COMPUTER SCIENCE CURRICULUM MAP
2024 – 2025

Intent:

Computer Science balances knowledge and practical application in order to provide students with both specialised and transferable skills that are greatly valued in the marketplace. All students will experience physical computing to develop and hone their ability to code through the completion of increasingly complex programming projects. The course emphasises three distinct strands within computing extracted from the KS3 National Curriculum: computer science (CS), information technology (IT) and digital literacy (DL). Each component is essential in preparing our students to thrive in an increasingly digital world. Computer science incorporates techniques and methods for solving problems and includes a distinct way of thinking and working that complements other disciplines.

Implementation:

Year	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
7	***Introduction to NBS Technology & Applications.*** ***Internet Safety*** The KS3 Curriculum builds on from KS2 and introduces e-Safety to all classes immediately. Dangers such as sexting, grooming and cyber bullying will be discussed and how to deal with these threats. Students will become aware of how to report concerns about their digital activity using CEOP, Child Line and Thinkuknow.	***Hardware & Software Components*** Year 7 students begin by deepening their knowledge of computer systems through the analysis of how hard- and software components cooperate and communicate. We start with this topic as it strengthens students' understanding of core elements of computer systems, which form the foundation of all subsequent learning.	***Functions of a Computer System*** Students subsequently study the more complex nuances of how a computer system functions focusing primarily on input and output processes. Students use systems to understand how data is input, computation performs and an output response is given. Students learn how data is checked against stored values.	***Computer Networks*** Building on this, students learn about LAN and WAN as examples of simple networks. Students are then able to apply this knowledge to understand how much larger networks such as the internet operate. Students are able to apply their learning by setting up a network to exchange data between computers across wired and wireless connections.	***Block based Programming*** Students build on from KS2 algorithms with a starting point of reintroducing visual programming language (Scratch-block based programming), and this will help them to later build onto text-based programming (Python) which will allow them to better understand the concepts behind programming and switch to other languages in the future. ***Programming Constructs using building blocks/Micro: bit simulator*** This unit will build learners' confidence and knowledge of the key programming constructs and offer students the opportunity to expand on their knowledge on the main programming concepts: sequencing, variables, selection, and count-controlled iteration. Students will develop experience in block-based programming by creating a few simple Scratch games or developing further using a micro: bit emulator.	***Mobile App Project*** The final topic in Year 7 will progresses students' knowledge and understanding of programming constructs in a block-based programming environment. Students will also develop their computational thinking and project planning, by going from decomposing a larger project into smaller parts and creating success criteria for the project to getting user feedback and evaluating their project. Students will explore, where in a world where there is an app for every possible need, this project aims to take the learners from designer to project manager to developer in order to create their own mobile app for their school or local community.

8	***Computational thinking*** In Year 8, Autumn 1 students participate in engaging projects to model computational thinking using abstraction, decomposition, pattern recognition and algorithmic thinking. Students begin to understand how modelling is a real life representation of a real-world system or situation that captures the aspects of the situation that are necessary for a particular purpose, while omitting the unimportant.	***Algorithms*** Students develop several key algorithms using sorting and searching examples and develop Linear and Binary algorithms. Students then understand how this process is time consuming if there are many pictures, and then learning how binary search works much quicker on a sorted list. These types of algorithms provide many unplugged activities for students to demonstrate how they created the solution using specific sorts and searches.	***Data Representation (Logic & Units)*** This topic conveys essential knowledge relating to binary representations. The activities gradually introduce students to binary digits and how they can be used to represent text and numbers. The concepts are linked to practical applications and problems that the students are familiar with. Students experiment with creating and manipulating bitmaps using image-editing programs and complete hand drawn designs of their own BITMAP images. Students learn about image file types and how JPEG images use compression techniques to make smaller files at the expense of some of the finer detail captured in the original bitmap.	***Programming techniques,*** To further develop students' programming techniques on Sequence, Selection and Iteration techniques, students are introduced to Boolean statements to perform truth value for example, AND, OR and NOT using unplugged activities using truth tables and then move onto programming using Python. Students are able to apply their new learning, develop their own logical statements, create arrays, and complete file handling operations. Students will use a combination of software simulations using farmbots, paper-based activities, flowcharts, pseudo code, and Python.	***Writing algorithms/ flow diagrams*** Students will become confident and discerning users of technology, selecting, using and combining applications. Students undertake creative programming projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users.	***Writing algorithms/ pseudo Code/ python*** Projects will combine the three computing strands enabling students to see how the three areas relate during set software development projects include: create a dice rolling simulator, guess the number and hangman; students will put into practice the following concepts taught in Computer Science such as Random function. Variables, Integer, Input/Output, Print, Boolean, While Loops and If/Else Statements.
9	***Spreadsheet Modelling & Data Science*** From transmitting data from one device to another, students will begin to confidently develop their spreadsheet skills to model data using spreadsheets. Students will participate in engaging activities to develop an understanding and applying basic formulas to writing their own COUNTIF statements. Students will develop a good set of skills that they can later use in their digital literacy course from Year 9 and in other subject areas.		***Manipulating data using SQL*** From analysing data using a visual representation and automating formulas and functions using spreadsheet software, students are introduced to databases and what they store. Students will be able to identify the purpose of storing data in specific databases. Students will also be able to obtain and process data from the database, which is called a query. By creating a query, there are many methods however; students will learn how to process a query using SQL commands. SQL is a programming language used to access and manage databases.	**Website development (CSS, HTML)** Students will now explore the technologies that make up the internet and World Wide Web. Starting with an exploration of the building blocks of the World Wide Web, HTML, and CSS. Students will investigate how websites are catalogued and organised for effective retrieval when using search engines. Students will start to understand how web pages are constructed using HTML tags, and how they are modified to resemble the websites they are accustomed to. Students will begin by considering the power of automation for repetitive tasks, before delving into some practical web page formatting activities using HTML tags. This topic will enable students to develop a functional website based on topics related to implications of digital literacy (ethical, environmental, cultural and legal).		**User interface design concept & development** The KS3 curriculum enables students to experiment how these devices can be combined, bringing together cameras, voice recorders, mobile phones, tablet computers, laptops, desktop computers and internet tools through project work. Students therefore have the opportunity to express their creativity when designing and implementing a user interface and produce a design using tools from different applications during the course of the project. Students are free to create solutions with the tools they feel are most suitable for the task and create inventive and original solutions that push their specific abilities. At the end of the project, students will evaluate the

				effectiveness of their solutions in terms of goals and suitability, and reflect on the process they followed, including the software they used. At the end of Summer 2, all computing students will have developed a solid foundation for KS4 computing and become digitally literate in using, expressing and developing their ideas through information and communication technology.

Enrichment Opportunities:

In line with the KS3 and KS4 programme of study, the Computer Science department encourages all our Computer Scientists (Years 7-13) to participate each year in the national Bebra's Computing Challenge, which introduces computational thinking to students. Students take an online 45 minutes test and answer multiple-choice questions that focus on computational and logical thinking. The challenge tasks are embedded into the start of each Computer Science lesson and is designed to get students excited about computing and computational thinking. It is a problem-solving contest with questions inspired by topics in Computer Science.

In KS3, our Year 8 Computer Scientists take a step further from their mobile app project from Year 7 to participate in a fully funded programmed aimed at young students, especially girls, to help them to gain digital skills, challenge gender stereotypes within the industry, and consider a career in technology. The programme enables students to design an 'app for good' that makes a real, tangible social change within their school and community. The programme is managed in school through boot camp sessions led by the Computer Science teachers'. Communication with an AWS ambassador takes place through a combination of online, face-to-face assemblies and visits to the Amazon head office to gain an insight of being mentored by Amazon colleagues to develop our student's mobile app idea.

A stronger focus is targeted for all Year 7 students to drive digital, enterprise skills in line with our programmes of study. Years 7 & 8 have been working towards their Bronze, and Silver Award in iDEA – The Inspiring Digital Enterprise Award, the programme helps students to further develop digital, enterprise and employability skills. The Computer Science department have incorporated iDEA badges to be completed each week in line with the programme of study for Year 7; this year in assembly, we will be celebrating the student awards across Years 7 & 8 during whole assembly to raise achievement in computing. An iDEA ambassador is also selected from each form group to lead the role of pastoral support outside of the Computer Science lesson and to work closely with the Computer Science department to review badges and challenges.

Year 7 Coding Club –Passionate coders opt in to attend weekly coding club sessions taking place in an ICT suite at lunchtimes. The programme is designed to aspire students to develop their text-based programming as well as online simulators. Students work towards completing mini projects which are celebrated in the school during assemblies.

Impact:

KS3 units are adapted and taught purely by topic or with a consideration of underpinning knowledge and skills from KS2, which forms part of the unit delivery from the Year 7 baseline assessment. From this, the programme of study is built on from the previous topic and links to the next topic. Key concepts such as programming, Computational thinking, algorithms and systems architecture are weaved into the KS3 as a starting point to help students familiarise with the technical vocabulary before they start KS4 and build onto complex content.

Formative assessment is an integral part of our approach to Teaching and Learning. Over the course of their study, all lessons use and apply formative assessment using questions, which is displayed, on the board or on paper, class teacher observation and recall retrieval activity/consolidation of learning. Examples of formative assessment, which is used, is self and peer assessment, different forms of questioning, quizzes to support learning and self-explanations or rubrics for assessing projects. Carefully chosen questions (diagnostic questions) are used to reveal student's misconceptions about the key principles and helps the Computer Science teacher understand the students' conception of the key topic. During practical programming lessons, multiple choice questions are used to assess programming skills by using snippets of block/text based code, which students will need to read and work out what the outcome of the running the snippets will be. Questions like these highlight that it is important for students to engage in code comprehension and code reading activities when learning to program.

Students will also sit a summative assessment at the end of each topic or unit at the end of the term. This assessment will be cumulative and will assess not only what the students have learned over the previous term, but also their understanding of all relevant material previously taught. Summative assessments consist of vocabulary to ensure students can speak the 'language' of Computer Science, students can fill in a missing component in a block of code or determine the output of a block of code and finally students can find and correct errors. Staff are supported to mark these accurately and post assessment moderation takes place to ensure the validity of the data. All data is analysed centrally (not by teachers) and the CS Subject Leader is given a report outlining the areas of strength and weakness. This is then used to inform future planning, pedagogical action/support with additional interventions and set changes.

Homework will be set for students using a combination of online as well as paper-based activities on the current and previous learning content with the addition of written extended exam questions at KS4.

DIGITAL INFORMATION TECHNOLOGY CURRICULUM MAP 2024 – 2025

Intent:

At WHTC, all KS4 students study and complete a digital practical qualification in BTEC L2 Tech Award in Digital Information Technology from Years 10-11. Students will learn a strong mix of creative design and technical knowledge. This is a digital qualification that gives students a real insight into the modern fundamentals of IT with an external assessment structured to be relevant to IT. The structure of the course has been designed to explore, develop and then apply to allow students to build on and embed their knowledge. This will enable our students to grow in confidence and then put into practice what they have learned.

Implementation:

Year	Half Term 1	Half Term 2	Half Term 3	Half Term 4	Half Term 5	Half Term 6
10	**Component 1: Exploring User Interface Design Principles and Project Planning Techniques (Controlled Assessment) Submission: December** As digital technologies and organisations continue to evolve, it is a good opportunity for students to recall KS3 design principles to further explore how new developments offer new and exciting ways of interacting with hardware devices. User interfaces allow individuals to interact with digital technologies and the design of the user interface is crucial in ensuring that users can interact positively with their hardware devices. Students will identify the different design principles that can be used to create an	**Component 3: Effective Digital Working Practices (Exam: 01/05/2025)** Aim: A Modern Technologies Students will revisit and explore how modern information technology is evolving. They will explore how IT professionals work with digital solutions to integrate them into organisations and their activities.	**Component 2: Collecting Presenting and Interpreting Data (Controlled Assessment) Submission: May** Students need to be aware that organisations collect vast amounts of data from a range of different sources so they can make decisions. Organisations need to use appropriate data collection methods to ensure that the data is of sufficient quality to enable decision making. Students need to know that to allow data to become useful, it must be converted into information. In this component, students will learn the different data manipulation tools that can be used to change the way that data is	**Component 3: Effective Digital Working Practices (Exam: 01/05/2025)** Aim: B Cyber Security Students will understand what cyber security is and how to safeguard against it. Students will further explore from Year 9 why systems are attacked and understand the types of internal and external threats. Students will be able to describe what steps an organisation must take to minimise their risk of threats.	**Component 3: Effective Digital Working Practices (Exam: 01/05/2025)** Aim: C Draw conclusions and review data presentation methods Students will now use their dashboard they created last term and draw conclusions and make suitable recommendations based on the information displayed in the dashboard. Students will also consider how the presentation methods chosen impact on the conclusions and recommendations they have made. Aim: D Planning & communication in digital systems. Students will understand the purpose of key diagrams which are used in organisations to show how textual and diagrammatical communication can be used to explain digital solutions. Students will develop how to interpret, refine and draw data flow diagrams, flow charts and system diagrams.	

	effective interface that meets user requirements as part of a project brief and complete time-controlled tasks. This component gives students the knowledge and skills required to understand the use of different types of user interface and how interfaces vary across different uses, and on a range of devices and purposes. Examining the factors affecting the choice of user interface in relation to hardware and software.		presented. They will provide clear summaries of the data and present them in a dashboard that will allow organisations to make effective decisions. Even when data has been converted into information, it will not provide any conclusions on its own. It is up to the data user to be able to look at the information and draw conclusions, so how the information is presented is key to ensuring that effective and accurate decisions are made. In this component, students will learn the different presentation features that can be used to ensure that information is understood clearly in an objective way so that it is not misinterpreted.		

Enrichment Opportunities:

AWS GetIT Competition

In KS3, our Years 8 & 9 Computer Scientists take a step further from their mobile app project from Year 7 to participate in a fully funded programmed aimed at young students, especially girls, to help them to gain digital skills, challenge gender stereotypes within the industry, and consider a career in technology. The programme enables students to design an 'app for good' that makes a real, tangible social change within their school and community. The programme is managed in school through boot camp sessions led by the Computer Science teachers'. Communication with an AWS ambassador takes place through a combination of online, face-to-face assemblies and visits to the Amazon head office to gain an insight of being mentored by Amazon colleagues to develop our student's mobile app idea.

CyberFirst Girls Development Days (National Cyber Security Crime-GCHQ)

Years 8 & 9 Digital Female Leaders will participate in a fun, scenario based interactive learning experience where they will hear from inspirational guest speakers and trailblazing women leaders working in cyber industry. Students participate in role-play activities and learn new cyber skills (Digital Forensics, Cryptography, Penetration Testing and Open Sources Intelligence) along the way.

Development of digital & technical skills

The creativity of the User Interface design element and the opportunity to work towards a realistic work scenario. Students discover how cloud storage and cyber security which can be related to social media like Instagram and Facebook.

Suggested class field trips may take place to analyse user interface designs used by high street stores. Further discussions take place on how companies like Instagram and Facebook store data and manage privacy. Students develop a broad taste of digital skills creating a stepping stone to careers like IT Project Management, Technical Support and Cyber Security. The technical skills gained in DIT will provide students going into creative careers such as app design, web design, video game design, digital advertising and much more.

Students will have developed a knowledge of analytics, performance and technical elements, which will help students to improve their creative output.

Impact:

Formative assessment is an integral part of our approach to Teaching and Learning. Over the course of their study, all lessons use and apply formative assessment using questions, which is displayed, on the board or on paper, class teacher observation and recall retrieval activity/consolidation of learning. Examples of formative assessment, which is used, is self and peer assessment, different forms of questioning, quizzes to support learning and self-explanations or rubrics for assessing projects. Carefully chosen questions (diagnostic questions) are used to reveal student's misconceptions about the key principles and helps the DIT teacher understand the students' conception of the key topic.

Students will also sit a summative assessment at the end of each topic for the external assessment component. This assessment will be cumulative and will assess not only what the students have learned over the previous term, but also their understanding of all relevant material previously taught. Summative assessments consist of vocabulary to ensure students can speak the 'language' as digital leaders and apply these to contextual examples. Staff are supported to mark these accurately in line with the mark schemes, these are then moderated to ensure the accuracy of the teachers' feedback. All data is analysed centrally (not by teachers) and the Subject Leader of Computer Science & ICT is given a report outlining the areas of strength and weakness. This is then used to inform future planning, pedagogical action/support with additional interventions and set changes.