



Cambridge and the Computer Laboratory

Cambridge has been an internationally respected centre of learning since the 13th century. Over the course of the last century the University of Cambridge has been the origin of fundamental advances in nuclear physics, molecular biology and computer science. In the 20th century the famous logician Alan Turing developed the theoretical foundations for computation. Over three hundred companies and commercial laboratories specialising in computing and advanced technology are now concentrated in the region.

The Computer Laboratory was founded in 1937 as the Mathematical Laboratory, where it conducted research into mechanical calculators and analogue computers. It became involved in digital computing after 1945 and was responsible for many of the developments of that period in the basic stock of computing knowledge, for example the ideas of subroutines and of microprogramming. Original pioneering work in building complete computers (the EDSAC was commissioned in 1949 and EDSAC 2 in 1958) slowly gave way to the early development of programming languages and operating systems as computers as we know them now became popular.

In 1970 the laboratory changed its name to the Computer Laboratory to reflect its growing focus on automatic computation. Since then the department has been at the forefront of research in computer science. Today it is home to approximately 40 academic staff, 25 support staff, 40 affiliated research staff, 150 research students, 50 ACS students, and 250 undergraduates.

The Research and Study Environment

The Computer Laboratory is located in the William Gates Building on the University's West Cambridge Site, adjacent to the world famous Cavendish Laboratory. The building contains staff offices and laboratories, modern lecture theatres, a cafe and a well-stocked library. It provides a pleasant work environment for students, researchers and visitors alike.



Student Prospectus

University of Cambridge
Computer Laboratory
William Gates Building
15 JJ Thomson Avenue
Cambridge CB3 0FD
UK

Email: admissions@cl.cam.ac.uk
Web: www.cl.cam.ac.uk/admissions

Enquiries & Reception
Tel: +44 (0)1223 763500
Fax: +44 (0)1223 334678



www.cl.cam.ac.uk/admissions



Why choose Computer Science?

Computer science is a fast moving, exciting field that brings together many different disciplines, including mathematics, programming, engineering, psychology and linguistics. Computer science has grown to underpin much of society. It can be found in the technologies that run our transport infrastructure, our economies, our homes and our communications networks. It has been fundamental to progress in scientific research in areas including genetics, astronomy and high-energy physics. It has shaped our art, our leisure and our health. It has revolutionised the world we live in and will define our future.

At its heart, computer science is about problem solving. It's about being able to compare solutions and seek out the most efficient one. It develops transferable skills such as analytical thinking and programming. Our graduates are highly sought after by a wide range of industries, even in a recession, and they command high salaries.

Computer science is an ideal degree for anyone with an inquisitive mind and an interest in technology. It is for people who want to understand how the modern world works, and who want to influence its future.

The Undergraduate Course

The department offers a three-year undergraduate course in computer science, leading to the BA degree. An optional fourth year, leading to the MEng degree, is available to those who perform well in the first three years and who wish to gain a more research-oriented view of computer science.

Year 1: Part IA

Computer science today is an advancing field that benefits from the input of many different scientific and social disciplines. The first year of our course covers a broad base of scientific knowledge that provides a foundation for subsequent years. We teach a common core of computer science and mathematics, alongside an elective subject chosen from a diverse range of options.

Computer Science with Mathematics

This option allows students to spend half of their first year studying courses from the Mathematical Tripos at Cambridge. Students study alongside mathematics undergraduates, covering half of the first year of Cambridge's mathematics course. The remaining half of the year is used to study the fundamentals of computer science.

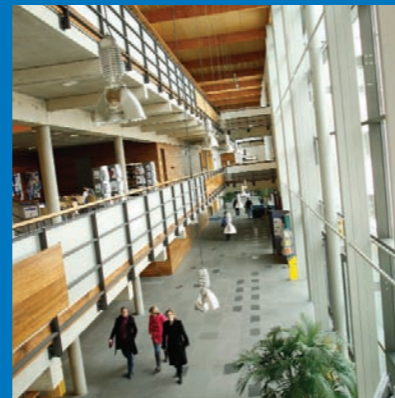
Computer Science with Natural Sciences or Psychology

Students taking this route spend half of the year studying the foundations of computer science; a quarter of the year studying

mathematics; and a quarter of the year studying one of physics, evolution and behaviour, geology, chemistry, physiology of organisms, or social psychology.

Course Flexibility

The first year of Cambridge's Natural Sciences Tripos is composed of four options. Students who take the Computer Science Tripos with Natural Sciences are studying the same mathematics course as natural scientists and their science option covers exactly the same material as a natural science student. Therefore, transfer into the Natural Sciences Tripos at the end of the first year is typically straightforward. There is an equivalent path for a natural science student: they can take half of the computer science foundation course as an option and transfer to the Computer Science Tripos at the end of their first year, covering any missing material via self-study over the intervening summer. Students who choose Computer Science with Mathematics, however, are normally unable to transfer into the Mathematical Tripos since they will have covered only half the material of a mathematics undergraduate.



Year 2: Part IB

The whole of the Part IB year is devoted to teaching the core principles of computer science. The course covers all of the main bases: theory, systems, discrete mathematics, applications, security and professionalism (i.e. the ethics, economics and law relevant to putting all of this into practice in a commercial environment).

Students also continue to develop their practical skills. By the end of the second year they will have learnt to program in ML, Java, C, C++ and Prolog and they have the opportunity to demonstrate their computer science abilities in one of the highlights of the year: the

group projects. These projects are proposed by industry and academia and challenge small teams of students to deliver a product to an external client. This allows students to experience the software engineering process first hand. Recent projects have included software to analyse twitter feeds, collaborative software for large multi-touch screens, Guitar Hero with a real guitar, and self-playing chess sets. Many of the projects have a commercial aspect, often leading to commercialisation, licensing, or employment of team members.

Year 3: Part II

The third year provides a set of courses to choose from, each exploring specific areas in depth with an expert in that field, building on the core material in Part IB. Students are free to choose the courses that interest them most from a large set of topical subjects. For example, in the 2010/11 academic year, the Part II courses were:

- Advanced Graphics
- Advanced Systems
- Artificial Intelligence
- Bioinformatics
- Business Studies
- Comparative Architecture
- Compiler Optimisation
- Computer Vision
- Concurrency
- Denotational Semantics

- Digital Communication
- Distributed Systems
- E-Commerce
- Human-Computer Interaction
- Information Retrieval
- Information Theory and Coding
- Natural Language Processing
- Quantum Computing
- Security
- Specification and Verification
- System-on-chip Design
- Types

Additionally, the third year sees students embark on an individual project that allows them to demonstrate their computer science skills and knowledge both to academia and to prospective employers.

Year 4: Part III (Optional)

Computer science is a dynamic subject and we offer a fourth year of undergraduate study to allow students to learn about the latest developments. Students wishing to continue into this final year must achieve a high ranking in their third year – progression from Part II to Part III depends on academic achievement and is not automatic. Those students who complete Part III graduate with both the BA and the MEng degrees.

The fourth year is ideal for students who are thinking of a career in research (academic or industrial). It's where students get exposed to the latest research in a variety of computer science domains. The courses are designed to explore issues at the forefront of computer science and we provide the opportunity to do a substantial project intended to demonstrate an ability to conduct research.

Graduate Courses

We offer two courses to excellent graduates from around the world.

The MPhil in Advanced Computer Science

The MPhil in Advanced Computer Science (“the ACS”) is a one-year course that is designed to be a stepping stone for graduates looking to do computer science research, whether at Cambridge or elsewhere.

The course covers a wide range of topics, each taught and assessed as a module. For 2010-11, 34 different modules were available, taught and assessed in a variety of ways. Some modules are similar to a traditional undergraduate lecture series, others are more practically focused, and yet others involve reading and discussing research papers in a particular field. ACS students get a free choice, so you can specialise as you see fit.

The ACS also allows for a substantial research project, which may lead to an academic publication. This means that the course gives students a chance to experience real research, and to discover whether they like it (or if they are any good at it!). It also provides transferable research skills and exposure to cutting-edge technical material.



The PhD Programme

The PhD is the primary research degree in the Computer Laboratory. It is a three-year programme of individual research on a topic agreed by the student and the Laboratory, under the guidance of a staff member as the student’s supervisor. The PhD is assessed purely on research – there are no taught courses, although PhD candidates are welcome to attend lectures given as part of the other degree courses.

Applying to Study Here

The Undergraduate Course

Applying with A-Levels

As with all subjects in Cambridge, admissions standards are set to seek out the best in the field, and a typical A-level offer for computer science is A*AA; if you choose to study Computer Science with Mathematics in the first year a typical offer will require you to take STEP exams too. Formally, admission to Cambridge is decided by a college, not by the department and the college is likely to interview an applicant before deciding whether or not to make an offer.

- For computer science, the primary qualifications we seek are in mathematics. A-level mathematics is essential. Further mathematics to AS- or A-level is desirable, although we recognise that not all schools currently offer it.

- A physical science to A-level is also an advantage and may be a requirement for some first-year options.

- A-levels such as ICT and Computing are more vocational in nature than the subject matter we teach as computer science. As such, a physical science is generally preferred to a qualification in these subjects.

Applying with Other Qualifications

We accept students with a wide range of qualifications including the International Baccalaureate, Scottish Highers, and the Irish Leaving Certificate. Broadly speaking we expect an equivalent standard to that achieved by our A-level candidates. Contact us if you would like to discuss your circumstances.

Further details are available at:

www.cl.cam.ac.uk/admissions/undergraduate

The MPhil in Advanced Computer Science

Entry to the ACS is extremely competitive, and graduates need to have attained a first-class honours degree to be considered for a place. Successful candidates typically also have good academic references and an interesting research proposal. More specifically, applicants are expected to have met the following prerequisites:

- first-class honours degree or equivalent in a relevant subject such as engineering, computer science or mathematics;
- mathematics to A-level standard;
- some programming experience.

Further details are available at:

www.cl.cam.ac.uk/admissions/acs

The PhD Programme

Applicants are expected to have a very good degree (in the UK a first-class honours degree) in computer science or a related subject. A masters-level degree, or other post-graduate work, is increasingly desirable; some PhD applicants may find prior study of our MPhil in Advanced Computer Science useful. Students are not assigned to pre-specified projects and must apply with a written research proposal.

Further details are available at:

www.cl.cam.ac.uk/admissions/phd