The Computer Science Tripos is made up of four parts. Parts IA, IB, and II are normally followed in a student’s first, second and third years of study. They lead to the BA degree. The optional Part III is normally taken in a student’s fourth year and leads to the MEng degree (in addition to a BA).

Overview

The course aims to:

- produce computer science graduates equipped to play leading roles in academia, in industry and in the professions and public service;
- attract outstanding students from within the UK and from overseas;
- develop new areas of teaching in response to the advance of scholarship and the needs of the community;
- for Part III, to produce computer science graduates equipped to go directly on to a research degree.

The philosophy that has guided the design of the syllabus for our course is that we should provide a challenging and stimulating programme to match the high ability of the intake that we are able to attract. In a subject like ours, where constant change is the norm, we want to educate our students about underlying principles, arguing that this will equip them in later life to train themselves to exploit whatever particular software and hardware tools become current. We expect that among our output will be a number of people who go on to extend the boundaries of computer techniques as leaders in their field, as well as others who apply the best of contemporary methods.

All Cambridge degree programmes follow the Tripos system, which structures courses into year-long modules. To be permitted to take one of the later modules a student must have demonstrated at least a pass level in previous years. Within each year we have aims and objectives associated with individual course-units (typically 8 to 20 lectures of material). This overview gives a higher-level statement of our aims and objectives for each year as a whole.

First Year aims and objectives

Our first year teaching aims to bring together students who will be united in having good school-leaving qualifications but who will have taken a variety of subjects and options before joining us. On the computing side, it will give them all an overview of computer hardware, ensure that they develop the practical skills of programming in both a functional and object-
oriented context and make them aware of fundamental issues in operating systems. It exposes them to those areas of mathematics that are pre-requisites for later parts of the programme and to professional and software engineering issues. From October 2016 students have been able to take a “75% computer science” option. The new option allows students to study three computer science papers in their first year rather than two plus an alternative subject. This option will appeal to those who have some familiarity with simple procedural programming. Alternatively, students may follow the general Cambridge first-year science practice of allowing those students who wish to, to maintain a degree of breadth by studying another subject (physics, chemistry, geology, evolution and behaviour, physiology, social psychology or additional mathematics) in their first year.

All students are expected to show practical skills to an acceptable level in ML, Java and Digital Electronics, and they are all expected to answer examination questions on each of the major units within the course. Our main first year objective is that students should be familiar with material spanning the full range of our subject so that they have a firm foundation for second year options.

Second Year aims and objectives
Our second year aims are that students should end up with a broad understanding of the classical core of computer science, and that they should progress in their practical programming and group-working abilities. The corresponding objectives are that they demonstrate that they have achieved these skills and this understanding: the programming assignments and group project are compulsory and the examination is structured so that students must answer questions on each of the key areas of theory, systems, programming, and applications and professionalism.

Third Year aims and objectives
A major aim in the final BA year is to provide a flexible structure where students can build on the core material taught earlier and consolidate and develop their skills in a range of advanced topics. Reflecting the wide range of topics that fall within the general umbrella of “computer science” (the subject benchmark comments on this), the only component of the course that we make mandatory at this level is an individual project.
Our objectives are then that students show that they have selected, worked consistently on and reached a satisfactory completion of their project, and that they demonstrate mastery of an appropriate number of the individual higher-level taught courses.

Fourth Year aims and objectives
The aim of the MEng year is preparation for research. We provide a fully flexible framework for this. Students take nine Masters-level modules from a selection that spans the Laboratory’s expertise. Our objective is that students demonstrate an understanding of current research in their chosen field(s) and are prepared to embark on a research degree on completion of the year.

Programme objective
To be awarded an honours BA degree, students need to pass examinations at the end of each of their three years of study. We expect that students will have a grasp on the fundamental tools and techniques in their subject, they will have studied core subject content across a wide range of topics, their group and individual programming skills will have been exercised and they will have demonstrated ability in a selection of modular options at an advanced level. To be awarded a Master of Engineering, students will additionally need to successfully complete the fourth year course.
Intended Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas.

A. Knowledge and understanding:
   1. Mathematics that is relevant to computer science;
   2. The fundamental concepts, principles and theories of computation and the application of computers;
   3. Business and management techniques and product development relevant to computer scientists;
   4. Detailed knowledge and understanding of the essential facts, concepts, principles and theories relevant to the student’s chosen area of specialisation;
   5. The role of computer scientists in society and the constraints within which their professional judgment will be exercised;
   6. The professional and ethical responsibilities of computer scientists;
   7. Trends and developments in the subject area;
   8. Current research issues [Part III].

B. Intellectual skills — to be able to:
   1. Plan, conduct and report a significant programming project;
   2. Analyse and solve computing problems;
   3. Design a computer system, process or protocol to meet a need;
   4. Be creative in the solution of problems and in the development of designs;
   5. Formulate and test hypotheses;
   6. Test computer software and to identify, isolate and correct defects;
   7. Apply formal reasoning to justify the correctness of results within computer science;
   8. Critically analyse the work of other researchers [Part III].

C. Practical skills — to be able to:
   9. Plan, design, implement and test computer programs and applications;
   10. Construct simple digital circuits;
   11. Make effective use of a variety of operating systems, programming languages and software tools;
   12. Prepare a substantial technical document describing project work done;
   13. Demonstrate the ability to critique, summarise, and present their own and other’s work [Part III].

D. Transferable skills — to be able to:
   1. Communicate effectively, in writing and verbally;
   2. Work as a member of a team;
   3. Manage resources and time;
   4. Learn independently in familiar and unfamiliar situations with an open mind and in the spirit of critical enquiry;
   5. Learn effectively for the purpose of continuing professional development and in a wider context throughout their career.

Teaching Methods

The programme is taught principally through lectures (arranged by the Computer Laboratory) and small-group supervisions (1–4 students in a group, arranged by the Colleges in the first two years and by the Laboratory in the third and fourth years). In addition, there are practical hardware laboratories in both first and second years; practical programming work in the first three years; and a wide range of practical exercises in the fourth year.
Assessment Methods
Assessment in the first three years is principally through end-of-year examinations. Practical exercises in the first and second years are assessed on a pass/fail system. A failed exercise may, in most cases, be resubmitted. The intention is that all students should pass all practical exercises in both years. The practical work in the first and second years counts as (roughly) 20% of the final mark. The third year personal project is assessed by at least three readers and the mark for this project counts as 25% of the total mark for the third year. The fourth year is assessed by a wide range of mechanisms, as appropriate for each module, including essays, programming exercises, oral presentations, tests, and examinations.

Progression Requirements
A student must pass one year of the course in order to progress to the next year and must pass the third year to be awarded the BA degree. There is no facility to re-sit or to re-take a year. Experience shows that only around 1% of students fail to pass. There are procedures for students who wish to apply for an aegrotat assessment or who wish to claim impaired performance. Very few students are affected and details of the procedures can be found in the Statutes and Ordinances of the University. Progression from third year (Part II) to fourth year (Part III) is not automatic and depends on the student achieving a standard set by the Faculty Board. A pass at Part III is a requirement for the award of the MEng degree.

Every effort has been made to ensure the accuracy of the information in this programme specification. At the time of publication, the programme specification has been approved by the relevant Faculty Board (or equivalent). Programme specifications are reviewed annually, however, during the course of the academical year, any approved changes to the programme will be communicated to enrolled students through email notification or publication in the Reporter. The relevant faculty or department will endeavour to update the programme specification accordingly, and prior to the start of the next academical year.

Further information about specifications and an archive of programme specifications for all awards of the University is available online at: https://www.camdata.admin.cam.ac.uk/