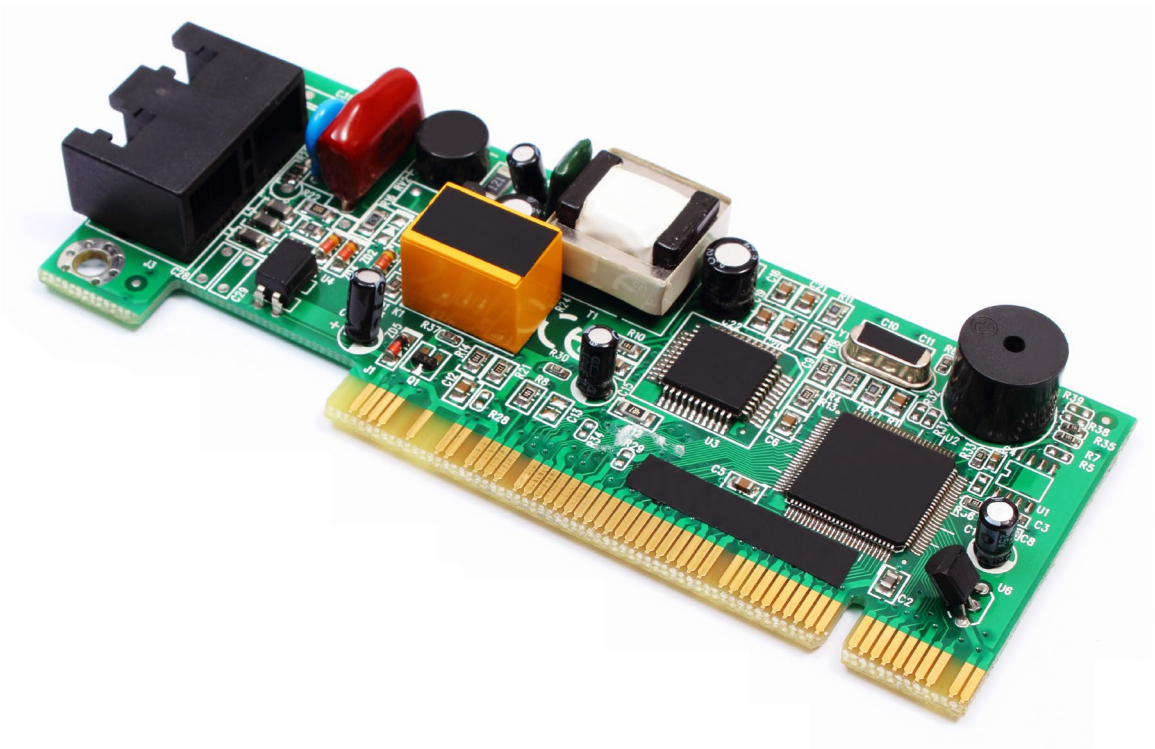
Cambridge Secondary 2

Cambridge IGCSE

Syllabus

Cambridge IGCSE® (9–1)
Computer Science **0984**

For examination in June and November 2019.



Version 2

Please check the syllabus page at **www.cie.org.uk/igcse** to see if this syllabus is available in your administrative zone.

CAMBRIDGE International Examinations

Why choose Cambridge?

Cambridge International Examinations prepares school students for life, helping them develop an informed curiosity and a lasting passion for learning. We are part of Cambridge Assessment, a department of the University of Cambridge.

Our international qualifications are recognised by the world's best universities and employers, giving students a wide range of options in their education and career. As a not-for-profit organisation, we devote our resources to delivering high-quality educational programmes that can unlock students' potential.

Our programmes and qualifications set the global standard for international education. They are created by subject experts, rooted in academic rigour and reflect the latest educational research. They provide a strong platform for learners to progress from one stage to the next, and are well supported by teaching and learning resources.

Our mission is to provide educational benefit through provision of international programmes and qualifications for school education and to be the world leader in this field. Together with schools, we develop Cambridge students who are confident, responsible, reflective, innovative and engaged – equipped for success in the modern world.

Every year, nearly a million Cambridge students from 10 000 schools in 160 countries prepare for their future with an international education from Cambridge.

'We think the Cambridge curriculum is superb preparation for university.'

Christoph Guttentag, Dean of Undergraduate Admissions, Duke University, USA

Quality management

Our systems for managing the provision of international qualifications and education programmes for students aged 5 to 19 are certified as meeting the internationally recognised standard for quality management, ISO 9001:2008. Learn more at **cie.org.uk/ISO9001**

Contents

Changes to this syllabus

The latest syllabus is version 2, published February 2018.

Any textbooks endorsed to support IGCSE Computer Science for examination from 2015 are still suitable for use with this syllabus.

1 Why choose this syllabus?

Key benefits

Cambridge IGCSE® syllabuses are created especially for international students. For over 25 years, we have worked with schools and teachers worldwide to develop syllabuses that are suitable for different countries, different types of schools and for learners with a wide range of abilities.

Cambridge IGCSE (9–1) Computer Science learners study the principles and practices of computing and gain confidence in computational thinking and programming. They learn to program by writing computer code and they develop their understanding of the main principles of problem solving using computers.

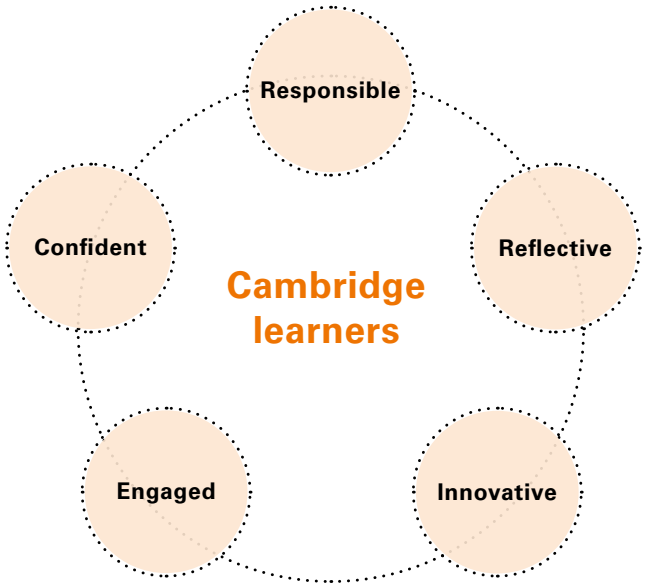
Learners apply their understanding to develop computer-based solutions to problems using algorithms and a high-level programming language. They also develop a range of technical skills, as well as the ability to test effectively and to evaluate computing solutions.

This qualification helps learners appreciate current and emerging computing technologies and the benefits of their use. They learn to recognise the ethical issues and potential risks when using computers.

Cambridge IGCSE (9–1) Computer Science is an ideal foundation for further study in Computer Science. Understanding the principles of Computer Science provides learners with the underpinning knowledge required for many other subjects in science and engineering, and the skills learnt can also be used in everyday life.

Our programmes balance a thorough knowledge and understanding of a subject and help to develop the skills learners need for their next steps in education or employment.

Our approach encourages learners to be:



'The strength of Cambridge IGCSE qualifications is internationally recognised and has provided an international pathway for our students to continue their studies around the world.'

Gary Tan, Head of Schools and CEO, Raffles International Group of Schools, Indonesia

Recognition and progression

The combination of knowledge and skills in Cambridge IGCSE (9–1) Computer Science gives learners a solid foundation for further study. Candidates who achieve grades 4 to 9 are well prepared to follow a wide range of courses including Cambridge International AS & A Level Computer Science, or the equivalent.

Cambridge IGCSEs are accepted and valued by leading universities and employers around the world as evidence of academic achievement. Many universities require a combination of Cambridge International AS & A Levels and Cambridge IGCSEs to meet their entry requirements.

Learn more at **www.cie.org.uk/recognition**

Supporting teachers

We provide a wide range of practical resources, detailed guidance and innovative training and professional development so that you can give your learners the best possible preparation for Cambridge IGCSE.

Support for Cambridge IGCSE

Teaching resources

- Syllabus
- Scheme of work
- Learner guide
- Endorsed textbooks and digital resources
- Teacher support **teachers.cie.org.uk**
- Discussion forum
- Resource List

Exam preparation resources

- Question papers
- Mark schemes
- Example candidate responses to understand what examiners are looking for at key grades
- Examiner reports to improve future teaching

Training

- Face-to-face workshops around the world
- Online self-study training
- Online tutor-led training
- Professional development qualifications

Community

Community forum **teachers.cie.org.uk**

LinkedIn **linkd.in/cambridgeteache**r

Twitter **@cie_education**

Facebook **facebook.com/cie.org.uk**

‘Cambridge IGCSE is one of the most sought-after and recognised qualifications in the world. It is very popular in Egypt because it provides the perfect preparation for success at advanced level programmes.’

Mrs Omnia Kassabgy, Managing Director of British School in Egypt BSE

2 Syllabus overview

Aims

The syllabus aims summarise the context in which you should view the syllabus content and describe the purposes of a course based on this syllabus. They are not listed in order of priority.

The aims are to develop:

- computational thinking, that is thinking about what can be computed and how, and includes consideration of the data required
- understanding of the main principles of solving problems by using computers
- understanding that every computer system is made up of sub-systems, which in turn consist of further sub-systems
- understanding of the component parts of computer systems and how they interrelate, including software, data, hardware, communications and people
- skills necessary to apply understanding to solve computer-based problems using a high-level programming language.

Content

Sections	Topics
Section 1 **Theory of computer science**	1.1 Data representation 1.1.1 Binary systems 1.1.2 Hexadecimal 1.1.3 Data storage 1.2 Communication and Internet technologies 1.2.1 Data transmission 1.2.2 Security aspects 1.2.3 Internet principles of operation 1.3 Hardware and software 1.3.1 Logic gates 1.3.2 Computer architecture and the fetch-execute cycle 1.3.3 Input devices 1.3.4 Output devices 1.3.5 Memory, storage devices and media 1.3.6 Operating systems 1.3.7 High- and low-level languages and their translators 1.4 Security 1.5 Ethics
Section 2 **Practical problem-solving and programming**	2.1 Algorithm design and problem-solving 2.1.1 Problem-solving and design 2.1.2 Pseudocode and flowcharts 2.2 Programming 2.2.1 Programming concepts 2.2.2 Data structures; arrays 2.3 Databases

Teacher support for Cambridge IGCSE (9–1) Computer Science

We provide a wide range of support resources to give your learners the best possible preparation for Cambridge programmes and qualifications. Support for Cambridge IGCSE (9–1) Computer Science includes a Teacher Guide, Example Candidate Responses and a Scheme of Work. These and other resources are available online through Teacher Support at https://teachers.cie.org.uk

Assessment

All candidates take two papers.

All candidates take:

Paper 1 1 hour 45 minutes
Theory 60%

75 marks

Short answer and structured questions

Questions will be based on section 1 of the Subject content

All questions are compulsory

No calculators are permitted

Externally assessed

and:

Paper 2 1 hour 45 minutes
Problem-solving and Programming 40%

50 marks

Short answer and structured questions

Questions will be based on section 2 of the Subject content

All questions are compulsory

20 marks are from questions set on the pre-release material[1]

No calculators are permitted

Externally assessed

1 The pre-release material for Paper 2 Problem-solving and Programming is made available to Centres shortly after the estimated entries deadline for the June and November examinations. It is also reproduced in the question paper. Candidates must not bring any prepared material into the examination.

3 Subject content

Annual technical updates

Technical updates will be published each year to take account of emerging technologies relevant to the Subject content. Please refer to the updates page for this syllabus on the Cambridge website **http//www.cie.org.uk/0984** for the relevant year of examination.

For Cambridge IGCSE (9–1) Computer Science, the assessment is by written examination but the learning should happen in a mainly practical way: problem-solving and programming.

Section 1 Theory of Computer Science

1.1 Data representation

Candidates should be able to:

1.1.1 Binary systems

- recognise the use of binary numbers in computer systems
- convert positive denary integers into binary and positive binary integers into denary (a maximum of 16 bits will be used)
- show understanding of the concept of a byte and how the byte is used to measure memory size
- use binary in computer registers for a given application (such as in robotics, digital instruments and counting systems)

1.1.2 Hexadecimal

- represent positive numbers in hexadecimal notation
- show understanding of the reasons for choosing hexadecimal notation to represent numbers
- convert positive hexadecimal integers to and from denary (a maximum of four hexadecimal digits will be required)
- convert positive hexadecimal integers to and from binary (a maximum of 16 bit binary numbers will be required)
- represent numbers stored in registers and main memory as hexadecimal
- identify current uses of hexadecimal numbers in computing, such as defining colours in Hypertext Markup Language (HTML), Media Access Control (MAC) addresses, assembly languages and machine code, debugging

1.1.3 Data storage

- show understanding that sound (music), pictures, video, text and numbers are stored in different formats
- identify and describe methods of error detection and correction, such as parity checks, check digits, checksums and Automatic Repeat reQuests (ARQ)
- show understanding of the concept of Musical Instrument Digital Interface (MIDI) files, JPEG files, MP3 and MP4 files
- show understanding of the principles of data compression (lossless and lossy) applied to music/video, photos and text files

1.2 Communication and Internet technologies

Candidates should be able to:

1.2.1 Data transmission

- show understanding of what is meant by transmission of data
- distinguish between serial and parallel data transmission
- distinguish between simplex, duplex and half-duplex data transmission
- show understanding of the reasons for choosing serial or parallel data transmission
- show understanding of the need to check for errors
- explain how parity bits are used for error detection
- show understanding of the use of serial and parallel data transmission, in Universal Serial Bus (USB) and Integrated Circuit (IC)

1.2.2 Security aspects

(This section links with section 1.4 of the syllabus.)

- show understanding of the security aspects of using the Internet and understand what methods are available to help minimise the risks
- show understanding of the Internet risks associated with malware, including viruses, spyware and hacking
- explain how anti-virus and other protection software helps to protect the user from security risks

1.2.3 Internet principles of operation

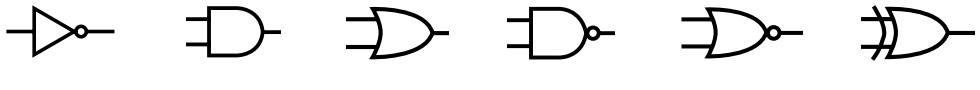
- show understanding of the role of the browser
- show understanding of the role of an Internet Service Provider (ISP)
- show understanding of what is meant by hypertext transfer protocol (http and https) and HTML
- distinguish between HTML structure and presentation
- show understanding of the concepts of MAC address, Internet Protocol (IP) address, Uniform Resource Locator (URL) and cookies

1.3 Hardware and software

Candidates should be able to:

1.3.1 Logic gates

- use logic gates to create electronic circuits
- understand and define the functions of NOT, AND, OR, NAND, NOR and XOR (EOR) gates, including the binary output produced from all the possible binary inputs (all gates, except the NOT gate, will have 2 inputs only)
- draw truth tables and recognise a logic gate from its truth table
- recognise and use the following standard symbols used to represent logic gates:



NOT AND OR NAND NOR XOR

- produce truth tables for given logic circuits, for example:

A	B	C	Output
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

- produce a logic circuit to solve a given problem or to implement a given written logic statement.

1.3.2 Computer architecture and the fetch-execute cycle

- show understanding of the basic Von Neumann model for a computer system and the stored program concept (program instructions and data are stored in main memory and instructions are fetched and executed one after another)
- describe the stages of the fetch-execute cycle, including the use of registers and buses

1.3.3 Input devices

- describe the principles of operation (how each device works) of these input devices: 2D and 3D scanners, barcode readers, Quick Response (QR) code readers, digital cameras, keyboards, mice, touch screens, interactive whiteboards, microphones
- describe how these principles are applied to real-life scenarios, for example: scanning of passports at airports, barcode readers at supermarket checkouts, and touch screens on mobile devices
- describe how a range of sensors can be used to input data into a computer system, including light, temperature, magnetic field, gas, pressure, moisture, humidity, pH and motion
- describe how these sensors are used in real-life scenarios, for example: street lights, security devices, pollution control, games, and household and industrial applications

1.3.4 Output devices

- describe the principles of operation of the following output devices: inkjet, laser and 3D printers; 2D and 3D cutters; speakers and headphones; actuators; flat-panel display screens, such as Liquid Crystal Display (LCD) and Light-Emitting Diodes (LED) display; LCD projectors and Digital Light Projectors (DLP)
- describe how these principles are applied to real-life scenarios, for example: printing single items on demand or in large volumes; use of small screens on mobile devices

1.3.5 Memory, storage devices and media

- show understanding of the difference between: primary, secondary and off-line storage and provide examples of each, such as:

  primary: Read Only Memory (ROM), and Random Access Memory (RAM)

  secondary: hard disk drive (HDD) and Solid State Drive (SSD); off-line: Digital Versatile Disc (DVD), Compact Disc (CD), Blu-ray disc, USB flash memory and removable HDD
- describe the principles of operation of a range of types of storage device and media including magnetic, optical and solid state
- describe how these principles are applied to currently available storage solutions, such as SSDs, HDDs, USB flash memory, DVDs, CDs and Blu-ray discs
- calculate the storage requirement of a file

1.3.6 Operating systems

- describe the purpose of an operating system (Candidates will be required to understand the purpose and function of an operating system and why it is needed. They will not be required to understand how operating systems work.)
- show understanding of the need for interrupts

1.3.7 High- and low-level languages and their translators

- show understanding of the need for both high-level and low-level languages
- show understanding of the need for compilers when translating programs written in a high-level language
- show understanding of the use of interpreters with high-level language programs
- show understanding of the need for assemblers when translating programs written in assembly language

1.4 Security

Candidates should be able to:

1.4.1

- show understanding of the need to keep data safe from accidental damage, including corruption and human errors
- show understanding of the need to keep data safe from malicious actions, including unauthorised viewing, deleting, copying and corruption

1.4.2

- show understanding of how data are kept safe when stored and transmitted, including:
  - use of passwords, both entered at a keyboard and biometric
  - use of firewalls, both software and hardware, including proxy servers
  - use of security protocols such as Secure Socket Layer (SSL) and Transport Layer Security (TLS)
  - use of symmetric encryption (plain text, cypher text and use of a key) showing understanding that increasing the length of a key increases the strength of the encryption

1.4.3

- show understanding of the need to keep online systems safe from attacks including denial of service attacks, phishing, pharming

1.4.4

- describe how the knowledge from 1.4.1, 1.4.2 and 1.4.3 can be applied to real-life scenarios including, for example, online banking, shopping

1.5 Ethics

Candidates should be able to:

- show understanding of computer ethics, including copyright issues and plagiarism
- distinguish between free software, freeware and shareware
- show understanding of the ethical issues raised by the spread of electronic communication and computer systems, including hacking, cracking and production of malware

Section 2 Practical Problem-solving and Programming

2.1 Algorithm design and problem-solving

Candidates should be able to:

2.1.1 Problem-solving and design

- show understanding that every computer system is made up of sub-systems, which in turn are made up of further sub-systems
- use top-down design, structure diagrams, flowcharts, pseudocode, library routines and sub-routines
- work out the purpose of a given algorithm
- explain standard methods of solution
- suggest and apply suitable test data
- understand the need for validation and verification checks to be made on input data (validation could include range checks, length checks, type checks and check digits)
- use trace tables to find the value of variables at each step in an algorithm
- identify errors in given algorithms and suggest ways of removing these errors
- produce an algorithm for a given problem (either in the form of pseudocode or flowchart)
- comment on the effectiveness of a given solution

2.1.2 Pseudocode and flowcharts

- understand and use pseudocode for assignment, using ←
- understand and use pseudocode, using the following conditional statements:

  `IF … THEN … ELSE … ENDIF`

  `CASE … OF … OTHERWISE … ENDCASE`
- understand and use pseudocode, using the following loop structures:

  `FOR … TO … NEXT`

  `REPEAT … UNTIL`

  `WHILE … DO … ENDWHILE`
- understand and use pseudocode, using the following commands and statements:

  `INPUT` and `OUTPUT` (e.g. `READ` and `PRINT`)

  totalling (e.g. `Sum` ← `Sum` + `Number`)

  counting (e.g. `Count` ← `Count` + 1)
- understand and use standard flowchart symbols to represent the above statements, commands and structures

(Candidates are advised to try out solutions to a variety of different problems on a computer using a language of their choice; no particular programming language will be assumed in this syllabus.)

2.2 Programming

Candidates should be able to:

2.2.1 Programming concepts

- declare and use variables and constants
- understand and use basic data types: Integer, Real, Char, String and Boolean
- understand and use the concepts of sequence, selection, repetition, totalling and counting
- use predefined procedures/functions

2.2.2 Data structures; arrays

- declare and use one-dimensional arrays, for example: `A[1:n]`
- show understanding of the use of one-dimensional arrays, including the use of a variable as an index in an array
- read or write values in an array using a `FOR … TO … NEXT` loop

2.3 Databases

Candidates should be able to:

- define a single-table database from given data storage requirements
- choose and specify suitable data types
- choose a suitable primary key for a database table
- perform a query-by-example from given search criteria.

4 Details of the assessment

For information on the Assessment objectives (AOs) see section 5.

Component 1 – Paper 1 Theory

Written paper, 1 hour 45 minutes, 75 marks

This is a compulsory question paper, consisting of short-answer and structured questions set on Section 1 of the Subject content. All questions are compulsory. Candidates answer on the question paper.

Component 2 – Paper 2 Problem-solving and Programming

Written paper, 1 hour 45 minutes, 50 marks

This is a compulsory question paper, consisting of short-answer and structured questions set on Section 2 of the Subject content. All questions are compulsory. Candidates answer on the question paper. 20 of the marks in this paper are from questions set on tasks provided in the Paper 2 Problem-solving and Programming pre-release material.

Candidates need sufficient practical sessions within their lesson timetable so they learn the contents of the section in a largely practical way. Candidates must program in a high-level programming language chosen by the Centre. The programming language must be procedural.

There is some examining of knowledge with understanding, but most of the credit is for using techniques and skills to solve problems. The examination questions require candidates to have practical programming experience, including writing their own programs, executing (running), testing and debugging them. Knowledge of programming language syntax is not examined; in all cases the logic is more important than the syntax.

Paper 2 – Problem-solving and Programming pre-release material

The Paper 2 Problem-solving and Programming pre-release material is available to Centres shortly after the estimated entries deadline for the June and November examinations. It is also reproduced in the question paper. Candidates must not bring any prepared material into the examination.

Candidates must develop solutions to tasks using a high-level programming language, such as Visual Basic, Pascal/Delphi or Python. The purpose of the pre-release material tasks is to direct candidates to some of the topics which will be examined in Paper 2. Teachers should incorporate these tasks into their lessons and give support in finding methods and reaching solutions. 20 of the marks in this paper are from questions testing candidates' understanding gained from developing programmed solutions to these tasks.

Notes for guidance

Equipment and facilities

Computer science is a practical subject and the Cambridge IGCSE (9–1) Computer Science syllabus places emphasis on the use of procedural high-level programming languages. Centres must ensure that their equipment and facilities are adequate for learners to be able to satisfy the requirements of the syllabus. The hardware facilities needed will depend on the number of learners, but must be sufficient for all candidates to have enough time to practise their programming skills.

Hardware

Learners need to have access to a system with direct-access file capability on backing store and hardcopy facilities.

Software

Learners must have experience of using a high-level programming language, such as Visual Basic, Pascal/Delphi or Python, chosen by the Centre.

Practical skills

Computer science is a practical subject and a range of practical exercises must be integral to the teaching of this qualification.

It is important that, as early as possible in the course, learners develop a systematic approach to practical problem-solving using appropriate resources.

5 Assessment objectives

The assessment objectives (AOs) are:

AO1 Recall, select and communicate knowledge and understanding of computer technology

AO2 Apply knowledge, understanding and skills to solve computing or programming problems

AO3 Analyse, evaluate, make reasoned judgements and present conclusions

Weighting for assessment objectives

The approximate weightings allocated to each of the assessment objectives (AOs) are summarised below.

Assessment objectives as a percentage of the qualification

Assessment objective	Weighting in IGCSE %
AO1	40
AO2	40
AO3	20

Assessment objectives as a percentage of each component

Assessment objective	Weighting in components %	
	Paper 1	**Paper 2**
AO1	53	20
AO2	27	60
AO3	20	20

6 What else you need to know

This section is an overview of other information you need to know about this syllabus. It will help to share the administrative information with your exams officer so they know when you will need their support. Find more information about our administrative processes at **www.cie.org.uk/examsofficers**

Before you start

Previous study

We recommend that learners starting this course should have studied a general curriculum such as the Cambridge Secondary 1 programme or equivalent national educational framework. Learners in England will normally have followed the Key Stage 3 programme of study within the National Curriculum for England.

Guided learning hours

Cambridge IGCSE syllabuses are designed on the assumption that learners have about 130 learning hours per subject over the duration of the course, but this is for guidance only. The number of hours required to gain the qualification may vary according to local curricular practice and the learners' prior experience of the subject.

Availability and timetables

You can enter candidates in the June and November exam series. You can view the timetable for your administrative zone at **www.cie.org.uk/timetables**

All Cambridge schools are allocated to one of six administrative zones. Each zone has a specific timetable. This syllabus is not available in all administrative zones. To find out about the availability visit the syllabus page at **www.cie.org.uk/igcse**

Private candidates can enter for this syllabus.

Combining with other syllabuses

Candidates can take this syllabus alongside other Cambridge syllabuses in a single exam series. The only exceptions are:

- Cambridge IGCSE Computer Science (0478)
- Cambridge O Level Computer Science (2210)
- syllabuses with the same title at the same level.

Cambridge IGCSE, Cambridge IGCSE (9–1) (Level 1/Level 2 Certificates) and Cambridge O Level syllabuses are at the same level.

Making entries

Exams officers are responsible for submitting entries to Cambridge. We encourage them to work closely with you to make sure they enter the right number of candidates for the right combination of syllabus components. Entry option codes and instructions for submitting entries are in the *Cambridge Guide to Making Entries*. Your exams officer has a copy of this guide.

Option codes for entries

To keep our exams secure we allocate all Cambridge schools to one of six administrative zones. Each zone has a specific timetable. The majority of option codes have two digits:

- the first digit is the component number given in the syllabus
- the second digit is the location code, specific to an administrative zone.

Support for exams officers

We know how important exams officers are to the successful running of exams. We provide them with the support they need to make your entries on time. Your exams officer will find this support, and guidance for all other phases of the Cambridge Exams Cycle, at **www.cie.org.uk/examsofficers**

Retakes

Candidates can retake the whole qualification as many times as they want to. This is a linear qualification so candidates cannot re-sit individual components.

Equality and inclusion

We have taken great care to avoid bias of any kind in the preparation of this syllabus and related assessment materials. In compliance with the UK Equality Act (2010) we have designed this qualification to avoid any direct and indirect discrimination.

The standard assessment arrangements may present unnecessary barriers for candidates with disabilities or learning difficulties. We can put arrangements in place for these candidates to enable them to access the assessments and receive recognition of their attainment. We do not agree access arrangements if they give candidates an unfair advantage over others or if they compromise the standards being assessed.

Candidates who cannot access the assessment of any component may be able to receive an award based on the parts of the assessment they have completed.

Information on access arrangements is in the *Cambridge Handbook* at **www.cie.org.uk/examsofficers**

Language

This syllabus and the related assessment materials are available in English only.

After the exam

Grading and reporting

Grades 1, 2, 3, 4, 5, 6, 7, 8 or 9 indicate the standard a candidate achieved at Cambridge IGCSE (9–1).

9 is the highest and 1 is the lowest. 'Ungraded' means that the candidate's performance did not meet the standard required for grade 1. 'Ungraded' is reported on the statement of results but not on the certificate. In specific circumstances your candidates may see one of the following letters on their statement of results:

- Q (result pending)
- X (no result)
- Y (to be issued)

These letters do not appear on the certificate.

Grade descriptions

Grade descriptions are provided to give an indication of the standards of achievement candidates awarded particular grades are likely to show. Weakness in one aspect of the examination may be balanced by a better performance in some other aspect.

A **Grade 7** Cambridge IGCSE (9–1) Computer Science candidate will be able to:

- communicate a thorough knowledge and understanding of the characteristics and methods of operation of a broad range of computer hardware, software and communications
- systematically analyse problems and identify efficient methods to solve them. They apply knowledge, understanding and skills to design and write effective computer programs which solve these problems. In their solutions, they effectively validate input data, sequence instructions, manipulate, store and process data and represent the results of the processing in an appropriate format. They plan thorough systematic testing of programmed solutions. They amend their own programs as well as those written by others when requirements change
- work systematically, and critically evaluate the way they and others produce and use computer solutions
- understand and adopt safe, secure and responsible practices.

A **Grade 4** Cambridge IGCSE (9–1) Computer Science candidate will be able to:

- communicate a good knowledge and understanding of the characteristics and methods of operation of a broad range of computer hardware, software and communications
- analyse problems and identify methods to solve them. They apply knowledge, understanding and skills to design and write computer programs which solve these problems. In their solutions, they select input data, sequence instructions, manipulate, store and process data and represent the results of the processing in a mostly appropriate format. They plan testing of programmed solutions. They amend programs when requirements change
- evaluate the way they and others produce and use computer solutions
- work using safe, secure and responsible practices.

A **Grade 2** Cambridge IGCSE (9–1) Computer Science candidate will be able to:

- communicate a basic knowledge and understanding of the characteristics and methods of operation of a limited range of computer hardware, software and communications
- apply limited knowledge, understanding and skills to design and write basic computer programs which solve simple problems. In their solutions, they input some data, use simple instructions to process data and represent the results. They plan simple tests to programmed solutions and make simple modifications to programs when requirements change
- provide comments on the way they and others produce and use computer solutions
- demonstrate some awareness of the need for safe, secure and responsible practices.

Changes to this syllabus for 2019

The syllabus has been updated. The latest syllabus is version 2, published February 2018.

Availability

This syllabus is no longer restricted to centres in the UK. Please check the syllabus page at **www.cie.org.uk/igcse** to see if this syllabus is available in your administrative zone.

‘While studying Cambridge IGCSE and Cambridge International A Levels, students broaden their horizons through a global perspective and develop a lasting passion for learning.’

Zhai Xiaoning, Deputy Principal, The High School Affiliated to Renmin University of China

Cambridge International Examinations
1 Hills Road, Cambridge, CB1 2EU, United Kingdom
Tel: +44 (0)1223 553554 Fax: +44 (0)1223 553558
Email: info@cie.org.uk www.cie.org.uk

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