

Walthamstow Academy – Computer Science Curriculum Journey

Our Curriculum Intent

Our computing curriculum is inclusive and ambitious for all learners. We aim to develop our students' digital literacy to enable them to become conscious and responsible consumers of digital technologies, the digital environment, particularly the online world. We aim for our curriculum to ultimately empower and enable our students to develop a better understanding of the world and hopefully contribute to them forming and developing the technologies of tomorrow as literate and skilled computer scientists.

Progression between Key Stages

The Year 7 curriculum builds on themes taught at KS2 and introduces learners to principles of instruction practiced at Walthamstow Academy, as well as being an opportunity to identify and mediate gaps in knowledge, developing key skills along the way.

The KS3 curriculum allows students the space to appreciate computing in many forms whilst also allowing them the opportunity to develop areas of interest in new and exciting ways. The curriculum is also designed to seamlessly reinforce crucial understanding and concepts essential to computer science

At KS4, the curriculum is more formal as it needs to address the needs of the qualification but is delivered in such a way as to afford students to luxury of drawing upon their previous learning to meet the needs of the curriculum.

At KS5, as with KS4, is formal in its approach but draws on prior learning to develop a deeper understanding. The NEA project allows students to explore their particular interests in a structured and meaningful way. KS5 is the pinnacle of our curriculum and where our computer scientists begin to understand what a career in computer science might look and feel like...

Our Curriculum Progression Model

When **sequencing** material we aim to strike a balance between theory and practice, between practical and academic. There are reoccurring and consistent themes throughout the entire curriculum that are reinforced, revisited and developed as they progress through the levels. At KS3 for example, when introducing Programming, these concepts are simplified and coded using 'blocks', at KS4 written languages are used, and at KS5 object-orientation is used.

KS3

Whilst students may be well-versed with the usage of Computers and Technology by the end of KS2, they may not be with the formalities of what's involved in providing computing functionality so it is incumbent upon us to draw this out and formalise their existing knowledge and understanding.

Much of KS3 focuses on ensuring that all students have a fundamental, rigorous and academic understanding of hardware, applications, software and programming and techniques.

KS4

Students are introduced to the science of computer science. In that their knowledge of hardware is formalised further, where solidified by introducing (universal) hardware structures that enable computing in all its forms. The inner-workings of the CPU, the important role that registers play, and how communication is facilitated using varying applications of binary.

Students' digital literacy is enhanced by exploring the use of communication protocols, understanding how system software helps manage computer systems, how IDE's can be used to help programming and considering the ethical, legal, cultural and environmental impacts of technology.

Programming expertise is developed by introducing algorithmic rigour, the supposition of Boolean logic, controlling program flow, understanding the various data types and correct or appropriate usage, sanitising input and testing which results in robust and competent programs.

KS5

Inclusive and ambitious - Each lesson is sequenced so that it builds on the learning from the previous lesson, and where appropriate, activities are scaffolded so that all pupils can succeed and thrive.

Scaffolded activities provide pupils with extra resources, such as visual prompts, to reach the same learning goals as the rest of the class.

Exploratory tasks foster a deeper understanding of a concept, encouraging pupils to apply their learning in different contexts and make connections with other learning experiences.

As well as scaffolded activities, embedded within the lessons are a range of pedagogical strategies (defined in the 'Pedagogy' section of this document), which support making computing topics more accessible.

Half Term	Curriculum Content	Assessment(s) (assessment title, duration and approx date)	Extra-Curricular Options (Places to visit; wider reading; clubs to join)		
	Year 7 Curriculum Overview: What will year 7s study and learn this academic year? Why this/ why now?				
Year 7 HT1	Unit Title: Impact of technology - Collaborating online respectfully Students are shown how to use the school network and services appropriately. 1. Welcome to the computing lab 2. Welcome to your workstation 3. Respectful online communication 4. Presenting to an audience part 1 5. Presenting to an audience part 2 6. Who are you talking to?	Summative assessment – Y7 – Impact of Technology – Collaborating Online Respectfully 25 minutes Week 6	https://www.childnet.com/res ources/cyberbullying-guidance- for-schools/ https://learning.anti- bullyingalliance.org.uk/all- modules		
Year 7 HT2	Unit Title: Modelling data – Spreadsheets Students will learn about the wonderful world of spreadsheets and the concept of cell referencing. 1. Getting to know a spreadsheet 2. Quick calculations 3. Collecting data 4. Become a data master! 5. Level up your data skills! 6. Assessment	Year 7 - Modelling Data – Spreadsheet 1 hour Week 12	https://en.wikipedia.org/wiki/ List of forests managed by t he Forestry Commission https://www.forestresearch.go v.uk/tools-and- resources/statistics/statistics- by-topic/public-opinion-of- forestry/		
Year 7 HT3	Unit Title: Networks from semaphores to the Internet Students will learn to define a network and address and be able to state the benefits of networking. 1. Computer networks and protocols 2. Networking hardware 3. Wired and wireless networks 4. The Internet 5. Internet services 6. The World Wide Web	Summative assessment – Networks_ from semaphores to the Internet – Y7 30 minutes Week 18			
Year 7 HT4	Unit Title: Programming essentials in Scratch – part I Students will build confidence and knowledge of the key programming constructs. 1. Introduction to programming and sequencing 2. Sequence and variables 3. Selection	Multiple choice questions – Programming essentials in Scratch – part I – Y7			

	4. Operators	20 minutes	
	5. Count-controlled iteration		
	6. Problem-solving	Week 24	
	Unit Title: Programming essentials in Scratch – part II		
	Students will build on their understanding of the control structures' sequence,	Summative assessment –	
	selection, and iteration (the big three), and develop their problem-solving skills.		
	1. You've got the moves!	Programming essentials in	
Year 7	2. Fly cat, fly!	Scratch_ part II - Y7	
HT5	3. Loop de loop!	30 minutes	
	4. Treasure those lists!	50 minutes	
	5. Translate this! Part 1	Week 30	
	6. Translate this! Part 2	vveek 50	
	Unit Title: Using media – Gaining support for a cause		
	Students will develop a deeper understanding of information technology and digital		
	literacy by using their skills across the unit to create a blog post about a real world	Summative assessment – Using	
	cause that they are passionate about and would like to gain support for.	media – Y7	
Year 7	1. Features of a word processor		
HT6	2. Licensing appropriate images	20 minutes	
	3. The credibility of sources		
	4. Research and plan your blog	Week 36	
	5. Promoting your cause		
	6. Project completion and assessment		

Term	Curriculum Content	Assessment(s) (assessment title, duration and approx date)	Extra-Curricular Options (Places to visit; wider reading; clubs to join)
	rriculum Overview: year 8s study and learn this academic year? Why this/ why now?		
Year 8 HT1	Unit Title: Computing systems Students will learn about the different layers of computing systems - from programs and the operating system, to the physical components that store and execute these programs, to the fundamental binary building blocks that these components consist of. 1. Get in gear 2. Under the hood 3. Orchestra conductor 4. It's only logical 5. Thinking machines 6. Sharing	Summative assessment – Computing systems – Y8 25 minutes Week 6	
Year 8 HT2	Unit Title: Developing for the web Students will learn about 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, learners will investigate how websites are catalogued and organised for effective retrieval using search engines. 1. Website building blocks 2. Words are not enough 3. Taking shortcuts 4. Searching the web 5. Tightening the web 6. Navigating the web	Summative assessment – Developing for the Web – Y8 20 minutes Week 12	
Year 8 HT3	Unit Title: Introduction to Python programming Students will learn develop skills of text-based programming with Python. The lessons form a journey that starts with simple programs involving input and output, and gradually moves on through arithmetic operations, randomness, selection, and iteration. Emphasis is placed on tackling common misconceptions and elucidating the mechanics of program execution. 1. First steps 2. Crunching numbers 3. At a crossroads 4. More branches	Summative assessment – Introduction to Python programming – Y8 50 minutes Week 18	

	5. Round and round		
	6. Putting it all together		
Year 8 HT4	Unit Title: Media – Vector graphics Students will learn how Vector graphics can be used to design anything from logos and icons to posters, board games, and complex illustrations. 1. Get into shapes 2. Paths united 3. Icon challenges 4. What will you make? 5. Under the hood 6. Showcase	Summative assessment – Media – Vector graphics – Y8 30 minutes Week 24	
Year 8 HT5	Unit Title: Mobile app development Students will journey through the entire process of creating their own mobile app, using App Lab from code.org. Building on the programming concepts learners used in previous units, they will work in pairs to perform user research, design their app, write the code for it, before finally evaluating and publishing it for the world to use. 1. App for that 2. Tappy Tap App 3. School Lab Studios 4. User input 5. App development 6. Project completion	Summative assessment – Mobile app development – Y8 20 minutes Week 30	
Year 8 HT6	Unit Title: Representations – from clay to silicon Students will understand how Humans use symbols to record, process and transmit information. We then introduce binary digits to Students as the symbols computers use to perform these tasks and focus on the representation of text and numbers. 1. Across time and space 2. Lights and drums 3. Binary digits 4. Numbers in binary 5. Large quantities 6. Turing's mug	L6 Summative assessment – Representations – from clay to silicon – Y8 30 minutes Week 36	

Term	Curriculum Content	Assessment(s) (assessment title, duration and approx date)	Extra-Curricular Options (Places to visit; wider reading; clubs to join)
	riculum Overview: year 9s study and learn this academic year? Why this/ why now?		
Year 9 HT1	Unit Title: Cybersecurity Students will be taken on a journey of discovery of techniques that cybercriminals use to steal data, disrupt systems, and infiltrate networks. The Students will start by considering the value their data holds and what organisations might use it for. They will then learn about social engineering and other common cybercrimes, and finally look at methods to protect against these attacks. 1. You and your data 2. Social engineering 3. Script kiddies	Summative assessment – Cyber security – Y9 25 minutes	
	 4. Rise of the bots 5. There's no place like 127.0.0.1 6. Under attack 	Week 6	
Year 9 HT2	Unit Title: Data science Students will be introduced to data science, and by the end of the unit they will be empowered by knowing how to use data to investigate problems and make changes to the world around them. Students will be exposed to both global and local data sets and gain an understanding of how visualising data can help with the process of identifying patterns and trends. 1. Delving into data science 2. Global data 3. Statistical state of mind 4. Data for action 5. Clean it up 6. Make a change	Summative assessment – Data science – Y9 20 minutes Week 12	
Year 9 HT3	Unit Title: Media – Animations Students will learn how films, television, computer games, advertising, and architecture have been revolutionised by computer-based 3D modelling and animation. In this unit Students will discover how professionals create 3D animations using the industry-standard software package, Blender.	Project 1 hour Week 18	

	 Move, rotate, scale, colour Animation, names, parenting Complex models and colours Organic modelling Lights, camera, render Project 		
Year 9 HT4	Unit Title: Physical computing Students will apply and enhance their programming skills in a new engaging context: physical computing, using the BBC micro:bit. 1. Hello physical world 2. Bare bones 3. Connections 4. Dream it up 5. Build it up 6. Wrap it up	Summative assessment – Physical computing – Y9 45 minutes Week 24	
Year 9 HT5	Unit Title: Python programming with sequences of data Students will learn how data can be represented and processed in sequences, such as lists and strings. 1. Warm up 2. Playlist 3. In a while, crocodile 4. The famous for 5. Make a thing 6. Wrap up	Summative assessment – Python programming with sequences of data – Y9 25 minutes Week 30	
Year 9 HT6	Unit Title: Representations – going audio-visual Students will develop skills of making digital media such as images and sounds, and discover how media is stored as binary code. 1. Binary mosaic 2. A splash of colour 3. Collage 4. Good vibrations 5. Sonic playground 6. Always another way	Summative assessment – Representations – going audiovisual – Y9 40 minutes Week 36	

Term	Curriculum Content	Assessment(s) (assessment title, duration and approx date)	Extra-Curricular Options (Places to visit; wider reading; clubs to join)
What will y	urriculum Overview: year 10s study and learn this academic year? Why this/ why now? year Students are taught the 'science' in Computer Science, working from the Processor up understanding of the Subject.		
Year 10 HT1	 Unit Title: Students will learn about the inner workings of a CPU, internal components that make up a Computer and how Memory and Storage (in particular) interact to provide a stable computing platform. Students will also have the opportunity to develop their Programming prowess. SLR1.1 Systems Architecture SLR1.2 Memory and Storage Programming 	Continual, formative, in-class assessment and feedback End of 1.1 Topic Test - Week 4	PG Online Resources Course Textbook Craig & Dave Videos Quizlet OAK National
Year 10 HT2	 Unit Title: Students will learn about the intricacies of Memory and Storage, how data is stored and manipulated in the digital realm. The Students will also learn the rudimentary operation of Computer Networks from a hardware perspective. Students will also have the opportunity to develop their Programming prowess. SLR1.2 Memory and Storage SLR1.3 Computer Networks – Connections and Protocols Programming 	Continual, formative, in-class assessment and feedback End of 1.2 Topic Test - Weeks 8 & 12 (two-parts)	PG Online Resources Course Textbook Craig & Dave Videos Quizlet OAK National
Year 10 HT3	 Unit Title: Students will develop their understanding of Computer Networks further by considering and exploring the use of Protocols and various, industry-standard, networking protocols and procedures. Students will also have the opportunity to develop their Programming prowess. SLR1.3 Computer Networks – Connections and Protocols SLR1.4 Network Security Programming 	Continual, formative, in-class assessment and feedback End of 1.3 Topic Test - Week 17 End of 1.4 Topic Test - Week 20	PG Online Resources Course Textbook Craig & Dave Videos Quizlet OAK National
Year 10 HT4	Unit Title: Students will develop skills of essential Systems Software that enable Technicians to manage the equipment. Students also consider the Ethical, Legal and Cultural issues	Continual, formative, in-class assessment and feedback End of 1.5 Topic Test - Week 24	PG Online Resources Course Textbook Craig & Dave Videos Quizlet

	that have arisen due to the adoption of Computing, per se. Students will also have the opportunity to develop their Programming prowess. • SLR1.5 Systems Software • SLR1.6 Ethical, Legal and Cultural • Programming	End of 1.6 Topic Test - Week 27	OAK National
Year 10 HT5	Unit Title: Students are exposed to typical Algorithms that are ubiquitous and therefore essential to their advancement of the Subject. Students will also have the opportunity to develop their Programming prowess. SLR2.1 Algorithms Programming	Continual, formative, in-class assessment and feedback	PG Online Resources Course Textbook Craig & Dave Videos Quizlet OAK National
Year 10 HT6	Unit Title: Students analyse commonly used programming constructs that enable them to better understand and efficiently implement such techniques. Students will also have the opportunity to develop their Programming prowess by creating a text-based game. SLR2.1 Algorithms SLR2.2 Programming Fundamentals Text Adventure Game	Continual, formative, in-class assessment and feedback End of 2.1 Topic Test - Week 37	PG Online Resources Course Textbook Craig & Dave Videos Quizlet OAK National

Term	Curriculum Content	Assessment(s) (assessment title, duration and approx date)	Extra-Curricular Options (Places to visit; wider reading; clubs to join)
What will Having lea	urriculum Overview: year 11s study and learn this academic year? Why this/ why now? Into the fundamentals in Year 10, Students will now apply their knowledge to higher-order tand productively apply their knowledge to work of their own choosing.		
Year 11 HT1	 Unit Title: Students will further develop their 'fundamental' programming constructs whilst also learning how to make their programs more robust. By understanding Boolean Logic better, Students will then be better placed to create useful and efficient programs. SLR2.2 Programming Fundamentals SLR2.3 Producing Robust Programs SLR2.4 Boolean Logic 	Continual, formative, in-class assessment and feedback End of 2.2 Topic Test - Week 2 End of 2.3 Topic Test - Week 5	PG Online Resources Course Textbook Craig & Dave Videos Quizlet OAK National
Year 11 HT2	 Unit Title: Students will be taught appropriate methods for applying Boolean Algebra to their programs and how to use the features of IDE's to their advantage / benefit. SLR2.4 Boolean Logic SLR2.5 Programming Languages and IDE's 	Continual, formative, in-class assessment and feedback End of 2.4 Topic Test - Week 8 End of 2.5 Topic Test - Week 12	PG Online Resources Course Textbook Craig & Dave Videos Quizlet OAK National
Year 11 HT3	 Unit Title: Examination Preparation Students will review the course content, developing their understanding by completing SLR's and prepare for impending Examinations by answering carefully curated past examination questions. Revision Exam Technique 	SLR's	PG Online Resources Course Textbook Craig & Dave Videos Quizlet OAK National
Year 11 HT4	Unit Title: Examination Preparation Students will review the course content, developing their understanding by completing SLR's and prepare for impending Examinations by answering carefully curated past examination questions. Revision Exam Technique	SLR's	PG Online Resources Course Textbook Craig & Dave Videos Quizlet OAK National
Year 11 HT5	Unit Title: Examination Preparation	SLR's	PG Online Resources Course Textbook Craig & Dave Videos

Students will review the course content, developing their understanding by completing	Quizlet
SLR's and prepare for impending Examinations by answering carefully curated past	OAK National
examination questions.	
Revision	
Exam Technique	

Term	Curriculum Content	Assessment(s) (assessment title, duration and approx date)	Extra-Curricular Options (Places to visit; wider reading; clubs to join)
	urriculum Overview: year 12s study and learn this academic year? Why this/ why now?		
Year 12 HT1	Unit Title: Students will learn about the intricacies of the CPU (LMC) and understand how the various components of the CPU interact and communicate, appreciating the role of Buses, Registers and the like. Students will understand that there are two main Processor Architectures out there, and that modern Processors will borrow from either Architecture to better achieve its goal. Students will also develop their programming ability through a range of structured activities. SLR1 Structure and Function of the Processor SLR2 Types of Processor Programming Practice	End-of-Topic Tests: SLR1 Structure and Function of the Processor – Wk5 SLR2 Types of Processor – Wk6	PG Online Resources Course Textbook Craig & Dave Videos Quizlet Isaac Computer Science https://www.101computing.ne t/LMC/
Year 12 HT2	Unit Title: Students will learn how data is captured, manipulated, output and stored. They will then learn how data can take various forms and the appreciate the implications of interpretation. Students will also learn advanced Boolean Algebra that will allow them to develop efficient code and explore operating systems and systems software to better understand the processes involved. Students will also develop their programming ability through a range of structured activities. SLR3 Input, Output and Storage SLR13 Data Types SLR15 Boolean Algebra SLR4 Operating Systems and Systems Software Programming Practice	End-of-Topic Tests: SLR3 Input, Output and Storage – Wk8 SLR13 Data Types – Wk10 SLR15 Boolean Algebra – Wk12 SLR4 Operating Systems and Systems Software – Wk14	PG Online Resources Course Textbook Craig & Dave Videos Quizlet Isaac Computer Science
Year 12 HT3	Unit Title: Students will appreciate how Legislation has had to adapt to the everchanging technological world by analysing appropriate legislation and exploring case studies. Students will also learn the stages of compilation that allow source code generate object code. Students will also consider different software methodologies, appreciating their strengths and weaknesses.	End-of-Topic Tests: SLR16 Computer Related Legislation — Wk17 SLR5 Application Generation — Wk19 SLR6 Software Development — Wk20 SLR10 Databases — Wk21	PG Online Resources Course Textbook Craig & Dave Videos Quizlet Isaac Computer Science

	Students will also learn about databases, create their own and learn SQL by manipulating this Database. Students will also develop their programming ability through a range of structured activities. SLR16 Computer Related Legislation SLR5 Application Generation SLR6 Software Development SLR10 Databases Programming Practice		
Year 12 HT4	Unit Title: Students will examine networks and extend this knowledge into web technologies to better appreciate the interaction between the two, and therefore the wealth of facility provided. They will then consider the ethical, moral and cultural issues that arise when delivering services globally. Data structures builds on their Database knowledge acquired last HT. Students will also develop their programming ability through a range of structured activities. SLR11 Networks SLR12 Web Technologies SLR17 Ethical, Moral and Cultural Issues SLR14 Data Structures SLR8 Introduction to Programming	End-of-Topic Tests: SLR11 Networks – Wk23 SLR12 Web Technologies – Wk24 SLR17 Ethical, Moral and Cultural Issues – Wk25 SLR14 Data Structures – Wk26	PG Online Resources Course Textbook Craig & Dave Videos Quizlet Isaac Computer Science
Year 12 HT5	Unit Title: Students will learn about how professional programmers apply certain techniques, appropriate for the task, to develop programs that satisfy the needs of their clients. SLR23 Programming Techniques SLR18 Thinking Abstractly SLR19 Thinking Ahead SLR20 Thinking Procedurally SLR21 Thinking Logically SLR25 Algorithms	End-of-Topic Tests: SLR18 Thinking Abstractly – Wk28 SLR19 Thinking Ahead – Wk29 SLR20 Thinking Procedurally – Wk30 SLR21 Thinking Logically – Wk31	PG Online Resources Course Textbook Craig & Dave Videos Quizlet Isaac Computer Science
Year 12 HT6	 Unit Title: Students will revise for their PPE Examination by completing Craig and Dave SLR's. Once the PPE is complete, the Students will then prepare for their Unit 3 Project which is worth 20% of their final grade. Revision Yr13 Course Introduction and preparation for Unit 3 - Project 	PPE Examination	PG Online Resources Course Textbook Craig & Dave Videos Quizlet Isaac Computer Science

Term	Curriculum Content	Assessment(s) (assessment title, duration and approx date)	Extra-Curricular Options (Places to visit; wider reading; clubs to join)
	urriculum Overview: year 13s study and learn this academic year? Why this/ why now?		
Year 13 HT1	Unit Title: Students will recap SLR's 1-6 from Yr12 as it nicely dovetails into SLR7 where Students will investigate several Programming Languages. In SLR9, they will also learn about different Compression, Encryption and Hashing techniques, appreciating their advantages and disadvantages and likely scenarios where to use them. SLR1 - 6 recap SLR7 Types of Programming Language SLR9 Compression, Encryption and Hashing Project: Definition and Analysis	End-of-Topic Test: SLR7 Types of Programming Language – Wk6 SLR9 Compression, Encryption and Hashing – Wk7	PG Online Resources Course Textbook Craig & Dave Videos Quizlet Isaac Computer Science
Year 13 HT2	Unit Title: Students will learn about Databases, Networks and Web Technologies that synergise around the representation of data, and their transmission and storage. SLR10 Databases SLR11 Networks SLR12 Web Technologies SLR13 Data Types Project: Design and Development	PPE Assessment	PG Online Resources Course Textbook Craig & Dave Videos Quizlet Isaac Computer Science
Year 13 HT3	 Unit Title: Students will further develop their understanding of Boolean Algebra and revisit SLR's 16 Computer Related Legislation & 17 Ethical, Moral and Cultural Issues. SLR15 Boolean Algebra SLR 16 & 17 Recap Project: Development 	End-of-Topic Test: SLR14 Data Structures - Wk17	PG Online Resources Course Textbook Craig & Dave Videos Quizlet Isaac Computer Science
Year 13 HT4	Unit Title: Students will revise SLR's 18-23 and be introduced to Computational Methods (efficient algorithms) that achieve a variety of tasks.	End-of-Topic Test: SLR24 Computational Methods – Wk26	PG Online Resources Course Textbook Craig & Dave Videos

	• SLR18 – 23 Recap		Quizlet
	SLR24 Computational Methods		Isaac Computer Science
	Project: Development		
Year 13 HT5	Unit Title:	End-of-Topic Test: SLR26 Algorithms – Wk32	PG Online Resources
	Students will recap SLR25 and will code the efficient algorithms of SLR24.		Course Textbook
	SLR25 Recap		Craig & Dave Videos
	SLR26 Algorithms		Quizlet
	Project: Evaluation		Isaac Computer Science