Computer Science A Level

Preparation work: Pre-course Reading, Research and Tasks

Pre-reading and research will help you to become more familiar with the topics you are going to study on your A Level Computer Science course. If you complete the tasks below they will also help you to become more confident when you start your course. Remember it is also a good idea to make sure you recap and consolidate your GCSE Computer Science knowledge as well. If you didn't study GCSE Computer Science, now is a great time to learn some invaluable skills.

Specification :

We study the AQA specification - have a look through the topics. What parts are you most looking forward to learning.

Task 1:

Programming!

Programming is the biggest element of the A-level, and there are loads of resources for you to develop your skills at home, regardless of your current level of skill.

It doesn't really matter what programming language you learn. If you are already a strong Python programmer then pick something new, if you know a language, but know you need to improve your skills, then stick to what you know. If you have never coded before then start with the 'Hour of Code' resource below.

Possible Resource	Notes	Level
Hour of Code	If you have never coded at all before start here	Beginner
Khan Academy	A run through JavaScript and Web technologies. An excellent and interesting run through from the very basics to advanced programming techniques.	Beginner --> Advanced
FreeCodeCamp	Another beginner through to very advanced set of tutorials for JavaScript, with a very different focus and feel to Khan.	All
ICT.Social	Provides an almost identical introduction to several different languages. Covering all GCSE and most of Year 1 A-level skills. You can try and compare: VB.Net, C#, PHP, JavaScript, Java and some others. Some annoying ads and there are a few paid for tutorials, but it is mainly free simple and clear.	Beginner/All
RosettaCode	A wiki of hundreds of programming challenges with solutions in every language you can think of.	Medium
ProjectEuler	Hard Maths based programming challenges	Advanced

Choose a course from the above list that best suits your current skills and interests. Try to approach the course by doing small chunks often. Keep a log of all you do in GitHub, PasteBin or locally in Word. (Khan will keep a log for you if you create an account).

Task 2:

An Introduction to Finite State Machines (FSM)

We thought it would be fun to do something completely new to all of you, regardless of whether you had completed the GCSE. This topic is also part of the A-Level course. FSM are another way of modelling and programming a solution to a problem.

Video Introducing the Concept of Finite State Machines
There is an excellent FSM program simulator where you control a Ladybug. It seems childish at first, but you can simulate a Turing machine in the full version!

Download the program here. You will also need to install the Java Run-Time Enviroment
The Manual runs through the environment and what Kara can do.

I have recorded a short video to introduce Kara and run through your tasks.
Your task is to learn the Kara interface and complete at least 3 of the challenges. You can select which ones, but Maze and Pac Man are good fun ones to try for!

Websites for Further Research and Reading:

Free Code Camp: https://www.freecodecamp.org/learn
Maths and physics tutor: Also does computer science!
XKCD.com: A web comic with its own discussion group
Rapid Online Vex STEM Challenge:VeX code, Scratch Like "Block-Code" control a robot with great prizes to be won.
MOOCs: EdX, FutureLearn, Coursera, Udemy:All host a mix of their own content and courses offered by universities and other big providers like Microsoft.

Books to Read:

- **Do Androids Dream of Electric Sheep**: by Philip K Dick
- **The Caves of Steel or I Robot**: by Isaac Asimov
- **Computational Fairy Tales:** by Jeremy Kubica also a website
- **Introducing Artificial Intelligence: A Graphic Guide** by Henry Brighton
- **CS4FN Magazine**: All back issues are available free.

Podcasts:

Steven Fry has an excellent series on the history of inventions: "**Great Leap Years**"
All are good, but the last episode "The Iotatron that Wasn't" is essential listening

Digital Human: Several Seasons of thought-provoking content
BBC Click: Technology focused weekly show
FreeCodeCamp produces a list of programming podcasts
TedTalks: Thousands of thought provoking lectures

Films to Watch:

- **The Imitation Game**
- **Pirates of Silicon Valley**
- **Inside Bill Brain** (Netflix)
- **Silicon Cowboys**
- **The Matrix**
- **We Are Legion**

Progression Opportunities

Why choose Computer Science A Level:

ComputerScience.org gives a good overview of Computing Careers

IBM provides a picture of what working for a huge multinational company would be like.

KPMG is better known for Tax and Audit; BUT it has a large technology division and has excellent apprenticeships, that highly value Computer Science.

Altius is an example of a fairly small company based in Godalming that now has a global reach. It provides excellent opportunities in a range of Computing and IT disciplines.

We hope you enjoy completing these tasks and look forward to you joining the course.