

Year 12

Curriculum Overview: A-Level Computer Science



Topics/ content outline:

Powerful Knowledge (key concepts, skills)

What will you be assessed on?

How can you help at home?

1. Components of a Computer System

- 2. Input, output and storage
- 3. Software Development
- 4. Application Generation
- 5. System Analysis
- 6. Algorithms
- 7. Compression and encryption
- 8. Hashing
- 9. Databases
- 10. Python challenges (1-20)

Define, explain and give examples of:

- Structure and function of different processors
- The need for, function and purpose of operating systems. memory management and scheduling
- The nature of applications, justifying suitable applications for a specific purpose.
- Procedural programming language techniques
- How data is exchanged between different systems
- Identify the inputs and outputs for a given situation and determine the order of the steps needed to solve a problem.
- Identify sub-procedures necessary to solve a problem.
- Programming constructs, variables and modularity
- How to de-bug a program.

All elements of Powerful knowledge Recall of facts Application of theory within a scenario

Topics 1-9 (Autum Term) via practice exam questions

Topic 10 (Autum Term) via practical exercises

Encourage your child to:

Recall key concepts from lessons

Work through practice papers from 2018-2022

Engage with on-line learning material / videos

Practice python programming every week (a minimum of 3 hours per week)

Review and complete the revision Year 12 CS revision plan.

Spring Term

Autumn Term

1. Networking

- 2. Data structures
- 3. Binary Manipulation
- 4. Computation thinking
- 5. Little Man Computer
- 6. Web Technologies
- 7. Boolean Algebra
- 8. Python challenges (21-30)

Define, explain and give examples of:

- The need and nature of abstraction and decomposition
- Characteristics of networks, protocols and standards.
- Internet structure, including The TCP/IP stack, DNS, Protocol layering, LANs and WANs, Packet and circuit switching.
- Client-server and peer to peer
- HTML, CSS and JavaScript
- Karnaugh maps to simplify Boolean expressions
- Primitive data types
- Use of sign and magnitude and two's complement
- Converting integers between bingry, hexadecimal and
- The properties of stacks and queues.

All elements of Powerful knowledge Recall of facts Application of theory within a scenario

Topics 1-9 (Autum Term) via practice exam *auestions*

Topics 1-7 (Spring Term) via practice exam *auestions*

Topic 10 (Autum Term) via practical exercises Topic 8 (Spring Term) via practical exercises

Encourage your child to:

Recall key concepts from lessons

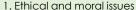
Work through practice papers from 2018-2022

Engage with on-line learning material / videos

Practice python programming every week (a minimum of 4 hours per week)

Review and complete the revision Year 12 CS revision plan.

Summer Term



- 2. Computing related legislation
- 3. Python challenges (31-40)
- 4. Preparation for the Year 12 mock exam.
- 5. Looking ahead to Year 13 project.

Define, explain and give examples of:

- The Data Protection Act 1998.
- The Computer Misuse Act 1990.
- The Copyright Design and Patents Act 1988.
- The Regulation of Investigatory Powers Act 2000.
- Computers in the workforce, Automated decision making.
- Artificial intelligence. Environmental effects.
- Censorship and the Internet. Monitor behaviour.
- Analyse personal information. Piracy and offensive communications. • Layout, colour paradigms & character sets

All elements of Powerful knowledge Recall of facts Application of theory within a scenario

Topics 1-9 (Autum Term) via exam questions Topics 1-7 (Spring Term) via exam questions Topics 1-2 (Summer Term) via exam auestions

Topics 9-10 (Autum Term) via practical exercises Topics 7-10 (Spring Term) via practical exercises Topics 7 (Summer Term) via practical exercises

All of H406 Exam 1 via the Year 12 Mock Exam

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Review and complete the revision Year 12 CS revision plan.



Autumn Term

Year 13

Curriculum Overview: A-Level Computer Science



Topics/ content outline:

Powerful Knowledge (key concepts, skills)

What will you be assessed on?

How can you help at home?

1. Computer System Part 2 (CISC and RISC processors)

- 2. Input, output and storage
- 3. Software Development
- 4. Application Generation Part 2 (Stages of compilation)
- 5. System Analysis
- 6. Object-oriented languages
- 7. Modes of addressing memory
- 8. Encryption
- 10. Coursework preparation

Define, explain and give examples of:

- Structure and function of different processors
- Stages of compilation (lexical analysis, syntax analysis, code generation and optimisation)
- Modes of addressing memory (immediate, direct, indirect and
- Object-oriented languages, understanding of classes, objects, methods, attributes, inheritance, encapsulation & polymorphism.
- Run length encoding, dictionary coding, lossless compression

Demonstrate:

- Analysis of coursework scenario
- Develop prototype, iterative development / testing

All elements of Powerful knowledge Recall of facts Application of theory within a scenario

Topics 1-9 (Autum Term) via practice exam questions

Topic 10 (Autum Term) via practical exercises

Encourage your child to:

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Work through the Year 13 project every day (a minimum of 7 hours per week)

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Spring Term

Recap and revision of:

- 1. Networkina Part 2
- 2. Data structures
- 3. Binary Manipulation Part 2
- 4. Computation thinking
- 5. Little Man Computer
- 6. Web Technologies Part 2
- 7. Boolean Algebra Part 2

Coursework preparation:

Define, explain and give examples of:

- Packet and circuit switching.
- Characteristics of networks, protocols and standards.
- PageRank algorithm.
- · Server and client side processing.
- Representation and normalisation of floating point numbers in binary.
- Floating point arithmetic, positive and negative numbers, addition and subtraction.
- · Bitwise manipulation and masks: shifts, combining with AND, OR, and XOR
- Demonstrate the design of prototype, testing and evolution.

All elements of Powerful knowledge Recall of facts Application of theory within a scenario

Topics 1-9 (Autum Term) via practice exam *auestions*

Topics 1-7 (Spring Term) via practice exam *auestions*

Topic 10 (Autum Term) via practical exercises Topic 8 (Spring Term) via practical exercises

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Summer Term

- 1. Ethical and moral issues
- 2. Computing related legislation
- 3. Algorithmic complexity
- 4. Preparation for the external examination.

Define, explain and give examples of:

- Measures and methods to determine the efficiency of different algorithms, Bia O notation (constant, linear, polynomial, exponential and logarithmic complexity).
- Comparison of the complexity of algorithms.
- Algorithms for the main data structures, (stacks, queues, trees, linked lists, depth-first (post-order) and breadth-first traversal of
- Standard algorithms (bubble sort, insertion sort, merge sort, quick sort, Dijkstra's shortest path algorithm, A* algorithm, binary search and linear search).

All elements of Powerful knowledge Recall of facts Application of theory within a scenario

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All of H406 Exam 1 via the Year 12 Mock Exam

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