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.

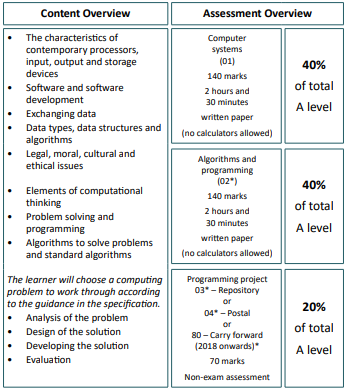
## Assessment Details

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 architecture  2. Functions and characteristics of CPU |
| 1.1.2 | Types of processor | 3. Types of processor |
| 1.1.3 | Input, output and storage | 4. Input devices  5. 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 cycle  11. Introduction to algorithms |
| 1.2.4 | Types of programming language | 12. Procedural and object oriented languages  13. 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 databases  16. Relational databases  17. Structured query language  18. Transaction processing and ACID |
| 1.3.3 | Networks | 19. Introduction to computer networks  20. Network topologies  21. Network protocols and layers  22. Internet technologies  23. Network security  27. Cloud computing and web applications |
| 1.3.4 | Web technologies | 24. Designing web pages using HTML and CSS  25. JavaScript  26. Search engine indexing  27. Cloud computing and web applications |
| **1.4** | Data types, data structures and algorithms |  |
| 1.4.1 | Data types | 28. Binary  29. Hexadecimal  30. Floating point numbers  31. Character sets |
| 1.4.2 | Data structures | 32. Arrays, tuples and records  33. Lists and linked lists  34. Stacks  35. Queues  36. Graphs  37. Trees  38. Hash table |
| 1.4.3 | Boolean algebra | 39. Logic gates and circuits  40. de Morgan's laws  41. 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** |  |
| 2.1.1  2.1.2  2.1.3  2.1.4  2.1.5 | Thinking abstractly  Thinking ahead  Thinking procedurally  Thinking logically  Thinking concurrently | 45. Computational thinking |
| **2.2** | **Problem solving and programming** |  |
| 2.2.1 | Programming techniques | 46. Introduction to programming  47. Basic programming constructs  48. Functions and procedures  49. Integrated development environment  50. Object oriented techniques |
| 2.2.2 | Computational methods | 51. Computational methods |
| **2.3** | **Algorithms** |  |
| 2.3.1 | Algorithms | 52. Evaluation and design of algorithms  53. Searching algorithms  54. Sorting algorithms  55. Algorithms for main data structures  56. 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/>