St Dunstan's School
GLASTONBURY

ICT, Computer Science & iMedia Curriculum Booklet 2024-25

Subject Lead: Mr Norris

ICT Curriculum Intent

The aim of ICT is to provide each and every student the skills and knowledge needed to access technology and use it to benefit their lives. A major focus is how to use computers safely and minimise any risks which may be present. Skills are built upon each year which lead into the two options available at GCSE level - Computer Science and iMedia. The scheme of work provides a rich experience of both practical skills as well as technical skills, setting students up for iMedia and Computer Science respectively.

The St Dunstan's ICT curriculum intends to instil the St Dunstan's core values of Truth, Resilience, Ambition, Community and Kindness (TRACK) as follows:

Truth - Students will seek truth by using judgement and knowledge to identify what information to trust on the internet. They will also be aware of implications of using technology, and that their digital footprint will be visible to future employers.

Resilience - During ICT lessons there are opportunities for students to make decisions and get things wrong. Trying is the important thing which is made clear to all students, and techniques are learnt to improve resilience by trying again if necessary.

Ambition - The expectation at St Dunstan's is for all students to do well. Ambition is shown through their attitude to learning and students can evidence this through ePortfolios, which are a digital alternative to books to be used as a platform for demonstrating knowledge.

Community - Students are aware of the impact of social media, fake news and scammers on the internet, and the threat they cause to people's wellbeing. Students are taught how to improve their online safety through privacy checks as well as how to spot a fraudulent email.

Kindness - The impact of cyberbullying can be very detrimental to a student's mental health. Over half of students have a social media account before they reach secondary school, so it is important that children understand the right way to use it as well as the rules and regulations associated.

KS3 ICT at St Dunstan's is inline with the National Curriculum:

The national curriculum for computing aims to ensure that all pupils:

- *can understand and apply the fundamental principles and concepts of computer science, including abstraction, logic, algorithms and data representation*
- *can analyse problems in computational terms, and have repeated practical experience of writing computer programs in order to solve such problems*
- *can evaluate and apply information technology, including new or unfamiliar technologies, analytically to solve problems*
- *are responsible, competent, confident and creative users of information and communication technology.*

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/239067/SECONDARY_national_curriculum_-_Computing.pdf

ICT Curriculum Implementation

Students at St Dunstan's experience a wide variety of the applications of Computers. The purpose of this is to discover if they have a passion for computers, and if so, which areas of the subject it includes.

The variety of topics keeps students engaged and helps them discover the wide array of potential uses of technology. Areas covered in the curriculum include:

- Programming
- Graphic Design
- Web Design
- Business skills
- E-Safety
- CAD (Linked with Design Technology)
- System Security
- Artificial intelligence

Software is used wherever possible to improve efficiency and, as mentioned, give students a variety of platforms to use for learning. Testing for KS3 has been streamlined and involves E assessment as well as practical work, allowing students to access more information about their learning as software can give direct feedback to students and allow them to see their areas of focus to improve upon.

The range of topics studied at KS3 will allow students to make an informed decision when choosing their option subjects and whether it is the right choice for them.

Allocated Curriculum Time

Year Group	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**
Fortnightly lesson allocation	2 lessons	2 lessons	2 lessons	5 for each subject	5 for each subject

Curriculum Plan: Year 7

Students begin studying some key areas of ICT:

Curriculum Foci Areas	Assessment Criteria
Getting Started When students arrive in Y7 they are unfamiliar with the school systems. The intention of the first few lessons will familiarise students with the school network as well as the other essential tools they will need for their electronic life at school and at home.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
Computer Crime and Security The intention of this unit is to make students aware of how to stay safe, secure and tech savvy whilst using digital technology. Students will be more aware of the dangers of the internet, how to spot them and resources to use if they spot something wrong.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
Algorithms In this unit pupils will be introduced to the Scratch programming environment and begin by reverse-engineering some existing games. The intention of this unit is to develop logical thinking and problem solving skills in a game development environment.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
Understanding Computers The intention of this unit is to teach students how computers work in the way that they do. We all take for granted the 'magic' which happens when we surf the web, watch a film or write a letter. This unit opens the lid on how this all works.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
Game Design The intention of this unit is to provide an introduction to the fundamentals of computer programming and games design via Kodu, a graphical development environment developed by Microsoft Games Lab.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)

Curriculum Plan: Year 8

Students continue their learning journey studying topics which lead on from those in year 7:

Curriculum Foci Areas	Assessment Criteria
Digital Graphics The intention of this unit is to prepare students for the iMedia course which many students will begin in Y9. This unit is an introduction to graphics and graphic file types. Students learn practical skills in order to create a series of different graphics.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
Modelling The intention of this unit is to cover the principles of creating and formatting spreadsheets to produce and use computer models.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
HTML & CSS The intention of this unit is to teach students the basic skills to make their own web applications and sites. This will be students' first experience of writing basic code and will form a good starting point for the programming unit later in the year.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
Networks The intention of this unit is to teach students how the internet and computer networks operate. It opens the lid into the amazing work of data transfer and connectivity. We take it for granted that when we surf the web or send an email it happens in an instant, however it's an incredibly complex process which happens behind the scenes.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
Python (5 & 6) The intention of this unit is to develop students' programming skills. The focus for this unit is on getting pupils to understand the process of developing programs, the importance of writing correct syntax, being able to formulate algorithms for simple programs and debugging their programs.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)

Curriculum Plan: Year 9

Students rotate four times a year to cover the following areas:

Curriculum Foci Areas	Assessment Criteria
ecoGames The intention of this unit is for students to experience a wide range of ICT skills which are used for a variety of job roles in the Media sector. The ecoGames project covers skills needed for Graphic Design, Coding, Video Editing as well as how to utilise social media for advertising.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
Artificial Intelligence The intention of this unit is to make students aware of how our world is changing because of AI and Machine Learning. We are now entering an age where computers are overtaking our intelligence as a human race. Students will learn about the science and ethics of this during this fascinating new unit.	**Assessment:** ● eAssessment ● ePortfolio ● Literacy test (key terminology)
iDea Award Students complete the iDEA qualification in order to develop talents and gain all-important knowledge and information about the digital world. Students can win career-enhancing badges, unlock new opportunities and, ultimately, gain industry-recognised Awards that help them stand out from the crowd. As well as being fun, the badges on iDEA provide a visual acknowledgment of achievement. The iDEA award helps to: ● Enhance student skills and knowledge of Computing ● Improve your digital literacy ● Learn about staying safe online ● Discover talents students didn't know they had ● Get more confident with technology	**Assessment:** Based on progress towards bronze, silver and gold awards

Curriculum Plan: Year 10+11 GCSE Computer Science
Exam Board: OCR - Specification: J277

Topic	Curriculum Foci Areas	Assessment Criteria
1	1.1 Systems architecture 1.1.1 Architecture of the CPU The purpose of the CPU: ● The fetch-execute cycle Common CPU components and their function: ● ALU (Arithmetic Logic Unit) ● CU (Control Unit) ● Cache ● Registers Von Neumann architecture: ● MAR (Memory Address Register) ● MDR (Memory Data Register) ● Program Counter ● Accumulator 1.1.2 CPU performance How common characteristics of CPUs affect their performance: ● Clock speed ● Cache size ● Number of cores 1.1.3 Embedded systems ● The purpose and characteristics of embedded systems ● Examples of embedded systems	**Assessment:** eAssessment ePortfolio
2	1.2 – Memory and storage 1.2.1 Primary storage (Memory) ● The need for primary storage ● The difference between RAM and ROM ● The purpose of ROM in a computer system ● The purpose of RAM in a computer system ● Virtual memory 1.2.2 Secondary storage The need for secondary storage Common types of storage: ● Optical ● Magnetic ● 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: ● Capacity ● Speed ● Portability ● Durability ● Reliability ● Cost	**Assessment:** eAssessment ePortfolio

	1.2.3 Units The units of data storage: ● Bit ● Nibble (4 bits) ● Byte (8 bits) ● Kilobyte (1,000 bytes or 1 KB) ● Megabyte (1,000 KB) ● Gigabyte (1,000 MB) ● Terabyte (1,000 GB) ● 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 1.2.4 Data storage 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 Characters 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.: ASCII Unocode Images How an image is represented as a series of pixels, represented in binary Metadata The effect of colour depth and resolution on: ● The quality of the image ● 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: ● The playback quality ● The size of a sound file 1.2.5 Compression The need for compression Types of compression: ● Lossy ● Lossless	

3	1.3 – Computer networks, connections and protocols 1.3.1 Networks and topologies 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 1.3.2 Wired and wireless networks, protocols and layers Modes of connection: ● Wired ● Ethernet ● Wireless ● Wi-Fi ● Bluetooth ● 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	**Assessment:** eAssessment ePortfolio
4	1.4 – Network security 1.4.1 Threats to computer systems and networks Forms of attack: ● Malware ● Social engineering, e.g. phishing, people as the ‘weak point’ ● Brute-force attacks ● Denial of service attacks ● Data interception and theft ● The concept of SQL injection 1.4.2 Identifying and preventing vulnerabilities Common prevention methods:	**Assessment:** eAssessment ePortfolio

	• Penetration testing • Anti-malware software • Firewalls • User access levels • Passwords • Encryption • Physical security	
5	1.5 – Systems software 1.5.1 Operating systems The purpose and functionality of operating systems: • User interface • Memory management and multitasking • Peripheral management and drivers • User management • File management 1.5.2 Utility software The purpose and functionality of utility software Utility system software: • Encryption software • Defragmentation • Data compression	**Assessment:** eAssessment ePortfolio
6	1.6 – Ethical, legal, cultural and environmental impacts of digital technology Impacts of digital technology on wider society including: • Ethical issues • 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)	**Assessment:** eAssessment ePortfolio
7	2.1 – Algorithms 2.1.1 Computational thinking Principles of computational thinking: • Abstraction • Decomposition • Algorithmic thinking 2.1.2 Designing, creating and refining algorithms Identify the inputs, processes, and outputs for a problem Structure diagrams Create, interpret, correct, complete, and refine algorithms using: • Pseudocode • Flowcharts • Reference language/high-level programming language	**Assessment:** eAssessment ePortfolio

	Identify common errors Trace tables 2.1.3 Searching and sorting algorithms Standard searching algorithms: ● Binary search ● Linear search Standard sorting algorithms: ● Bubble sort ● Merge sort ● Insertion sort	
8	2.2 – Programming fundamentals 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 common arithmetic operators The common Boolean operators AND, OR and NOT 2.2.2 Data types The use of data types: ● Integer ● Real ● Boolean ● Character and string ● Casting 2.2.3 Additional programming techniques 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 The use of arrays (or equivalent) when solving problems, including both one-dimensional (1D) and two-dimensional arrays (2D) How to use subprograms (functions and procedures) to produce structured code Random number generation	**Assessment:** eAssessment ePortfolio
9	2.3 – Producing robust programs 2.3.1 Defensive design Defensive design considerations: ● Anticipating misuse ● Authentication	**Assessment:** eAssessment ePortfolio

	Input validation Maintainability: ● Use of sub programs ● Naming conventions ● Indentation ● Commenting 2.3.2 Testing The purpose of testing Types of testing: ● Iterative ● Final/terminal Identify syntax and logic errors Selecting and using suitable test data: ● Normal ● Boundary ● Invalid/Erroneous Refining algorithms	
10	2.4 – Boolean logic Simple logic diagrams using the operators AND, OR and NOT Truth tables Combining Boolean operators using AND, OR and NOT Applying logical operators in truth tables to solve problems	**Assessment:** eAssessment ePortfolio
11	2.5 – Programming languages and Integrated Development Environments 2.5.1 Languages 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 2.5.2 The Integrated Development Environment (IDE) Common tools and facilities available in an Integrated Development Environment (IDE): ● Editors ● Error diagnostics ● Run-time environment ● Translators	**Assessment:** eAssessment ePortfolio

All students are given the opportunity to undertake programming tasks during their course of study. The programming tasks allow them to develop skills within the following areas when programming:

• Design
• Write
• Test
• Refine

Each task will use a high-level text based programming language, either to a specification or to solve a problem. The high-level text-based programming language we use at St Dunstan's is Python.

GCSE Computer Science: Final Assessment Structure:

OCR's GCSE (9–1) in Computer Science consists of two compulsory components that are externally assessed.

Component	Weighting	Content	Proposed Date of Examination
J277/01: Computer systems	This is a compulsory component. It is worth 80 marks, representing 50% of the total marks for the GCSE (9–1).	This component is an externally assessed written examination testing AO1 and AO2. The examination lasts 1 hour 30 minutes. All the questions are mandatory. The question paper will consist of short and medium answer questions. There will also be one 8-mark extended response question. This question will enable students to demonstrate the ability to construct and develop a sustained line of reasoning.	May/June (year 11)
J277/02: Computational thinking, algorithms and programming	This is a compulsory component. It is worth 80 marks, representing 50% of the total marks for the GCSE (9–1).	This component is an externally assessed written examination testing AO1, AO2 and AO3. The examination lasts 1 hour 30 minutes and is divided into two sections. All the questions are mandatory. Section A is worth 50 marks, and assesses students' knowledge and understanding of concepts of Computer Science. Students then apply these to problems in computational terms, where they may use an algorithmic approach. Section B is worth 30 marks, and assesses students' Practical Programming skills and their ability to design, write, test and refine programs. The question paper will consist of short and medium answer questions.	May/June (year 11)

Please see the exam board website for up to date information:
https://www.ocr.org.uk/qualifications/gcse/computer-science-j277-from-2020/