COMPUTER SCIENCE –

A-Level Computer Science at Holy Family Catholic High School. We have chosen OCR as our exam board of choice because it runs in tandem with the GCSE CS that many of you will have already done at GCSE. The A-Level works to expand your knowledge around all topics covered at GCSE and also build on new ideas and concepts within Computer Science.

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## This qualification aims to enable learners to develop:

* An understanding of and ability to apply the fundamental principles and concepts of computer science including; abstraction, decomposition, logic, algorithms, and data representation
* The ability to analyse problems in computational terms through practical experience of solving such problems including writing programs to do so
* The capacity for thinking creatively, innovatively, analytically, logically, and critically
* The capacity to see relationships between different aspects of computer science
* Mathematical skills
* The ability to articulate the individual (moral), social (ethical), legal and cultural opportunities and risks of digital technology.

## The key features of this specification encourage:

• Emphasis on problem-solving using computers

• Emphasis on computer programming and

* Algorithms

• Emphasis on the mathematical skills used to

* Express computational laws and processes
	+ E.g. Boolean algebra/logic and comparison of
* The complexity of algorithms

• Less emphasis on ICT.

We have been working hard to get all our resources and lessons ready for your start in September. The teaching of this course will be very theory-heavy and this will ultimately best prepare you for further progression onto University. This being said there will be many practical and hands-on aspects of the course too.

We are still in the process of deciding what programming languages we will be coding in but it is of our utmost propriety that it is relevant and used in the industry.

We will be building from the bottom up with our programming knowledge so do not worry if it is not your strong area.

## Assessment Details

The A-Level in Computer Science is a linear qualification with 100% external assessment.

This qualification consists of two examined components 01 and 02 and moderated coursework components 03 or 04.

Both examinations are of 2 hours and 30 minutes duration, each with a 40% weighting.

The coursework component weighted at 20%. The programming project will be submitted in the form of a report that will contain the solution to a problem, written in a suitable programming language.



## Topic Breakdown

Your learning over the two years will cover 56 different topics listed below…

|  |  |  |
| --- | --- | --- |
|  | **OCR specification** | **A Level Topic Reference** |
| **1.1** | **The characteristics of contemporary processors, input, output and storage devices** |  |
| 1.1.1 | Structure and function of the processor | 1. Computer architecture2. Functions and characteristics of CPU |
| 1.1.2 | Types of processor | 3. Types of processor |
| 1.1.3 | Input, output and storage | 4. Input devices5. Output devices                        6. Data storage |
| **1.2** | Software and software development |  |
| 1.2.1 | Systems software | 7. Systems Software |
| 1.2.2 | Applications Generation | 8. Categories of software            9. Translators |
| 1.2.3 | Software development | 10. Software Development life cycle11. Introduction to algorithms |
| 1.2.4 | Types of programming language | 12. Procedural and object oriented languages13. Assembly languages |
| **1.3** | **Exchanging data** |  |
| 1.3.1 | Compression, Encryption and Hashing | 14. Compression, Encryption and Hashing |
| 1.3.2 | Databases | 15. Introduction to databases16. Relational databases17. Structured query language18. Transaction processing and ACID |
| 1.3.3 | Networks | 19. Introduction to computer networks20. Network topologies21. Network protocols and layers22. Internet technologies23. Network security27. Cloud computing and web applications |
| 1.3.4 | Web technologies | 24. Designing web pages using HTML and CSS25. JavaScript      26. Search engine indexing27. Cloud computing and web applications |
| **1.4** | Data types, data structures and algorithms |  |
| 1.4.1 | Data types | 28. Binary                                                         29. Hexadecimal30. Floating point numbers31. Character sets |
| 1.4.2 | Data structures | 32. Arrays, tuples and records33. Lists and linked lists34. Stacks                                      35. Queues                                                      36. Graphs                                                   37. Trees                              38. Hash table             |
| 1.4.3 | Boolean algebra | 39. Logic gates and circuits40. de Morgan's laws41. Karnaugh maps        42. Adders and flip-flops |
| **1.5** | **Legal, moral, cultural and ethical issues** |  |
| 1.5.1 | Computing related legislation | 43. Computing related legislation |
| 1.5.2 | Moral and ethical Issues | 44. Moral and ethical Issues |
| **2.1** | **Elements of computational thinking** |  |
| 2.1.12.1.22.1.32.1.42.1.5 | Thinking abstractlyThinking aheadThinking procedurallyThinking logicallyThinking concurrently | 45. Computational thinking |
| **2.2** | **Problem solving and programming** |  |
| 2.2.1 | Programming techniques | 46. Introduction to programming47. Basic programming constructs48. Functions and procedures49. Integrated development environment50. Object oriented techniques |
| 2.2.2 | Computational methods | 51. Computational methods |
| **2.3** | **Algorithms** |  |
| 2.3.1 | Algorithms | 52. Evaluation and design of algorithms53. Searching algorithms54. Sorting algorithms55. Algorithms for main data structures56. Dijkstra's shortest path algorithm and A\* algorithm |

## Reading List

**Issac Computer Science** - sign up with the exact link below using school email address and complete the 5 transition units set. Can complete more units if desired.

<https://isaaccomputerscience.org/account?authToken=8NC9J6>

**OCR AS and A Level Computer Science Textbook** - A complete course text which includes AS and A Level for the H046/H446 specifications. *This book is at your own cost and is not a compulsory purchase for this course.*

<https://www.pgonline.co.uk/resources/computer-science/a-level-ocr/ocr-a-level-textbook/>