Computer Science

Head of Department
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Exam Board
AQA

Specification
7516/7517

COURSE DETAILS

Examination
The course is examined at the end of Year 12 and as a whole at end of Y13 There is a small Non Examined Assessment (NEA) in year 13 worth 20% of the final grade.

Unit 1: (Y12 and Y13)
In year 12 this unit will cover student's ability to program using standard programming concepts such as definite and indefinite iteration with conditions, use of arithmetic, relational and Boolean operations. Students will also program using a procedural-orientated method. Students will also develop their knowledge of the theoretical side of computer science from fundamentals of programming, fundamentals of data structures (single and multi-dimensional arrays), systematic approaches to problem solving (how to build suitable programs from set problems) and the theory of computation (abstraction, decomposition, composition and automation).

In year 13 this unit will also include the fundamentals of algorithms and the skills learnt whilst studying the systematic approach to problem solving.

Unit 2: (Y12 and Y13).
This unit focuses on fundamentals of data representation which is heavily maths orientated. This focuses on natural, rational, irrational, real and ordinal numbers plus different number systems used by computers to represent data. Fundamentals of computer systems includes hardware, software and programming languages. Fundamentals of computer organization and architecture (how the CPU works and interprets and works with data). Consequences of uses of computing (ethical, moral and legal implications of working with IT systems) and the fundamentals of communication and networking (how computer networks work and transfer data).

For Y13 this unit also includes fundamentals of databases, big data and the fundamentals of functional programming**.**

Unit 3: Non-Exam Assessment – The computing practical project (Y13 only).
The non-exam assessment assesses a student's ability to use the knowledge and skills gained through the course to solve or investigate a practical problem. Students will be expected to follow a systematic approach to problem solving, when creating the project, a student will analyse, design, create and test a program to solve a problem, this could be a website with dynamic content and a database back-end, a mobile app, an application for artificial intelligence, a computer game or something completely different.

SUMMER WORK FOR INTRODUCTION TO YEAR 12

Task	Topic	Details
1	Fundamentals of Programming	Complete the 11 Python Learning Tasks. Each task sheet must have evidence of the completed activity. Please provide a screen shot of the code with annotation stating what the code does and a screen shot of the code running.
2	Programming Challenges	Having completed the Python Learning Tasks you are required to complete 3 of the Python challenges per Python objective for example 3 tasks from the “understanding condition controlled iterations” objective work sheet. Please provide a screen shot of the code with annotation stating what the code does and a screen shot of the code running.

WIDER READING TO PREPARE FOR COURSE

- The new Turing omnibus, A K Dewdney, (Palgrave Macmillan, 2003)
- How to think like a mathematician, Kevin Houston, (Cambridge University Press, 2009)
- Computer Science Illuminated Sixth Edition, Nell Dale, John Lewis, (Jones and Bartlett, 2015)
- Algorithmics: The Spirit of Computing by David Harel (Addison Wesley, 2004)
- Computer Science: An Overview by J. Glenn Brookshear (Addison Wesley, 2006)
- The New Turing Omnibus by A.K. Dewdney (W.H. Freeman & Co, 2001)
- David Harel is Computers LTD. What they really can't do (Oxford University Press, 2000)
- The Principles of Computer Hardware by Alan Clements (fourth edition, Oxford, 2006)
- Structured Computer Organisation by Andrew Tanenbaum (fifth edition, Prentice Hall, 2005)
- Computational Thinking by Jeannette Wing of Carnegie-Mellon University available from https://www.cs.cmu.edu/~15110-s13/Wing06-ct.pdf