of lectures, 6 hours of practical or programming class and 1 hour of tutorial (or, later, individual project supervision). Our teaching was rated 'Excellent', the highest possible, in the most recent external teaching quality assessment.

Each student has a supervisor who is responsible for guiding his or her studies. You will meet with your supervisor on an individual basis at the start and end of every term. Your supervisor will also lead your weekly one-hour tutorial throughout your first year and these are typically held with a group of four students. The purpose of the tutorial is to support the learning of the material presented in the lectures, but also to broaden your skills, knowledge and experience concerning wider issues, such as professional development, ethics in Computer Science and presentation of ideas.

Exercises carried out in unscheduled time, such as the writing of essays and programs, play an important role; such activities are allowed for in your workload. There are problem classes in the second year and weekly one-to-one, individual project supervisions in the third and fourth years. Throughout the programme, you are encouraged to develop your own approach to study.

Study abroad

We run a North American exchange scheme, where you can apply to spend a year studying at any one of five North American universities: the University of California, University of Illinois, Ohio State University, York University, Ontario, Canada, and Columbia University in Manhattan, New York City. The year in North America replaces the corresponding year of a participant's degree programme at York, and the marks obtained abroad count towards the classification of the York degree. BSc and BEng students can spend their second year abroad; MEng and MMath students can spend either their second or third year abroad. If you are interested in the scheme, you do not need to indicate this in your application. You can discuss it further either at your open day visit or with your supervisor when you arrive.

Assessment

All assessments, except in the final year, are qualifying assessments and you must pass strands (see the previous 'What you study' section) in order to continue into the next year of study. Approximately 60% of your degree programme will be assessed by means of

closed examinations. These take place each January (covering the work of the Autumn Term modules) and May/June (covering the Spring and Summer Terms). In addition there is a range of programming assignments, demonstrations and project reports associated with modules, to be carried out in unrestricted conditions with a time limit ranging from a week to several weeks. These are known collectively as open assessments and make up the remaining 40% of assessment. The most significant open assessment in terms of the contribution to your final mark will be the report of your final year individual project.

Admissions

If your UCAS application passes our initial selection, you will be invited to the Department for an interview. It is our policy to make an offer only following an interview, making an exception in cases where it would be unreasonable for a candidate to travel to York (for example, when they are overseas). The visit has two functions: first, we can form a better opinion of you than we can from just the UCAS form; second, it is important that you should visit the place where you might be spending the next three or four years of your

"The main appeal of the course to me was its breadth: software, hardware, computer architecture and theory in the first year, then optional modules in subsequent years to allow you to specialise. Staff are always enthusiastic, and willing to chat outside lectures as well as answering quick queries by email. Most importantly, you're assigned a tutor who helps you to settle in and then becomes a first point of contact. The career successes of past students were also appealing!"

Chris, Computer Science, 2nd year



Right Human intelligence
Far right Artificial intelligence



www.cs.york.ac.uk

life and discuss your choice of programme with us. The following subsections show a summary of our requirements.

Academic A levels

Our typical offer in terms of A level grades is AAB, where one A level must be Mathematics, although we do sometimes make higher or lower offers. Note that an A level (or other qualification) in Computer Science/Studies is not a requirement for any of our programmes.

Vocational A levels

A vocational A level can be used in place of a single academic A level, so you would require two additional academic A levels, one of which is Mathematics.

Scottish qualifications

We have no particular requirements involving Highers. The offer we give you will be stated in terms of grades in Advanced Highers (AH). Our general offer level is grades AA at AH level, which must include Mathematics, plus a further A during sixth year studies in another Higher or Advanced Higher.

Other qualifications

For full details of our entry requirements, please visit our web pages.

Mature applicants

The Department welcomes applications from mature candidates and has admitted many such students. Such applications are considered on their individual merits and all suitable candidates will be interviewed before a decision is taken. Mature applicants should contact the Admissions Tutor for an informal discussion and to obtain more information and advice before applying.

Destinations of York Computer Science graduates 2004–2006

Destination	%
Postgraduate (research)	12.0
Postgraduate (taught)	5.0
Other further study	4.7
Industry	10.7
Hospitality/sales	3.2
Logistics/telecommunications	5.7
Financial services	4.7
Computing/IT	26.8
Research and development	4.4
Law/accountancy/consultancy	9.8
Public administration	6.9
Education	4.1
Health work	0.6
Social/community work	0.3
Recreation/culture	0.3
Other social and business	0.6

This chart shows the sorts of further study and kinds of employment taken up by York graduates from this department over the past three years.

For more information see: www.york.ac.uk/careers/destinations

After you finish

The academic aspects of our programmes are enhanced by the inclusion of formal projects and opportunities to gain direct experience of industry, through industrial placements. All our programmes provide you with a range of skills attractive to a wide range of employers. The demand for computer scientists and software engineers from the rapidly expanding field of information technology has created employment opportunities within a broad cross-section of employers. The electronics and software industries are the largest employer groups. Many other graduates take advantage of the continuing expansion in the use of computers in commercial and financial operations to find employment. Here, your sharpened numeracy and analytical skills will have prepared you well.

Graduates are not restricted to the above areas, and a small number obtain work in

the media, management and social services. Although more emphasis would be placed on personal qualities in these particular cases it should be appreciated that the ability to work effectively with other people is an important aptitude that the Department aims to develop in students throughout their studies at York. A recent 'destination survey' of graduates with Computer Science degrees has shown that York Computer Science graduates have 96% employment within the top three occupational classifications, as compared with a national average of 75% for all Computer Science graduates from UK higher education institutions.