

Computing/Information and Communication Technology

Through the study of computing, and information and communication technology (ICT), you will start to learn more about:

- ICT tools, systems and applications.
- *Hardware* and *software*.
- Information systems in society and in business.
- Solving practical problems using ICT.
- Presenting and handling information.
- Developments in technology.

There are few careers today that do not involve the use of some form of ICT. Accountants, engineers, lawyers, librarians, doctors, nurses, teachers, secretaries, retail assistants, designers, scientists, and many others, use computers as tools to find, store or process information. Jobs for specialists in computing and information technology (IT) are to be found with:

- Manufacturers of IT hardware.
- Computing services and software companies.
- *Consultancies*.
- End users (the organisations that buy and use computer hardware and software).

Manufacturing hardware	Hardware includes computers, laptops, tablets, smart phones, servers, printers, routers, storage devices and monitors. There are opportunities, at <i>graduate</i> , <i>HND</i> and technician level, for people with a good engineering or scientific background. Useful disciplines include computer engineering, electronics engineering, mathematics, physics, and instrumentation and control engineering. You can find jobs in research and development, hardware design, and in the manufacturing process itself, in production and quality assurance. Engineers and technicians might be involved in giving an aftersales service to the customer, which might include checking equipment regularly and doing any repairs if needed. There are also opportunities in sales and marketing.
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Computing services and systems

The computing services and *software* business is one of the fastest growing areas of information technology. Computer specialists are employed both in service companies and with the people who use computers and their software, in the following areas:

Operations - Computer operators monitor and control large central computers. They load in programs, process batches of data and deal with some routine maintenance and problem solving.

Software development/programming - Systems programmers are concerned with programs that control the operations of the computer, for example, how it stores information or sends it to a printer. Applications developers and programmers work on programs that are used to carry out or support specific tasks on information entered by users, for example, running a payroll or producing sales reports.

Systems analysis and design - Business systems analysts find out what the organisation's needs are, analyse the results, and design or adapt a system to meet those needs. Many organisations now combine the roles of the developer/programmer and the analyst.

Software engineering - Software engineers analyse, design and develop computer systems and software (the programs used by computers). Software engineers usually deal with complex work such as developing operating systems.

The internet - Web designers use a combination of design and IT skills to produce web pages for the internet. They need to achieve a balance between design and ease of use. Website managers make sure the information is accurate and up to date. They plan and test the technical development of the website and make sure it is secure. Many programmers develop software for web applications. IT trainers can deliver whole training courses online.

Computer games - Computer games designers create ideas for computer games, including apps for phones and tablets, and help to decide the way they look and play. They provide instructions for the game's art and 'playability'. Computer games developers/programmers turn these instructions into computer code. Testers make sure that there are no faults in the games.

Project management - This means planning, organising, managing and monitoring one or more IT projects. Managers usually start by putting together the team necessary to complete the job. Project managers often have skills in programming and systems analysis.

Support services - Computer support services engineers install, demonstrate, maintain and update computer equipment for customers or colleagues. They also do routine testing and repair any minor computer faults. Customer support managers organise technical support and advice to customers after the sale of computer systems (hardware and/or software). They are often responsible for a team of help desk staff who try to solve problems by telephone, by email or online.

Sales and marketing - Technical sales managers sell computer *hardware* and software to business customers. They advise them on the benefits to their organisation of investing in new computer systems, or making improvements to their existing systems. They find the best solution for each organisation and *negotiate* a price. Computer/software sales assistants work in stores selling computers and computer-related goods. They help customers to choose those products which would best meet their needs.

Consultancies - While organisations usually have their own staff to manage their information technology, from time to time they might feel they need an outside opinion. They might want to consult an expert on a particular problem, or they might need advice on which *hardware* to buy and the best *software* packages to meet particular needs. They might bring in a *consultant* IT trainer to deliver a single training course in a specific application, or to plan and present a series of courses for different members of staff according to their needs.

The end users

In almost every organisation today, large or small, people are using ICT; for example, the nurse who keeps patient treatment plans on the computer system or the secretary who sends letters by email. Some organisations have departments devoted to information technology, with a manager who has overall responsibility for the planning, provision, security, efficiency and use of IT systems and services.

Retailers - Supermarkets use sophisticated ICT systems. For example, they use the barcodes on goods to track their movement, from their delivery at the warehouse until the moment the customer buys them. ICT enables the retailer to work out what is and isn't selling. This means they can hold stocks at the right level, and arrange their deliveries just in time. ICT can also affect how, when and where we do our shopping. Most retailers have online services; customers can log on from wherever they are, order almost anything available from the store and have it delivered to their home or somewhere else.

The financial sector - You might have seen television pictures of people working on the Stock Exchange, watching banks of computer screens, surrounded by telephones. The financial sector relies on sophisticated computerised information systems, and market information is instantly available from any part of the world. Computers are vital to the trade in stocks and shares. Bank staff can find a customer's details while they are on the telephone, and then use computer systems to move money between accounts and process credit card transactions. Many people do their banking online; website managers and IT security specialists must make sure that both their money and their personal details are secure.

Manufacturing industry - One of the earliest uses of IT in manufacturing was in the control of machinery. Today, manufacturing organisations use computer-aided design (CAD) technology in their design departments, and computer-controlled systems in their production areas.

Telecommunications - It is possible to send information from one part of the world to another within a few seconds. This could be in the form of voice, text, figures, graphics or moving images. Systems include social networking, email, video-conferencing, direct-dial satellite systems for ships, and in-flight calls for aircraft. And, of course, there is the internet, a vast source of information and a virtual meeting place, used by almost everyone.

The public sector - Local and central government are major users of ICT, for the storage, processing, analysis and handling of information. Local authorities prepare tax bills by computer, while the police have databases of criminal offenders and systems for the analysis of fingerprints. The internet helps us to find out about employment and learning opportunities. The internet is readily available on mobile phones and tablets, and also in everyday places such as supermarkets, Jobcentre Plus offices, libraries, colleges and community centres.

Transport and logistics - All modern transport systems depend heavily on computers. A pilot's training is partly on flight simulators. On board the aircraft, the modern cockpit is fully computerised. Navigation aids, collision avoidance systems, the black box recorders - they all rely on computers. The whole process of air travel requires computers, from booking seats to scheduling runways for take-off. Trains use computerised traffic and safety signalling systems. Travellers can use electronic smart-card tickets on the London Underground that they can top-up online. Shipping depends on satellite systems for navigation, and on automatic steering aids and computerised control systems. On our motorways, flashing warnings tell motorists when to reduce their speed because of hazards such as fog. On other types of road, cameras respond automatically by taking pictures of speeding cars. Distribution and logistics managers use computer systems to help them plan the most cost-effective routes for deliveries.

If you are aged between 14 and 16, you will study computing/ICT in some form as part of the *National Curriculum*. Many schools offer Information and Communication Technology *GCSE*. You might already have a *GCSE* in Applied ICT (Double Award) although this is no longer offered for new starters. You might have the chance to study for a *GCSE* in Computing or Computer Science. You might be able to work towards:

- Edexcel BTEC *First* or *National* qualifications in IT or Information and Creative Technology.
- Cambridge *National* or *Technical* qualifications in ICT or IT.
- A Cambridge *National* qualification in Creative iMedia.
- The Edexcel Certificate in Digital Applications for IT Users (CiDA).

There are *AS levels* and *A levels* in ICT and Applied ICT. There are also *AS* and *A levels* in Computing, which include systems, databases and programming.

Two options are available as part of the *International Baccalaureate Diploma* - Computer Science, and Information Technology in a Global Society. Both are offered at Standard and Higher levels.

Higher National Diplomas, *Higher National Certificates*, *degrees* and *postgraduate* qualifications are widely available in different aspects of ICT and computer science. It is also possible to combine computing subjects with, for example, business studies. Full-time and part-time *foundation degrees* are offered in various ICT and computing subjects. *Higher education* (HE) course titles include:

- Applied computing.
- Computer science.
- Multimedia technology.
- Software engineering.
- Information technology.
- Electronic engineering.
- Business information technology.
- Information systems.

A number of universities offer the Information Technology Management for Business (ITMB) degree that has been jointly developed with major employers. See the e-skills website for further details. Depending on the post, some employers value proof of your abilities just as highly as academic qualifications. For example, if you were applying for a job as a web designer, having your own personal website would be excellent proof of what you can do. Many people go on to study for professional qualifications, such as those of BCS: The Chartered Institute for IT.

You might be able to work towards relevant work-related qualifications for IT users, practitioners or professionals, or the *European Computer Driving Licence (ECDL)*. *Intermediate Level Apprenticeships* and *Advanced Level Apprenticeships* might be available in your area. There is also a *Higher Apprenticeship* programme.