COMPUTER SCIENCE

Year 10

DE SALIS STUDIO COLLEGE

What are the aims and intentions of this curriculum?

The aim of our Key Stage 4 Curriculum is to:

- Understand the impacts of digital technology to the individual and to wider society;
- Apply mathematical skills relevant to Computer Science;
- Think creatively, innovatively, analytically, logically and critically in developing programming techniques.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	**System security:** - Threats posed to networks - People as the 'weak point' in secure systems - Identifying and preventing vulnerabilities	- malware, phishing - social engineering - brute force attacks - denial of service attacks - data interception and theft - the concept of SQL injection - poor network policy - penetration testing; network forensics; anti-malware software; firewalls; user access levels; passwords; encryption - network policies	- Describe the different strategies that criminals use to attack computer networks - Explain how people are the greatest security risks to networks - Describe the threats posed to networks - Explain how these threats can be identified, prevented and combatted - Explain the role of network policies.	- Group Presentations - Spelling test - Seneca Online activities - Case Studies - End of topic quiz - End of term test - Microsoft Teams collaborative activities - Home work - Class Discussions - Topic Worksheets - Past Paper question sheets

Autumn 2	**Systems software:**
	
	Operating System
	Utility Software
		• the purpose and functionality of systems software
		• operating systems:
		  ✓ user interface
		  • memory management/ multitasking
		  • peripheral management and drivers
		  • user management
		  • file management
		
		• utility system software:
		  ✓ encryption software
		  ✓ defragmentation
		  ✓ data compression
		  ✓ the role and methods of backup:
		  ✓ full
		  ✓ incremental
			• Explain what is meant by systems software.
			
			• Explain what is meant by an operating system.
			
			• Describe the functions of the operating system.
			
			• Explain what is meant by utility systems software.
			
			• List some examples of utility systems software and their functions.
				• Individual Presentations
				• Spelling test
				• Seneca Online activities
				• Case Studies
				• End of topic quiz
				• End of term test
				• Microsoft Teams collaborative activities
				• Home work
				• Class Discussions
				• Topic Worksheets
				• Past Paper question sheets

Spring 1	**Ethical, legal, cultural and environmental concerns**	• how to investigate and discuss Computer Science technologies while considering:
		  ✓ ethical issues; legal issues; cultural issues; environmental issues
		
		• how key stakeholders are affected by technologies environmental impact of Computer Science cultural implications of Computer Science
		• privacy issues
		
		• legislation relevant to Computer Science:
		  ✓ The Data Protection Act 1998;
		  ✓ Computer Misuse Act 1990; Copyright Designs and Patents Act 1988;
		  ✓ Creative Commons Licensing; Freedom of Information Act 2000;
		  ✓ Open source vs proprietary software
			• Investigate and discuss the following issues in relation to the development and impact of computer science technologies:
			  ✓ environmental
			  ✓ ethical
			  ✓ legal
			  ✓ cultural
			
			• Discuss issues of data collection and privacy
			
			• Describe the legislation relevant to computer science.
				• Group Presentations
				• Spelling test
				• Seneca Online activities
				• Case Studies
				• End of topic quiz
				• End of term test
				• Microsoft Teams collaborative activities
				• Home work
				• Class Discussions
				• Topic Worksheets
				• Past Paper question sheets

| Spring 2 | Programming Techniques: | • The use of variables, constants, operators, inputs, outputs and assignments
• The use of the three basic programming constructs used to control the flow of a program:
  ✓ sequence
  ✓ selection
  ✓ iteration (count and condition controlled loops)

• The use of basic string manipulation.
• The use of basic file handling operations:
  ✓ open
  ✓ read
  ✓ write
  ✓ close
• The use of records to store data
• The use of SQL to search for data | • Use input, processing and output in algorithms.

• Use sequence, selection and iteration in algorithms.

• Explain what is meant by iteration.

• Explain the difference between definite and indefinite iteration.

• Use for, while, do until, nested loops.

• Work with text files. | • Individual Presentations
• Seneca Online activities
• Case Studies
• Worksheets
• End of topic quiz
• End of term test
• Microsoft Teams collaborative activities.
• Programming Practical
• Home work
• Class Discussions
• Electronic and hardcopy Portfolio
• Past Paper question sheets |
| Summer 1 | Programming Techniques (Continue) | • The use of arrays (or equivalent) when solving problems, including both one and two dimensional arrays
• How to use sub programs (functions and procedures) to produce structured code
• The use of data types:
  ✓ integer
  ✓ real
  ✓ Boolean
  ✓ character
  ✓ string
  ✓ casting
• The common arithmetic operators
• The common Boolean operators | • Create structured programs using procedures | • Individual Presentations
• Seneca Online activities
• Case Studies
• End of topic quiz
• End of term test
• Microsoft Teams collaborative activities.
• Programming Practical
• Topic Worksheets
• Home work
• Class Discussions
• Electronic and hardcopy Portfolio
• Past Paper question sheets |

Summer 2	Data Representation:	• **Units:** bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte
		  ✓ how data needs to be converted into a binary format to be processed by a computer.
		• **Numbers**
		  ✓ how to convert positive denary whole numbers (0–255) into 8 bit binary numbers and vice versa
		  ✓ how to add two 8 bit binary integers and explain overflow errors which may occur
		  ✓ binary shifts
		  ✓ how to convert positive denary whole numbers (0–255) into 2 digit hexadecimal numbers and vice versa
		  ✓ how to convert from binary to hexadecimal equivalents and vice versa
		  ✓ check digits.
			• Explain why the binary system is essential for computer processing.
			
			• Convert binary numbers into denary and vice versa.
			
			• Carry out addition, subtraction, multiplication and division on binary numbers.
			• Use left and right shifts when multiplying or dividing binary numbers by powers of 2.
			
			• Explain why hexadecimal numbers are used.
			
			• Convert between binary, denary and hexadecimal.
				• Group Presentations
				• Individual Presentations
				• End of topic quiz
				• End of term test
				• Home work
				• Class Discussions
				• Topic Worksheets
				• Past Paper question sheets

	Personal Enrichment (Project)	Learn at least one (1) of the listed programming languages using own initiative.	Produce a robust program using at least one (1) of the following: • C, C#, C++ • Java • JavaScript • Visual Basic/.Net • PHP • Delphi • BASIC	• Problem identification, assessment and development activities
	Work Experience	Team Building, self confidence		
	Alliance Challenge	Team Building, self confidence	Team work and collaboration	