Year 13 Computing Curriculum Rationale

A Level Computer Science builds upon the foundations of the first year. Learners will develop an ability to analyse, critically evaluate and make decisions. The A Level includes project approach is a vital component of 'post-school' life and is of particular relevance to Further Education, Higher Education and the workplace. Each learner is able to tailor their project to fit their individual needs, choices and aspirations, which will be complete and submitted within the year. Once the units are covered, revision and exam techniques will be taught explicitly with resources and guided practice.

Unit	Core knowledge/skill development:	Sequence:	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
13.1 Boolean Algebra 13.2 Legal, cultural and ethical issues	Logic gates Boolean expressions Karnaugh maps Adders and D type flip flops Computing related legislation Legal, ethical and cultural issues Privacy and censorship	Complete a truth table for a given logic gate circuit Represent and solve a problem using Boolean logic Use de Morgan's laws to manipulate and simplify Boolean expressions Simplify an expression using a Karnaugh map Draw the logic circuit for a half adder Give the output from a series of connected D type flip flops Comment on the current capacity to distribute, publish, communicate and	End of unit assessments	Technical writing-numeracy, logic and critical thinking	Analysing – critical and logical thinking (deduce, hypothesise, reason, and seek evidence).	Flipped learning, students will need to self-study a topic and be prepared to come to lessons prepared for a discussion, and with questions prepared.

Unit	Core knowledge/skill development	Sequence	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development	Home learning and enrichment
		disseminate personal information and the benefits and drawbacks of this capability Discuss some of the issues involved in regard to the collection and analysing of personal information by security agencies and other organisations, and relate them to relevant laws. Identify some of the ethical issues arising from the use of digital technology Describe some environmental effects of digital technology Describe both positive and negative impacts of				

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		the use of computers on the workforce Describe some of the opportunities and risks of artificial intelligence and automated decision making				
13.3 Computational Thinking 13.4 Programming Techniques	Thinking ahead Thinking Abstractly Thinking Procedurally Thinking concurrently Problem recognition Problem solving Programming Basics Selection Iteration Subroutines	determine the preconditions for devising a solution to a problem describe the nature, benefits and drawbacks of caching identify the components of a problem and its solution determine the order of steps needed to solve a problem determine the logical conditions that affect the outcome of a decision	End of unit assessment and marked developer diary.	Technical writing	Analysing – critical and logical thinking (deduce, hypothesise, reason, and seek evidence). Analysing – Precision, the ability to work effectively within the rules of a domain	Flipped learning, students will need to self-study a topic and be prepared to come to lessons prepared for a discussion, and with questions prepared.

Unit	Core knowledge/skill development:	Sequence:	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
	Recursion	determine how decisions affect flow through a program identify sub-procedures needed to solve a problem explain how a Divide and Conquer algorithm works explain what is meant by backtracking, data mining, heuristics, performance modelling, pipelining and visualisation describe features of an IDE which are useful in developing and debugging a program write a pseudocode solution for a problem involving iteration and selection (branching)				

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		determine the output from a pseudocode program use structured programming techniques and write their own subroutines with parameters construct algorithms using two-dimensional arrays use local and global variables in subroutines trace through a recursive algorithm compare iterative and recursive algorithms for solving a problem complete given pseudocode for an object-oriented program				
13.5 Exchanging Data	Database concepts	explain the difference between	End of unit assessment (test)	Technical writing, logic and	Meta-thinking – Meta-cognition, transferring	Flipped learning, students will need to

Unit	Core knowledge/skill development:	Sequence:	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
	Relational and normalised databases Transaction processing Compression and encryption	lossy and lossless compression and list advantages and disadvantages of each use basic encryption to create ciphertext encrypt and decrypt a message using the Caesar cipher explain the weaknesses of the Caesar cipher define the terms flat file, primary key, indexing define the terms relational database, foreign key, secondary key, entity draw a simple entity relationship diagram involving three or four entities state the properties of a database in Third Normal Form		numeracy (algorithms, SQL), (databases)	knowledge from one circumstance to another. Analysing – critical and logical thinking (deduce, hypothesise, reason, and seek evidence).	self-study a topic and be prepared to come to lessons prepared for a discussion, and with questions prepared.

Unit	Core knowledge/skill development:	Sequence:	Assessment	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
		interpret a simple SQL statement list methods of capturing data for input to a database list problems that can arise with a multi-user database				