

YEAR 12 COMPUTER SCIENCE CURRICULUM PROGRESSION OVERVIEW

Subject Curriculum Intent

Develop skills and understanding of computer systems, including computer hardware, software, networks and computer programming. Prepare students for potential further study in the field of computer science, or to be able to apply the principles of computer science in a range of other fields.

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	<ul style="list-style-type: none"> Programming principles Number Theory 	<ul style="list-style-type: none"> Programming structures Binary Representation 	<ul style="list-style-type: none"> Essential data structures Logic and Architecture 	<ul style="list-style-type: none"> Advanced programming techniques Hardware 	<ul style="list-style-type: none"> Data structures Networking and Communication 	<ul style="list-style-type: none"> Essential algorithms NEA Analysis Privacy, Environmental, Cultural, Ethical and Legal Issues
Core Knowledge/ Threshold Concept	<ul style="list-style-type: none"> Reading and predicting existing programs Editing and improving code Using the Console in Java Set Theory Binary & Hexadecimal conversion Binary Arithmetic 	<ul style="list-style-type: none"> Selection Iteration Arrays Following trace tables Binary Representation of Images Binary Representation of Sound Binary Representation of Text Error Checking Compression Encryption 	<ul style="list-style-type: none"> Multi-dimensional arrays File handling Records Logic Gates, Truth Tables, Logic Circuits and Expressions Adders and Boolean Algebra Harvard vs. Vonn Neumann Architecture Fetch – Decode – Execute cycle 	<ul style="list-style-type: none"> Recursion Structured programming Object-oriented programming CPU Performance Factors Storage Technologies Instructions Sets, Addressing Modes and Assembly Code Peripheral principles of operation 	<ul style="list-style-type: none"> Graphs Trees Stacks Queues Dictionaries Communication methods and principles Communication Hardware and Topologies Wireless vs. Wired networking The Client Server Model 	<ul style="list-style-type: none"> Searching algorithms Sorting algorithms Graph traversal Tree traversal Utilities, Translators and Languages Computing Legislation Privacy and Censorship Concerns
Why this learning now?	Support all students no matter their background in getting to grips with a new	Build on previous practice to develop problem solving skills.	Allow students to manage and manipulate data,	Ensure that students have experience of programming in a range of styles, in	Theory of data structures is essential before investigating how to manipulate	Students can apply their theoretical knowledge of data

	<p>programming language.</p> <p>A fundamental understanding of Binary and number theory is essential for all parts of the post-16 course.</p>	<p>Shows how the use of Binary facilitates the operation of other familiar parts of computing.</p>	<p>adding to their prior skillset.</p> <p>Logic is another fundamental that underpins many programming concepts. Architecture will help students understand why modern devices are built in a particular way.</p>	<p>preparation for mocks and NEA.</p> <p>Expansion of knowledge from Architecture to grasp how other components of a computer system interact with the CPU.</p>	<p>data using those data structures.</p> <p>Understanding modern networks requires are grounding of the limitations of current technologies as well as techniques used in the past that have to be adapted to the modern world.</p>	<p>structures to build complex programs.</p> <p>Students begin NEA so they have time to explore and develop their ideas over the summer.</p> <p>Coverage of Software to complement the Hardware heavy content up to this point.</p> <p>Exploration of 'bigger picture' issues to broaden students perception of Computing's impact on society.</p>
Assessment Opportunities:	<ul style="list-style-type: none"> Written exam-style assessments of theory content Practical programming activities 	<ul style="list-style-type: none"> Written exam-style assessments of theory content Practical programming activities 	<ul style="list-style-type: none"> Written exam-style assessments of theory content Practical programming activities 	<ul style="list-style-type: none"> Written exam-style assessments of theory content Practical programming activities 	<ul style="list-style-type: none"> Written exam-style assessments of theory content Practical programming activities 	<ul style="list-style-type: none"> Written exam-style assessments of theory content Practical programming activities
Learning at Home	<ul style="list-style-type: none"> Regularly set home learning activities based on cementing the knowledge taught throughout the year Independent programming tasks to reinforce the knowledge of syntax and problem-solving capabilities taught through programming, primarily using Java 					

Key Vocabulary	<ul style="list-style-type: none"> • Syntax • Debug • Library • Binary • Hexadecimal • 2's Complement 	<ul style="list-style-type: none"> • Selection • Iteration • Immutable • Bitmap • Sample • Character Set 	<ul style="list-style-type: none"> • Nested • Buffer • Record • Fetch • Decode • Execute 	<ul style="list-style-type: none"> • Recursion • Class • Object • Encapsulation • Magnetic • Optical • Solid State 	<ul style="list-style-type: none"> • Graph • Tree • Hash • Serial • Parallel • Server 	<ul style="list-style-type: none"> • Efficiency • Robust • Complexity • Compiler • Declarative • Software
Spiritual, Moral, Social and Cultural concepts covered	<ul style="list-style-type: none"> • Understanding why computer problems occur and identifying strategies for solving them • Consideration of the moral, environmental, legal and cultural consequences of computing • Developing solutions to solve real-world problems 					
Links to careers and the world of work	<ul style="list-style-type: none"> • Understanding of how computer hardware choices impact suitability for a range of tasks • Practical experience with computer networks and solving computer problems • Developing a fundamental grounding in computer science concepts that can support a wide range of careers • Practical problem solving techniques that apply to programming, but also to the wider world 					

YEAR 12 BTEC IT CURRICULUM PROGRESSION OVERVIEW

Subject Curriculum Intent

Develop skills and understanding in the use of information technology. Students should become more competent and independent users of IT systems. This includes data manipulation using both spreadsheets and databases, understanding how to use social media to support an agenda and gaining knowledge in a range of IT infrastructure.

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	<ul style="list-style-type: none"> Unit 1: Hardware Unit 3: Impact of social media 	<ul style="list-style-type: none"> Unit 1: Software Unit 3: Business uses and Assignment 	<ul style="list-style-type: none"> Unit 1: Networking Unit 3: Develop a plan to meet requirements 	<ul style="list-style-type: none"> Unit 1: The Internet Unit 3: Implement plan and Assignment 	<ul style="list-style-type: none"> Unit 1: Legislation 	<ul style="list-style-type: none"> Final exam
Core Knowledge/ Threshold Concept	Unit 1: <ul style="list-style-type: none"> ICT Systems Digital Devices Peripherals and Assistive Technology Emerging Technology Unit 3: <ul style="list-style-type: none"> Identification of developments in social media Content / formats / features Risks & Issues 	Unit 1: <ul style="list-style-type: none"> Application Software Operating Systems and User Interfaces Utilities Unit 3: <ul style="list-style-type: none"> Content creation Advertising / Linking / Profiles and relationships Developing an audience Viral Assignment 	Unit 1: <ul style="list-style-type: none"> Networking Models Network Hardware Network Performance Unit 3: <ul style="list-style-type: none"> Social media planning Business requirements Content planning and publishing Developing a social media policy 	Unit 1: <ul style="list-style-type: none"> Network Protocols Network Security Unit 3: <ul style="list-style-type: none"> Account creation Implementation of online community building Data gathering Analysis Skills, knowledge and behaviours 	Unit 1: <ul style="list-style-type: none"> Data Protection Computer Misuse Copyright, Designs and Patents Software Licensing Accessibility and Equality Ergonomics Customer Interaction and Feedback 	
Why this learning now?	Ensuring all students have secure grounding in the practical aspects of IT Systems	Continuation of building a solid foundation of IT	Having grasped how computers are built and operate, exposing students to the	Further building on understanding of networking. Giving students an insight	Students use their knowledge of IT Systems and Networking and frame	

	<p>regardless of background or prior knowledge.</p> <p>Understanding of the impacts of social media and how to minimise negatives.</p>	<p>Systems with a focus on the non-physical.</p> <p>Preparation for Assignment 1.</p>	<p>concept and realities of how computers operate together and can be used to collaborate puts context to many of their everyday interactions with digital devices.</p> <p>Deeper consolidation of key concepts. Identification of aspects relative to successful campaigns.</p>	<p>into the more complex aspects of networking provide them with an appreciation of those who deal with networks on a daily basis.</p> <p>Further understanding of the nature of social media in a business context to aid understanding in preparation of Assignment 2.</p>	<p>it in the concept of the 'bigger issues' that dictate how devices are used within businesses and the wider world and how these technologies are controlled through legislation.</p>	
Assessment Opportunities:		Unit 3 Task 1 Deadline		Unit 3 Task 2 Deadline		Unit 1 exam
Learning at Home	<ul style="list-style-type: none"> Students to research successful social media campaigns and understand the reasons as to the failure of other campaigns. Data analysis tools specific to social media. 					
Key Vocabulary	<ul style="list-style-type: none"> System Peripheral Storage Platform Community Risks Dangers Hashtag 	<ul style="list-style-type: none"> Operating System User Interface Utility Software Viral Campaign Audience Community 	<ul style="list-style-type: none"> Topology Router Bandwidth Policy Ethical Promotion 	<ul style="list-style-type: none"> Protocol Malware Firewall Insights Monitoring Feedback 	<ul style="list-style-type: none"> Unauthorised Access Ergonomics Accessibility Open Source Proprietary Copyright Creative Commons 	<ul style="list-style-type: none">

Spiritual, Moral, Social and Cultural concepts covered	<ul style="list-style-type: none"> • Impact on social media on society and culture • Positive and negative consequences of IT in a variety of contexts
Links to careers and the world of work	<ul style="list-style-type: none"> • Social media is amongst the most widely used communication tools in society and business.

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	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	<ul style="list-style-type: none"> NEA Internet Structure and Operation 	<ul style="list-style-type: none"> Databases Networking Protocols 	<ul style="list-style-type: none"> Functional Programming Network Security, Threats and Countermeasures 	<ul style="list-style-type: none"> Skeleton Code Regular Languages and Big Data 	<ul style="list-style-type: none"> Final revision and preparation 	<ul style="list-style-type: none"> Exams
Core Knowledge/ Threshold Concept	<ul style="list-style-type: none"> Design documentation Modelling Robust programming techniques Recap of Communication Basics Internet Backbone Domain Name System 	<ul style="list-style-type: none"> Relational databases Normalisation SQL TCP/IP Stack Application Layer Protocols Subnet Masking, Network Address Translation and Port Forwarding 	<ul style="list-style-type: none"> Function composition Function application List processing Asymmetric Encryption Digital Signatures Digital Certificates Malware Firewalls 	<ul style="list-style-type: none"> Reading the skeleton code Decomposition Strategies for development Backus-Naur Form Regular Expressions Challenges of Big Data Solutions to Big Data 	<ul style="list-style-type: none"> Revision of all topics 	
Why this learning now?	<p>Further develop NEA ideas from the summer term and complete design and development sections.</p> <p>Student use of the Internet is ubiquitous but they need to</p>	<p>Practical database activities to further strengthen theory-based knowledge.</p> <p>Continuation from previous half term.</p>	<p>Adding a third programming paradigm and helping students with their appreciation of how to process Big Data.</p> <p>Continuation of previous half term. Students recognise a</p>	<p>Significant element of the on-screen paper 1 exam.</p> <p>As a follow on from learning about the complexities of the modern Internet, Big Data gives students an appreciation of the</p>	<p>Final preparation for exams</p>	

	understand the complexities.		large proportion of Security terminology without fully understanding the complexities.	challenges facing Networking professionals in the real world.		
Assessment Opportunities:	<ul style="list-style-type: none"> • Written exam-style assessments of theory content • Practical programming activities • Timed assessments both on-screen (paper 1) and paper (paper 2) • NEA (worth 20% of final grade) 					<ul style="list-style-type: none"> • Final exam
Learning at Home	<ul style="list-style-type: none"> • Regularly set home learning activities based on cementing the knowledge taught throughout the year • Independent programming tasks to reinforce the knowledge of syntax and problem-solving capabilities taught through Python programming 					
Key Vocabulary	<ul style="list-style-type: none"> • Modelling • DFD • Lifecycle • DNS • Fibre Optic • Coaxial 	<ul style="list-style-type: none"> • Normalisation • Primary Key • Foreign Key • Application • Transport • Network • Physical 	<ul style="list-style-type: none"> • Composition • Application • Asymmetric • Virus • Firewall 	<ul style="list-style-type: none"> • Varies according to contextual content of the skeleton code • Volume • Velocity • Variety 		
Spiritual, Moral, Social and Cultural concepts covered	<ul style="list-style-type: none"> • Understanding why computer problems occur and identifying strategies for solving them • Consideration of the moral, environmental, legal and cultural consequences of computing • Developing solutions to solve real-world problems 					

**Links to
careers and
the world of
work**

- Understanding of how computer hardware choices impact suitability for a range of tasks
- Practical experience with computer networks and solving computer problems
- Developing a fundamental grounding in computer science concepts that can support a wide range of careers
- Practical problem solving techniques that apply to programming, but also to the wider world

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	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	<ul style="list-style-type: none"> Unit 2: Data Structures Unit 5: Spreadsheet basics 	<ul style="list-style-type: none"> Unit 2: Validation Unit 5: Assignment & Spreadsheet modelling 	<ul style="list-style-type: none"> Unit 2: Queries/Reports Unit 5: Spreadsheet Modelling 	<ul style="list-style-type: none"> Unit 2: Forms Unit 5: Spreadsheet design and interpretation 	<ul style="list-style-type: none"> Unit 2: Exam Unit 5: Assignment 	<ul style="list-style-type: none"> Exams
Core Knowledge/ Threshold Concept	<p>Unit 2:</p> <ul style="list-style-type: none"> Introduction to relational databases Data normalisation Entity Relationship diagrams Tables, fields & records Data types Primary & foreign keys <p>Unit 5:</p> <ul style="list-style-type: none"> Spreadsheet fundamentals Entering and formatting data Considering alternatives 	<p>Unit 2:</p> <ul style="list-style-type: none"> Validation types Creating & evidencing validation rules <p>Unit 5:</p> <ul style="list-style-type: none"> Functions & formulae Data validation Output requirements Processing features Assignment 	<p>Unit 2:</p> <ul style="list-style-type: none"> Simple queries Sorting & grouping Totals queries Expressions Functions <p>Unit 5:</p> <ul style="list-style-type: none"> Deeper functions and formulae (logical / nested IF / VLOOKUP) Conditional formatting Absolute cell referencing 	<p>Unit 2:</p> <ul style="list-style-type: none"> Form wizard Form validation Adding buttons User interface Re-query Lookups <p>Unit 5:</p> <ul style="list-style-type: none"> Worksheet structure diagrams Test planning Reviewing and refining 	<p>Unit 2:</p> <ul style="list-style-type: none"> Final revision <p>Unit 5:</p> <ul style="list-style-type: none"> Assignment 	

	<ul style="list-style-type: none"> Accuracy of data 					
Why this learning now?	<p>Understanding the fundamentals of data structures and their component parts is crucial to being able to build effective databases.</p> <p>Grounding in the basics of spreadsheet skills and design.</p>	<p>Progression to explore how data can be assigned rules to ensure accuracy.</p> <p>Understanding of purpose and advantages of modelling in preparation of Assignment 1.</p>	<p>Progression in to using data structures to produce information</p> <p>Developing on understanding of basics in spreadsheets in preparation of producing own working model.</p>	<p>Developing effective user interfaces to enable data processing</p> <p>Consolidating further on knowledge and develop wider understanding of the nature of modelling.</p>	<p>Exam takes place late April/early May</p> <p>Hand in Spreadsheet assignment</p>	
Assessment Opportunities:		Unit 5 Task 1 Deadline		Unit 5 Task 2 Deadline	Unit 2 exam	
Learning at Home	<ul style="list-style-type: none"> Past papers available on Satchel:One to enable students to practice data normalisation and design If students have access to correct software, they are able to practice the database skills. Correct software available through school accounts, extension and consolidation tasks available. 					
Key Vocabulary	<ul style="list-style-type: none"> Table Field Record Data type Currency 	<ul style="list-style-type: none"> Type Format Input mask Validation Range List Lookup Length Presence 	<ul style="list-style-type: none"> Query Criteria Sort Ascend/Descend Expression Function 	<ul style="list-style-type: none"> Combo Lookup Validation Verification Append Macro Event 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none">

Spiritual, Moral, Social and Cultural concepts covered	<ul style="list-style-type: none"> • Issues relating to data protection and GDPR • Consideration of the consequences for automated and semi-automated data processing
Links to careers and the world of work	<ul style="list-style-type: none"> • Spreadsheet skills sought after in many industries and office based environments.