| | **Dallam School** Curriculum Overview | **Department: Computing** **Year Group: 12** |
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| AUTUMN | | SPRING | | SUMMER | |
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| **Half term 1** | **Half term 2** | **Half term 3** | **Half term 4** | **Half term 5** | **Half term 6** |
| **Unit 2: Fundamentals of Computer Systems** | **Unit 2: Fundamentals of Computer Systems** | **Unit 2: Fundamentals of Computer Systems & Unit 7: IT Systems Security and Encryption** | **Unit 2: Fundamentals of Computer Systems & Unit 7: IT Systems Security and Encryption** | **Unit 1: Principles of Computer Science** | **Unit 1: Principles of Computer Science** |
| By the end of this half term pupils will know *(key knowledge, including tier 3 vocabulary)* | | | | | |
| The concepts and implications of the use of, and relationships between, hardware and software that form computer system. The implications of computer architecture models and the impact of the relationships between their component parts.<br><br>***Tier 3 vocab***<br>• *user experience compatibility implementation*<br>• *timescales*<br>• *migration*<br>• *RAID*<br>• *NAS*<br>• *real-time operating system single-user single task single-user multi-tasking multi-user* | The characteristics, concepts and implications of computer data representation methods.<br><br>***Tier 3 vocab***<br>• *Aggregation*<br>• *Analysis*<br>• *conversion*<br>• *reporting*<br>• *sorting*<br>• *validation*<br>• *accumulator*<br>• *instruction register*<br>• *memory address register (MAR)*<br>• *memory data register (MDR)*<br>• *Program counter.*<br>• *units of digital data (bit, byte, kilobyte)*<br>• *binary*<br>• *binary coded decimal (BCD)* | The characteristics and implications of methods of organising data in computer systems, and its impact on computer processes.<br>You will investigate the many different types of security attack, the vulnerabilities that exist and techniques that can be used to defend IT systems of organisations. You will learn about the complexities of configuring and supporting these networks. You will also explore how encryption can be used to protect data.<br><br>***Tier 3 vocab***<br>• *social engineering*<br>• *denial-of-service attack*<br>• *spoofing* | The use, application and interpretation of logical processes and diagrams to represent data flow and relationships in and between computer systems.<br>You will plan and apply suitable protection to an IT system and test it to ensure the protection is effective. You will configure an IT system's access control settings to control user access to various IT system resources, including files, folders and printers. Finally, you will review the protection that you have applied to an IT system and consider how effective it might be in defending the system from attack. | You will explore the logical and structured ways that computer systems process data to develop programs, processes and systems that solve specific problems.<br><br>***Tier 3 vocab***<br>• *Decomposition*<br>• *Pattern recognition*<br>• *Abstraction*<br>• *Algorithm*<br>• *pseudocode* | You will examine the features of effective computer programming and apply accepted computing and programming paradigms.<br><br>***Tier 3 vocab***<br>• *Process.*<br>• *Decisions*<br>• *Input/output*<br>• *Connectors*<br>• *Start/end*<br>• *Programming paradigms: Procedural, Object Orientated*<br>• *Users*<br>• *Organisations*<br>• *Developers* |

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| • *program execution interrupts*<br>• *modes*<br>• *memory management multi-tasking*<br>• *Device drivers* | | • *Protocol (ARP) poisoning*<br>• *smurf attack*<br>• *Buffer & heap overflow*<br>• *SQL injection*<br>• *Encryption*<br>• *obfuscation*<br>• *steganography*<br>• *two-factor authentication*<br>• *Shift cipher*<br>• *One-time pads*<br>• *hash functions*<br>• *block ciphers,*<br>• *stream ciphers*<br>• *cryptographic primitives*<br>• *cryptographic salts.*<br>• *virtual private networks (VPNs)*<br>• *Generic Routing*<br>• *ASCII*<br>• *UNICODE*<br>• *stack*<br>• *queue*<br>• *array*<br>• *list* | ***Tier 3 vocab***<br>• *Antivius*<br>• *Malware*<br>• *Firewall*<br>• *Penetration testing*<br>• *simplex*<br>• *half-duplex*<br>• *full-duplex*<br>• *point-to-point*<br>• *multi-drop*<br>• *Caesar cipher – Vigenère cipher*<br>• *symmetric key encryption –*<br>• *public key encryption*<br>• *lossy*<br>• *lossless.*<br>• *parity schemes*<br>• *checksum*<br>• *repetition schemes*<br>• *cyclic redundancy check (CRC).*<br>• *automatic repeat request (ARQ)*<br>• *forward error correction (FEC)* | | |
| They will understand *(key concepts)* | | | | | |
| The way computer components work both individually and together to store and process data, | Why computer components, and the data they use, perform in certain ways has a significant impact on the work of all computing professionals. | The impact that computing systems have on organisations and individuals.<br>Current IT security threats, information security and the legal requirements affecting the security of IT systems.<br>Cryptographic techniques and processes used to protect data | The way in which data is transmitted and used in computer systems. Techniques used to protect an IT system from security threats & strategies to protect an IT system from security threats. | Understanding of computing facts, terms, standards, concepts and processes. | Select and use computing technologies and procedures to explore outcomes and find solutions to problems in context |

| They will know how to *(key skills)* | | | | | |
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| Apply knowledge and understanding of computing facts, terms, standards, concepts and processes to real-life scenarios Command words: calculate, complete, demonstrate, describe, draw, explain, produce Select and use computing technologies and procedures to explore likely outcomes and find solutions to problems in context. | You will be able to analyse complex information, data and situations, in vocational contexts, in order to draw conclusions and make valid observations. | Unit 2 You will be are able to synthesise knowledge and understanding of computing to deconstruct problems, drawing on various sources of information to develop effective solutions with justification. Unit 7 Explain the different security threats that can affect the IT systems of organisations. Explain the principles of information security when protecting the IT systems of organisations. Explain why organisations must adhere to legal requirements when considering IT system security. Explain the principles and uses of cryptography to secure and protect data. | Unit 2 You will be able to able to evaluate the effectiveness of computer systems to make justified recommendations on their development and future actions that can be taken. Unit 7 Assess the impact that IT security threats can have on organisations' IT systems and business whilst taking account of the principles of information security and legal requirements. Analyse how the principles and uses of cryptography affects the security and protection of data. Evaluate the effectiveness of the techniques used to protect organisations from security threats whilst taking account of the principles of information security and legal requirements. | Apply thinking skills involved in analysing problems and processes, to identify solutions that can be developed into computer programs. | Techniques used to design solutions to problems. |

| | **Dallam School** Curriculum Overview | | **Department: Computing** **Year Group: 13** | | |
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| AUTUMN | | SPRING | | SUMMER | |
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| **Half term 1** | **Half term 2** | **Half term 3** | **Half term 4** | **Half term 5** | **Half term 6** |
| **Unit 1: Principles of Computer Science** | **Unit 1: Principles of Computer Science** | **Unit 14: Computer Games Development** | **Unit 14: Computer Games Development** | **Unit 14: Computer Games Development** | |
| By the end of this half term pupils will know *(key knowledge, including tier 3 vocabulary)* | | | | | |
| You will analyse, develop and evaluate algorithms and computer code, and propose and apply solutions to ensure that computer systems are fit for purpose.<br><br>*Tier 3 vocab*<br>• *Data types*<br>• *Relational operators*<br>• *Boolean operators*<br>• *Post check actions*<br>• *Validation*<br>• *Control structures*<br>• *LIFO*<br>• *FIFO*<br>• *performance*<br>• *platform independence* | You will develop the computational-thinking skills to effectively analyse a problem, break it down into its component parts, and design and evaluate solutions.<br><br>*Tier 3 vocab*<br>• *Classes*<br>• *objects/instances*<br>• *inheritance*<br>• *encapsulation*<br>• *polymorphism*<br>• *main loop call-back*<br>• *event handlers event loops*<br>• *service orientated processing*<br>• *time driven*<br>• *Trigger functions* | You will investigate the computer games industry and its impact on technological and social trends.<br><br>*Tier 3 vocab*<br>• *multiplayer*<br>• *artificial intelligence*<br>• *mathematical optimisation*<br>• *emerging technologies*<br>• *central processing unit (CPU)*<br>• *graphics processing unit (GPU)*<br>• *memory, e.g. random-access memory (RAM)*<br>• *read-only memory (ROM)* | You will design and develop a computer game to meet requirements.<br><br><br>*Tier 3 vocab*<br>• *rendering engines*<br>• *physics engines*<br>• *collision detection scripting*<br>• *animation*<br>• *path finding algorithms* | You will design and develop a computer game to meet requirements.<br><br><br>*Tier 3 vocab*<br>• *Boundary test*<br>• *Invalid test*<br>• *Debug*<br>• *Erroneous test*<br>• *Compile*<br>• *Iterative testing*<br>• *Terminal testing*<br>• *Optimisation* | |

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| • *power protocols and APIs* | | | | | |

**They will understand** *(key concepts)*

| How to analyse data and information related to computer science in order to predict outcomes and present solutions. | How to evaluate technologies, procedures, outcomes and solutions to make reasoned judgements and make decisions | Technologies used in the computer gaming industry and the implications they have for users, developers and organisations. | How user needs and preferences impact on game design and how target technologies affect the design and development of a computer game. | How to design, create and review a computer game to meet requirements and reflect on the skills and understanding applied during the design and development process. | |
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**They will know how to** *(key skills)*

| Use of standard structures and conventions to build and develop accurate, efficient and effective computer code to fulfil identified criteria and solve problems. | The features, applications, impact and implications of using different programming paradigms to develop code to solve problems. | You will be able to identify technologies used in computer gaming including: social trends in computer gaming, technologies used in computer gaming. Project brief, design documentation, development and testing logs, meeting notes and a report that evaluates the effectiveness and appropriateness of the computer game. | You will be able to design a computer game to meet client requirements including design processes and techniques, review and refining designs, design specification showing the design and development of a computer game to meet identified client requirements. | You will be able to develop a computer game to meet client requirements including, developing computer games, testing computer games, reviewing computer games quality and characteristics. | |
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