



EMMANUEL COLLEGE

CORE KNOWLEDGE

What I will know and understand by the end of Year 11.

This year in Computer Science - Computer Systems we will be learning:		This links to:	Key Vocabulary:	
1	Computer Networks, Connections and Protocols - Types of network: LAN (Local Area Network), WAN (Wide Area Network) - Factors that affect the performance of networks - The different roles of computers in a client-server and a peer-to-peer network - The hardware needed to connect stand-alone computers into a Local Area Network: wireless access points, routers, switches, NIC (Network Interface Controller/Card), transmission media - The Internet as a worldwide collection of computer networks: DNS (Domain Name Server), hosting, The Cloud, web servers and clients - Star and Mesh network topologies. - Modes of connection: wired, wireless - Encryption - IP addressing and MAC addressing - Standards - Common protocols including TCP/IP (Transmission Control Protocol/Internet Protocol), HTTP (Hyper Text Transfer Protocol), HTTPS (Hyper Text Transfer Protocol Secure), FTP (File Transfer Protocol), POP (Post Office Protocol), IMAP (Internet Message Access Protocol), SMTP (Simple Mail Transfer Protocol) - The concept of layers	You will build on initial network material covered in Year 7 and the system architecture unit and data storage sub units covered in Year 10. It introduces issues that highlight the need for network security and hence is a precursor to the unit on this that you will study later this year.	- Network - Stand alone - Bandwidth - Latency - Client - Server	- Topology - Peer-to-peer - Encryption - Address - Protocol - Standard
2	Network Security - Threats to computer systems and networks, forms of attack: malware, social engineering, brute-force attacks, denial of service attacks, data interception and theft, SQL injection - Identifying and preventing vulnerabilities, common prevention methods: penetration testing, anti-malware software, firewalls, user access levels, passwords, encryption, physical security	You will build on knowledge acquired in the Year 8 securing and analysing data unit and the computer networks unit studied earlier this year	- Malware - Social engineering - Brute-force attacks - Denial of service attacks - Data interception - SQL injection	- Penetration testing - Anti-malware software - Firewalls - User access levels - Passwords - Encryption
3	Systems Software - The purpose and functionality of operating systems: user interface, memory management and multitasking, peripheral management and drivers, user management, file management - The purpose and functionality of utility software: encryption software, defragmentation, data compression	You will build on material covered in the Year 9 computer systems unit to consider the role of specific pieces of system software. This also links to the network security and memory and storage units as the utility software we look at complete functions laid out in these units.	- Software - Systems software - Operating system - User interface - Peripheral	- Multitasking - Encryption - Fragmentation - Defragmentation - Compression
4	Ethical, legal, cultural and environmental impacts of digital technology - Impacts of digital technology on wider society including ethical issue, legal issues, cultural issues, environmental issues, privacy issues - Legislation relevant to Computer Science: The Data Protection Act 2018, Computer Misuse Act 1990, Copyright Designs and Patents Act 1988, Software licences (i.e., open source and proprietary)	You will build on material covered in the initial Year 7 unit and the system security unit covered earlier this year to consider both positive and negative effects of specific technologies as well as the legislations that exist to try and mitigate these.	- Ethical - Legal - Legislation - Cultural - Privacy	- AI - Big Data - Machine Learning - Digital Divide - Proprietary software - Open-source software

Target Grade:

AP1:

AP2:

AP3:



This year in Computer Science – Computational Thinking we will be learning:		This links to:	Key Vocabulary:	
1	Producing Robust Programs: Defensive Design - Defensive design considerations: anticipating misuse and authentication - Input validation - Maintainability: use of sub programs, naming conventions, indentation, commenting	Building on year 10 algorithms and programming units you appreciate the features programmers use to ensure their programs stand up to real use and can be updated to cope with changes to standards. It also has close links with the testing unit as rigorous testing of validation and authentication is essential to the integrity of a program.	- Authentication - Validation - Range check - Type check - Presence check - Length specification	- Format restrictions - Indentation - Commenting - Identifier - Maintainability
2	Algorithms: Searching and Sorting Algorithms - Standard searching algorithms: binary search, linear search - Standard sorting algorithms: bubble sort, merge sort, insertion sort	You will build on your knowledge from the algorithms and programming units to identify describe and recognise standard searching and sorting algorithms that can be employed by programmers who need to include a search or sort in their program.	- Algorithm - Search - Sort - Array - Index	- Element - Iteration - Search criteria - Ordered
3	Programming languages and Integrated Development Environments - Characteristics and purpose of different levels of programming language: - High-level languages - Low-level languages - The purpose of translators - The characteristics of a compiler and an interpreter - Common tools and facilities available in an Integrated Development Environment (IDE): - Editors - Error diagnostics - Run-time environment - Translators	You will build on knowledge acquired in the data representation sub unit and programming unit to consider how what programmers write is converted to a form that the computer can store and execute.	- Translate - Execute - Source code - Executable code - Machine code	- Assembler - Interpreter - Compiler

Target Grade:

AP1:

AP2:

AP3: