OKEHAMPTON COLLEGE

Introduction to A-Level Computer Science for Eduqas

Computer Science - A Level

What is the subject about?

The ability to analyse problems through practical experience of solving problems and deconstructing technology. Computers are widely used in all aspects of business, industry, government, education, leisure and the home.

Computer science integrates well with subjects across the curriculum. Computer science demands both logical discipline and imaginative creativity in the selection and design of algorithms.

Some of the key objectives this course will develop are:

- Applying abstraction, decomposition, logic, algorithms and data representation to solve problems.
- The capacity for thinking creatively, innovatively, analytically, logically and critically
- The ability to articulate the individual (moral), social (ethical), legal and cultural opportunities and risks of digital technology.

What skills will I need and develop in this course?

You don't need to have prior learning however; you will need a good numeracy and literacy understanding. The course relies heavily on mathematics to express the computational laws and processes. There is a minimum of 10% mathematics for the course – the key topics are Boolean algebra, number representations and bases and a comparison of complexity of algorithms. You will develop skills in programming, system development, computer architecture, data, communication and applications.

As with all A-Level courses it is important that all students pass a **probationary period** to ensure their suitability for the course. To ensure that you pass this probationary period you should:

- Gain a grade 5 or more in GCSE Maths.
- Complete the questions in the 'Summer Tasks' section of this booklet to an appropriate standard.
- Have some knowledge of Computer Science or have taken GCSE ICT/Computer Science.

What can the course lead to in terms of higher education and future careers?

This course builds a good foundation for higher education, vocational qualifications or employment. This course teaches you the skills and knowledge to extend your horizons beyond school or college into society and employment.

Some of the future careers are:

Summer tasks

Your task is to complete the following questions using the given sources or any other suitable ones you find. Do NOT copy and paste any text, all work must be in your own words.

1. Explain how Apple uses voice recognition to program Siri.
2. Explain what augmented reality is and how it can be useful to society.
3. Make a list of the common searching and sorting algorithms.
4. Define what a binary tree is.
5. Draw a binary tree by inserting the following numbers from left to right: 11, 6, 8, 19, 4, 13, 5, 17, 43, 49, 16, 31, 32

Useful links

https://www.zdnet.com/article/how-apples-siri-really-works/

https://www.microsoft.com/en-us/hololens

https://www.cs.cmu.edu/~adamchik/15-121/lectures/Trees/trees.html

Syllabus (EDUQAS A500QS)

Subject content

Component 1: Programming and System Development

1. Data structures
2. Logical operations
3. Algorithms and programs
4. Principles of programming
5. System analysis
6. System design
7. Software engineering
8. Program construction
9. Economic, moral, legal, ethical and cultural issues relating to computer science

Component 2: Computer Architecture, Data, Communication and Applications

10. Hardware and communication
11. Data transmission
12. Data representation and data types
13. Organisation and structure of data
14. Databases and distributed systems
15. The operating system
16. The need for different types of software systems and their attributes
17. Data security and integrity processes

Assessments

The course is assessed through two written exams and a 20% piece of coursework completed by the end of year 13.

Component 1

Written exam: 2 hours and 45 minutes.

40% of the A-level.

Each paper is marked out of 100.

Content

Content 1-9 above is assessed paying close attention to investigating programs, data structures, algorithms, logic, programming methodologies and the impact of computer science on society.

Component 2

Written exam: 2 hours and 45 minutes.

40% of the A-level.

Each paper is marked out of 100.

Content

Content 10-17 above is assessed paying close attention to investigating computer architecture, communication, data representation, organisation and structure of data, programs, algorithms and software applications.

Component 3

Programming project to include a written report

20% of the A-level

Content

Discuss, investigate, design, prototype, refine and implement, test and evaluate a computerised solution to a problem chosen by you, using original code.

Weighing of the theory

A01 Demonstrate knowledge and understanding of the principles and concepts of computer science, including abstraction, logic, algorithms and data representation.

QUESTIONS relating to logical operations, Big O Notation, Shortest-Path Algorithms, Backus-Naur Form (BNF), Waterfall and agile approaches, Parallelisation, The Von Neumann Architecture and Fetch-Execute Cycle, Sign and Magnitude and Two's Complement, Cryptography Algorithms,

A02 Apply knowledge and understanding of the principles and concepts of computer science, including to analyse problems in computational terms.

QUESTIONS relating binary trees, hash tables, linked list, logical operations, simplifying Boolean expressions, Big O Notation, Shortest-Path Algorithms, Backus-Naur Form (BNF), Assembly Language, Parallelisation, Lowest-Cost Routes, Sign and Magnitude and Two's Complement, Structured Query Language (SQL), Cryptography Algorithms,

A03 Design, program and evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions

QUESTIONS relating to Big O Notation, Shortest-Path Algorithms, Backus-Naur Form (BNF), Structured Query Language (SQL), Cryptography Algorithms.

	AO1	AO2	AO3
Component 1	17.5%	16%	6.5%
Component 2	17.5%	16%	6.5%
Component 3	-	3%	17%
Total	**35%**	**35%**	**30%**