

Course Outline: A Level Computer Science Year 12

Rationale: The course of Computer Science begins with a microscopic look at the most fundamental part of the computer, the CPU. Pupils will learn how it operates and the types of number system it can understand such as binary. From here we look at how the CPU can understand different types of data such as image and sound in addition to studying other regions of the computer such as various input and output devices. The course then looks deeper at the languages written for the CPU to process and the types of software than can be used on the computer. At this point, we begin to zoom out and look at the wider use of computers such as their ability to create networks and how they can be used to store and data and the implications to wider society of using these machines.

	CONTENT	KEY/FUNDAMENTAL CONCEPTS	ASSESSMENT
Autumn Term	Number Systems Number bases Units of information Binary number system Internal hardware components of a computer The stored program concept Structure and role of the processor and its components	Types of numbers Number bases Bits and bytes Units Unsigned binary arithmetic Signed binary using two's complement Numbers with a fractional part Internal hardware components The stored program concept The processor The Fetch-Execute cycle The processor instruction set Addressing modes Processor performance	In class assessment of a significant piece of work.
	Half-term		
	Information coding systems Representing images, sound and other data External hardware devices	Character form of a decimal digit ASCII and Unicode Error checking and correction Bit patterns, images, sound and other data Analogue/digital conversion Bitmapped graphics Digital representation of sound Musical Instrument Digital Interface (MIDI) Data compression Encryption input and output devices Secondary storage devices	End of unit test on data representation
Christmas Holiday			
Spring Term	Hardware and software Classification of programming languages Assembly Language	Relationship between hardware and software Classification of software Role of an operating system (OS) Low-and high-level languages imperative high-level language Machine-code/assembly language operations	End of unit test on computer organisation and architecture
Half-term			

	Types of program translator Logic gates Communication Networking	The role of the assembler, compiler and interpreter. Intermediate language Source and object code Logic gates & truth tables Logic circuits Boolean expressions Half-adders edge-triggered D-type flip-flop Communication methods Communication basics Network Topology Types of networking Wireless networking	End of unit test on computer systems
Easter Holiday			
	Developments in digital technology Responsibility of computer scientists The challenges facing legislators in the digital age The internet	Monitoring behaviour Amass and analyse personal information Distribute and disseminate personal information The internet and how it works Internet security	End of unit test on consequences of uses of computing
Half-term			
Summer Term	Relational databases Database design and normalisation techniques Structured Query Language (SQL) Client server databases Transmission Control Protocol	Attributes, primary key, foreign key Normalise relations to third normal form Understand why databases are normalised. Be able to use SQL to retrieve, update, insert and delete data from multiple tables of a relational database. Be able to use SQL to define a database table. Know that a client server database system provides simultaneous access to the database for multiple clients Know how concurrent access can be controlled to preserve the integrity of the database. TCP/IP Standard application layer protocols IP standards DHCP	End of unit test on communication and networking



Course Outline: A Level Computer Science Year 13

	CONTENT	KEY/FUNDAMENTAL CONCEPTS	ASSESSMENT
Autumn Term	Describing Big Data Distribution of processing Functional programming Graph Schema	Volume, Velocity, Variety Machine learning techniques Continuously streamed data Immutable data structures Statelessness Higher order functions	End of unit test on Big Data
	Rounding errors Absolute and relative errors Range and precision Normalisation of floating-point form Underflow and overflow	Binary fractions Calculation of absolute and relative errors Fixed point & floating-point form Positive and negative mantissas	
	Half-term		
	Functional programming paradigms Writing functional programs Lists in functional programming	Function type First class objects Function application Partial function application Composition of functions Functional language programs List processing	End of unit test on functional programming
Boolean algebra	Boolean Identities De Morgan's Laws		
Christmas Holiday			
Spring Term	Revision focussing more on Year 12 content and key/fundamental concepts	Revise key concepts	In class mock
	Half-term		
	Revision focussing more on Year 12 content and key/fundamental concepts and exam technique.	Revise key concepts	In class mock
Easter Holiday			
Summer Term	Revision focussing on all Paper 2 content and exam technique.	Revise key concepts	In class mock
	Half-term		