

DP Computer Science

What is Computer Science?

Computer Science has a unique role in the world. It is the field that is transforming almost every other field. Automation, ubiquitous networks, artificial intelligence, and data mining are changing the way we communicate, travel, plan, purchase, design and build our lives. No matter your final destination, you will benefit from an understanding of the ideas of computer science for you will see its impact in every industry both now and even more so in the future.

At its heart, Computer Science is the study of computing as a problem solving process (as opposed to the study of computers, the devices).

It is perfectly possible to do computer science without the modern electronic machines we know of as "computers". Computing, as a field, is as old as mathematics. Obviously we are still interested in understanding how these devices work as they can make problem solving far more efficient, but the focus is about using the devices to solve problems.

At its core there are two main elements: algorithms and data structures.

- Algorithms are the procedures we design to solve a problem (the recipe of steps)
- Data structures are how we organise and link our data together so we can extract meaning from it

What will you learn?

Standard Level: 5 lessons/fortnight

- An introduction to programming using Java
- Designing algorithms
- Measuring algorithm efficiency
- Object orientated programming
- Project design processes
- Internal architecture of computers & networks
- The Internal Assessment project (the IA)

High Level: 7 lessons/fortnight

- All the SL content plus -
- Abstract and dynamic data structures
- Operating systems
- Controlling hardware with sensors & actuators
- In-depth research into an emerging technology (the case study)

The internal assessment project

- A self-selected programming project
- Substantial - 30 hours of class time on a project of your own choosing
- May be any programming language (does not have to be Java)
- Written documents, technical diagrams & demonstration video
- A lot of work, but also a lot of fun!

Past examples I've had students create:

- Voice activated assistant (Alexa, Google Assistant)
- Your own take on a classic computer game
- App for another subject area (eg: Math game)
- Fantasy sports team calculator
- To-do task / homework task reminders app
- Fitness routine / exercise tracker
- Student council voting system

The case study (HL only)

The case study is a non programming research task to study an emerging technology. The topic changes every year. It is usually quite interesting.

Past topics have included:

- Cryptocurrencies
- Autonomous vehicles,
- Computer aided dispatch systems,
- Remote health & robotic surgery,
- 3D graphics, etc.

30 hours of class time

What if I don't have igcse Computer Science?

Students without igcse Computer Science are very welcome to enrol in the Diploma course.

Obviously the igcse students will have an advantage as they have spent the past two years developing a background in programming, but it is still very possible to get 6s and 7s if new to the subject.

It is worth noting the Year 11s are the first group to benefit from igcse. The current Year 12s and Year 13s studying Computer Science did not have igcse yet several will get 6s and 7s. It will require more work than someone who has the benefit of the igcse, but it is still quite achievable.

Computer Science v ITGS?

Computer Science is a technical course, focusing on computational thinking. Students will learn computer programming, how to design algorithms and data structures, and about the internal operations of what makes a computer work.

ITGS is a sociological course, focusing on the impact of technology within society and using technology to create digital artifacts. Students will look at issues related to privacy, security, reliability, authenticity, & digital citizenship.

How “hard” is Computer Science?

Computer science can be challenging and demanding at times, but is certainly doable. The best way to think of it is as a fusion between mathematical problem solving and learning a foreign language.

Being a good computer scientist relies on the same skills as a good mathematician: A love for precision, logical thinking skills, and the capacity for in depth problem solving. If you struggle with these aspects of Mathematics it may be worth discussing your circumstances with me before enrolling in the course.

The reference to foreign languages speaks to the challenge of learning to read and write a programming language. In the early days you have to focus and concentrate on every bit of grammar and syntax and your extremely limited vocabulary just to be understood for the most simple of phrases. In time, however, your vocabulary becomes rich and you are able to speak fluently without giving it much thought. Learning to program works the same way, and requires the same commitment to regular practice in order to gain fluency.

Computer Science is not the “easy Science” for non-Science minded students who may be looking for an “easy” path for their group 4 choice. *“Computer Science is as challenging as Physics and Chemistry especially for those without existing programming skills”* - a current Year 13 STC student.

Contact me

I am very happy to answer any individual questions you have.

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