DEYES HIGH SCHOOL
LYDIATE LEARNING TRUST

Year 11 Computer Science Sequence

Year	Content Taught	Reference	Essential Knowledge	Assessment	Rationale
Year 11 Computer Science					
HT1 (A)	In this half term students will study a topic focused on: **Computer systems**	Develop their capability, creativity and knowledge in computer science, digital media and information technology Develop and apply their analytic, problem-solving, design, and computational thinking skills	**The purpose of the CPU:** The fetch-execute cycle Common CPU components and their function: o ALU (Arithmetic Logic Unit) o CU (Control Unit) o Cache o Registers Von Neumann architecture: o MAR (Memory Address Register) o MDR (Memory Data Register) o Program Counter o Accumulator **How common characteristics of CPUs affect their performance:** o Clock speed o Cache size o Number of cores **The purpose and characteristics of embedded systems** Examples of embedded systems Primary storage (Memory) The need for primary storage	**Formative** Students will complete retrieval exercises each lesson to review and recall knowledge from previous lessons and apply this knowledge to alternate scenarios to deepen understanding. **Summative** Students will complete a Teams based KO Test to summarise content. Within this half term students will develop essential knowledge in lessons and 'bring it all together', by answering the following question: "How does virtual memory work?"	This Essential Knowledge also builds on knowledge gained in Yr 10 and KS3. In Computer Science is engaging and practical, encouraging creativity and problem solving. It encourages students to develop their understanding and application of the core concepts in computer science. Students also analyse problems in computational terms and devise creative solutions by designing, writing,

			The difference between RAM and ROM The purpose of ROM in a computer system The purpose of RAM in a computer system Virtual memory Required Why computers have primary storage How this usually consists of RAM and ROM Key characteristics of RAM and ROM Why virtual memory may be needed in a system	"What affects the performance of a CPU?" "What is the connection between main memory and the CPU" Fortnightly practice recall exam questions will be issued on paper 2 content (completed in year 10).	testing and evaluating programs. This includes all units relating to Algorithms, programming techniques, Producing Robust Programs, Computational Logic, Data Representation. This is taught at the start of Year 10 as it introduces the students to the 4 main concepts of Computer Science. It teachers them the theory and essential knowledge of programming in order to build them up to being able to complete their programming project in Year 11. This will equip the students with the essential knowledge to progress to specific ICT & Computer Science
HT1 (B)	In this half term students will study a topic focused on: **Computer systems**	Develop their capability, creativity and knowledge in computer science, digital media and information technology Develop and apply their analytic, problem-solving, design, and computational thinking skills	**The need for secondary storage** Common types of storage: o Optical o Magnetic o Solid state Suitable storage devices and storage media for a given application The advantages and disadvantages of different storage devices and storage media relating to these characteristics: o Capacity o Speed o Portability o Durability o Reliability o Cost	**Formative** Students will complete retrieval exercises each lesson to review and recall knowledge from previous lessons and apply this knowledge to alternate scenarios to deepen understanding. **Summative** Students will complete a Teams based KO Test to summarise content. Within this half term students will develop essential knowledge in lessons and 'bring it all together', by implementing it into a	

				challenging Python programming creation task. Students will apply algorithmic thinking to create a Python based solution to the task set. Fortnightly practice recall exam questions will be issued on paper 2 content (completed in year 10).	KS5 courses or employment that is computer oriented. This covers Systems Architecture, Memory and Storage, Networks, Legal and Ethical issues. This is taught in Year 11 as it is very theory based. It means students can have plenty of exam practice and during the delivery of the content can focus on how to achieve high marks and answer exam questions. This will equip the students with the essential knowledge to progress to specific ICT & Computer Science KS5 courses or employment that is computer oriented.
HT2	In this half term students will study a topic focused on: **Computer systems**	Develop their capability, creativity and knowledge in computer science, digital media and information technology Develop and apply their analytic, problem-solving, design, and computational thinking skills	**The units of data storage:** o Bit o Nibble (4 bits) o Byte (8 bits) o Kilobyte (1,000 bytes or 1 KB) o Megabyte (1,000 KB) o Gigabyte (1,000 MB) o Terabyte (1,000 GB) o Petabyte (1,000 TB) How data needs to be converted into a binary format to be processed by a computer Data capacity and calculation of data capacity requirements How to convert positive denary whole numbers to binary numbers (up to and including 8 bits) and vice versa How to add two binary integers together (up to and including 8 bits) and explain overflow errors which may occur How to convert positive denary whole numbers into 2-digit hexadecimal numbers and vice versa	**Formative** Students will complete retrieval exercises each lesson to review and recall knowledge from previous lessons and apply this knowledge to alternate scenarios to deepen understanding. **Summative** Students will complete a Teams based KO Test to summarise content. Within this half term students will develop essential knowledge in lessons and 'bring it all together', by answering the questions:	

			How to convert binary integers to their hexadecimal equivalents and vice versa Binary shifts Numbers How to convert positive denary whole numbers to binary numbers (up to and including 8 bits) and vice versa How to add two binary integers together (up to and including 8 bits) and explain overflow errors which may occur How to convert positive denary whole numbers into 2-digit hexadecimal numbers and vice versa How to convert binary integers to their hexadecimal equivalents and vice versa Binary shifts Required Denary number range 0 – 255 Hexadecimal range 00 – FF Binary number range 00000000 – 11111111 Understanding of the terms 'most significant bit', and 'least significant bit' Conversion of any number in these ranges to another number base Ability to deal with binary numbers containing between 1 and 8 bits e.g. 11010 is the same as 00011010 Understand the effect of a binary shift (both left or right) on a number Carry out a binary shift (both left and right) Characters	"Explain the term 'character set'" "Convert the following binary numbers into denary" "convert the following denary numbers to hexadecimal" "How will colour depth impact the size and quality of an image?" "Explain what is meant by sound sampling" Fortnightly practice recall exam questions will be issued on paper 2 content (completed in year 10).	

			The use of binary codes to represent characters The term 'character set' The relationship between the number of bits per character in a character set, and the number of characters which can be represented, e.g.: o ASCII o Unicode Images How an image is represented as a series of pixels, represented in binary Metadata The effect of colour depth and resolution on: o The quality of the image o The size of an image file Sound How sound can be sampled and stored in digital form The effect of sample rate, duration and bit depth on: o The playback quality o The size of a sound file		
HT3	In this half term students will study a topic focused on: **Computer systems** Network Security Systems Software Ethical, legal, cultural and environmental impacts of digital technology	Systems software, Ethical, legal, cultural and environmental impacts of digital technology Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online	Forms of attack: o Malware o Social engineering, e.g. phishing, people as the 'weak point' o Brute-force attacks o Denial of service attacks o Data interception and theft o The concept of SQL injection Common prevention methods: o Penetration testing o Anti-malware software o Firewalls	**Formative** Students will complete retrieval exercises each lesson to review and recall knowledge from previous lessons and apply this knowledge to alternate scenarios to deepen understanding. **Summative**	

		identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns.	o User access levels o Passwords o Encryption o Physical security The purpose and functionality of operating systems: o User interface o Memory management and multitasking o Peripheral management and drivers o User management o File management Impacts of digital technology on wider society including: o Ethical issues o Legal issues o Cultural issues o Environmental issues o Privacy issues Legislation relevant to Computer Science: o The Data Protection Act 2018 o Computer Misuse Act 1990 o Copyright Designs and Patents Act 1988 o Software licences (i.e. open source and proprietary)	Students will complete a Teams based KO Test to summarise content. Within this half term students will develop essential knowledge in lessons and 'bring it all together', by answering the questions: "What is meant by an SQL injection?" "Which prevention methods should a company use to prevent cyber-attacks?" "Even though people's smart phones still work, people often want the most up to date models. Discuss the impact of people wanting to update to the latest smart phone. Consider the impact on: stakeholders, technology, ethical issues, environmental issues'	

				Fortnightly practice recall exam questions will be issued on paper 2 content (completed in year 10).	
HT4	In this half term students will study a topic focused on: **Computer networks, connections and protocols**	Understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems	Types of network: o LAN (Local Area Network) o 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: o Wireless access points o Routers o Switches o NIC (Network Interface Controller/Card) o Transmission media The Internet as a worldwide collection of computer networks: o DNS (Domain Name Server) o Hosting o The Cloud o Web servers and clients Star and Mesh network topologies Modes of connection: o Wired • Ethernet o Wireless • Wi-Fi	**Formative** Students will complete retrieval exercises each lesson to review and recall knowledge from previous lessons and apply this knowledge to alternate scenarios to deepen understanding. **Summative** Students will complete a Teams based KO Test to summarise content. Within this half term students will develop essential knowledge in lessons and 'bring it all together', by answering the questions: "What are the advantages and disadvantages of using the cloud?" "What network hardware may be	

			• Bluetooth Encryption IP addressing and MAC addressing Standards Common protocols including: o TCP/IP (Transmission Control Protocol/Internet Protocol) o HTTP (Hyper Text Transfer Protocol) o HTTPS (Hyper Text Transfer Protocol Secure) o FTP (File Transfer Protocol) o POP (Post Office Protocol) o IMAP (Internet Message Access Protocol) o SMTP (Simple Mail Transfer Protocol) The concept of layers	required to successfully set up a star network? Justify your answer" "What are three differences between a client-server network and a peer-to-peer network?" Fortnightly practice recall exam questions will be issued on paper 2 content (completed in year 10).	
HT5	In this half term students will study a topic focused on: **Computer systems** Network Security Systems Software Ethical, legal, cultural and environmental impacts of digital technology	Systems software, Ethical, legal, cultural and environmental impacts of digital technology Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate	Forms of attack: o Malware o Social engineering, e.g. phishing, people as the 'weak point' o Brute-force attacks o Denial of service attacks o Data interception and theft o The concept of SQL injection Common prevention methods: o Penetration testing o Anti-malware software o Firewalls o User access levels o Passwords o Encryption o Physical security	**Formative** Students will complete retrieval exercises each lesson to review and recall knowledge from previous lessons and apply this knowledge to alternate scenarios to deepen understanding. **Summative** Students will complete a Teams based KO Test to summarise content. Within this half term students will develop essential knowledge in	

		content, contact and conduct and know how to report concerns.	The purpose and functionality of operating systems: o User interface o Memory management and multitasking o Peripheral management and drivers o User management o File management Impacts of digital technology on wider society including: o Ethical issues o Legal issues o Cultural issues o Environmental issues o Privacy issues Legislation relevant to Computer Science: o The Data Protection Act 2018 o Computer Misuse Act 1990 o Copyright Designs and Patents Act 1988 o Software licences (i.e. open source and proprietary)	lessons and 'bring it all together', by answering the questions: "What is meant by an SQL injection?" "Which prevention methods should a company use to prevent cyber-attacks?" "Even though people's smart phones still work, people often want the most up to date models. Discuss the impact of people wanting to update to the latest smart phone. Consider the impact on: stakeholders, technology, ethical issues, environmental issues' Fortnightly practice recall exam questions will be issued on paper 2 content (completed in year 10).	
HT6	**N/A**	Understand the hardware and	Students will revise content from Computer Systems content and Computational thinking,	**Formative**	

		software components that make up computer systems, and how they communicate with one another and with other systems Systems software, Ethical, legal, cultural and environmental impacts of digital technology Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns.	algorithms and programming content. Topics will include: • Systems architecture • Memory and storage • Computer networks, connections and • Protocols • Network security • Systems software • Ethical, legal, cultural and environmental • impacts of digital technology • Algorithms • Programming fundamentals • Producing robust programs • Boolean logic • Programming languages and Integrated • Development Environments	Students will complete retrieval exercises each lesson to review and recall knowledge from previous lessons and apply this knowledge to alternate scenarios to deepen understanding. **Summative** Students will complete a Teams based KO Test to summarise content. Within this half term students will use the developed essential knowledge in lessons and 'bring it all together', by applying knowledge from Computer Systems content and Computational thinking, algorithms and programming to prepare for the final external exam. Fortnightly practice recall exam questions will be issued on paper 2 content (completed in year 10).	