**The Nottingham Emmanuel School – Computer Science & ITCurriculum Map (2022-2023)**

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| **Intent statement** | To develop a love of learning in Computer Science, enabling students to explore the world of Computer Science & IT beyond that of just their ‘classroom curriculum’ experience, whilst providing the support they need individually within the classroom. In doing so, helping students identify the role of the subject in the wider community and raise their aspirations regarding progression within this sector. |
| **Diversity across the curriculum** | Our curriculum represents the diversity of our students by celebrating a diverse group of pioneers within the Computer Science sector along with understanding how technology can be utilised to meet the needs of all IT users. |
|  | **AUT 1** | **AUT 2** | **SPR 1** | **SPR 2** | **SUM 1** | **SUM 2** |
| Year 7 | **Title and objectives** | **7.1 – IT Fundamentals** | **7.2 – CS Fundamentals** | **7.3 – Algorithms** | **7.4 – Computer Graphics** | **7.5 – Computer Basics** | **7.6 – Computational Thinking** |
| **Core knowledge** | Introduction to IT @ NESKey IT Software Skills including: Microsoft Teams and E-MailFile Management SkillsUsing the InterneteSafety | What is a computer system?Input DevicesOutput DevicesStorage Devices inc. the CloudData RepresentationBinary & Denary Number Systems | What is an algorithm?Importance of InstructionsSequence & SelectionBlock based programmingFlowchartsWritten Algorithms | Types of Images – Bitmap vs. VectorImage File TypesPixels and ResolutionQuality of an Image | History of ComputersComputer Science PioneersComputer Science CareersComputer Components | Problem Solving TasksDecompositionAbstractionPattern RecognitionAlgorithmic Design |
| **Skills** | Using the school IT systems. | Identifying and selecting suitable devices.Converting to/from BinaryBinary Addition  | Creating scenario based written and flowchart algorithms.Solving mathematical problems using algorithms. | Design a digital image using binary values.Selecting a suitable image type based on a scenario. | Select suitable skills required for different career pathways.Identify and describe computer components. | Breaking down problems.Simplifying problems.Using patterns to create effective solutions to problems. |
| **Covid recovery** | This unit is usually taught in a non-covid year but time being taken cover the key IT fundamental skills whilst assessing the student’s level of IT use. |  |  |  |  |  |
| **Careers** |  |  |  |  | Lessons highlighting career pathways within the CS & IT sector and the skills associated with them. |  |
| Year 8 | **Title and objectives** | **8.1 – CS Fundamentals** | **8.2 – Programming in Python** | **8.3 – Spreadsheets** | **8.4 – Memory & Storage** | **8.5 – Networks & Security** | **8.6 – Product Development** |
| **Core knowledge** | Re-cap of Year 7 content.> CS Fundamentals> Computer Graphics> Computer Basics> Computational Thinking | Introduction to PythonBasic Input/OutputBasic Data TypesConcept of Sequence & Selection | Introduction to Microsoft ExcelKey Spreadsheet ComponentsFormulae & Functions  | Primary Memory (RAM & ROM) Virtual MemorySecondary Storage Devices | Types of NetworksSecurity ThreatsSecurity Prevention Techniques | Design ToolsIntroduction to the concept of Augmented Reality (AR) and Virtual Reality (VR) and their uses.Designing a basic AR application. |
| **Skills** | Revision techniques.Resilience & Independence | Creating simple text-based programs.Use a small range of data types in suitable situations.Describe the difference between sequence and selection | Writing simple formulas using arithmetic operators and functions. | Describe the purposes of RAM, ROM and Virtual MemorySelect a suitable storage device from a range of options. | Matching security prevention techniques to a range of threats. | Developing products using professional planning documents.Planning and designing AR programs. |
| **Covid recovery** | This unit has been developed to re-cap topics covered in Year 7 to help cover any gaps in knowledge. Students are then assessed on their current understanding of the content at the end of the half term. |  |  |  |  |  |
| **Careers** |  |  |  |  | Exploring the job roles within Cyber Security – one of the fastest growing sectors. Examining the employability skills required for these roles. |  |
| Year 9 Computer Science Pathway | **Title and objectives** | **9.1 - Number Systems** | **9.2 - Representing Data** | **9.3 - Programming A** | **9.4 - Memory and storage** | **9.5 - Networks A** | **9.6 - Programming B** |
| **Core knowledge** | Units of storageNumber SystemsBinary/Denary/Hex | Character setsImage file SizesSound file sizes.Compression | Data typesAdvanced mathematical operatorsApplying selectionCombining core concepts to create complex programs | Characteristics of Primary and Secondary storage.Benefits and limitations of Virtual MemoryApplications of Secondary Storage | Performance of NetworksP2P/Client ServerNetwork HardwareThe InternetNetwork Topologies | String ManipulationIteration |
| **Skills** | Convert between data storage units.Binary Addition/ShiftsConvert between Denary/Binary/Hexadecimal number systems | Select and justify a suitable character set for a given scenario.Calculate Image file sizes.Calculate sound file sizes.Select and justify suitable compression methods for a given scenario | Apply the full range of data types to suitable scenarios.Solve problems using a range of advanced mathematical operators.Apply selection effectively within a program. | Justify the need for primary and secondary storage.Recommend and justify the use of virtual memory based on a given scenario.Select and justify the use of a wide range of storage devices for given scenarios. | Describe common limiting factors impacting networks.Justify the use of different network configurations for given scenarios.Create a detailed diagram depicting different network topologies. | Use various techniques to style and alter strings in a program.Use count-controlled and condition-controlled loops as part of a functional program.  |
| **Covid recovery** | Although there has been no direct disruption to this pathway, we acknowledge students may have has an interrupted education during the pandemic and take this into account throughout the year and when teaching content that relies on knowledge previously taught in Years 7 & 8. |
| **Careers** | Careers Case Study 1 – Hardware Engineer |  | Careers Case study 2 – Software Engineer |  | Careers Case study 3 – Network Technician | Careers summary – Which is the most appealing case study? What skills do you have that match? What further skills are required? What is the best pathway to get there and where can I find out more? |
| Year 9 IT Pathway | **Title and objectives** | **9.1 - Design Tools Basics** | **9.2 - Spreadsheet Skills** | **9.3 – Augmented Reality** | **9.4 – Internet of Everything (IoE)** | **9.5 – The Connected World** | **9.6 - Manipulation using a spreadsheet** |
| **Core knowledge** | Types of Design Tools:Flowcharts, Mind maps, Visualisation diagrams and Wireframes | Using a range of spreadsheet tools and techniques to create a solution | Understanding the concept of Augmented Reality (AR) and being able to use software to plan design an AR solution | Understanding the link between IoE and the World Wide Web (WWW).Some of the latest emerging technologies. | Characteristics of wired and wireless connectivity channels such as 4G, 5G, Bluetooth, Mobile Wi-Fi hotspots and wired connections. | Design tools used to plan spreadsheets solutions.Planning and presenting a spreadsheet solution based on a given scenario. |
| **Skills** | Knowing the components if each design tool and the software that can be used for each of them.Selecting the correct design tool for a specified need. | Basic formattingArithmetic operatorsFormulasGraphs/ChartsFunctions | The different types of ARMaking use of assets, triggers and layers using AR software. | Knowing the four pillars of the IoE and understanding how they interact with each other. | To be able to consider/select a suitable connection method based on a given scenario. | Planning and creating spreadsheets to include key features such as: layout, navigation, content, validation and functions such as IF statements. |
| **Covid recovery** | Although there has been no direct disruption to this pathway, we acknowledge students may have has an interrupted education during the pandemic and take this into account throughout the year and when teaching content that relies on knowledge previously taught in Years 7 & 8. |
| **Careers** |  | Careers Case Study 1 – Spreadsheet Specialist/Data Analyst | Careers Case study 2 –App Developer |  | Careers Case study 3 – Network Technician | Careers summary – Which is the most appealing case study? What skills do you have that match? What further skills are required? What is the best pathway to get there and where can I find out more? |
| Year 10 Computer Science Pathway | **Title and objectives** | **CS Consolidation & Programming** | **Networks 2** | **Systems Software** | **System Architecture** | **Boolean Logic** | **Programming Techniques & Project** |
| **Core knowledge** | Consolidating knowledge on:Data StoragePrimary & Secondary StorageNetworks & Security**Programming Techniques:**Functions, and logical operators AND, OR and NOT. | Modes of connectionEncryptionIP addressing and MAC addressingStandardsCommon protocols including the concept of layers | Operating SystemsUtility Software**Programming Techniques:**2D Arrays, Array Theory, SQL and Records | Purpose of the CPUVon Neumann – RegistersCPU ComponentsFactors affecting performanceEmbedded Systems | Data in binary formLogic GatesTruth TablesBoolean OperatorsLogical Operators**Programming Techniques:**File handlingDefensive DesignTesting | Consolidation of programming knowledge and applying them within a project context – analysis, design, development, testing and evaluation.Random Number Generation |
| **Skills** | Create and use functions in a functional program. Identify the difference between subroutines and procedures.Apply AND, OR and NOT to selection statements. | Describe differences between wired and wireless technologies.Describe purpose and differences between IP and MAC Addresses.Describe the purpose of standards and layers. | Identify key features of an operating system.Explain the difference between utility and application software and give examples.Create and manipulate a functioning 2D array.Interrogate a database using SQL code. | Identify the key components of the CPU.Describe factors which can improve the performance of the CPU. Describe the purpose and characteristics of embedded systems. | Know the truth tables and logic gate symbols for AND, OR and NOT.Understand how to create, complete or edit logic diagrams and truth tables for given scenarios. | Creating design documents to plan a program.Developing a complex program to meet a specification.Documenting structured tests for a program. |
| **Covid recovery** | This unit has been developed to re-cap topics covered in Year 9 to help cover any gaps in knowledge. Students are then assessed on their current understanding of the content. |  |  |  |  |  |
| **Careers** |  | Careers Case Study 1 – Network Technician | Careers Case Study 2 – Software Engineer | Careers Case Study 3 – Hardware Engineer |  | Careers summary – Which is the most appealing case study? What skills do you have that match? What further skills are required? What is the best pathway to get there and where can I find out more? |
| Year 10 IT Pathway | **Title and objectives** | **R060 – Data Manipulation using Spreadsheets****Exam Board Set Assignment** | **Augmented Reality Skills** | **R070 – Using Augmented Reality to****Present Information (Part 1)****Exam Board Set Assignment** |
| **Core knowledge** | Design ToolsHCI Design ConventionsData Handling & ManipulationTesting a spreadsheet solutionMethods of evaluating | Understanding the concept of Augmented Reality (AR) and being able to use software to plan design an AR solution. | Introduction to the set assignmentPlanning and design considerationsDesign ToolsModel prototypes, triggers and layersUser Interaction and information outputTesting a spreadsheet solutionMethods of evaluating |
| **Skills** | Planning, designing, creating, testing and evaluating a spreadsheet solution. | The different types of ARMaking use of assets, triggers and layers using AR software. | Planning, designing, creating, testing and evaluating a spreadsheet solution.*This unit of work will be continued into the Autumn Term of Year 11.* |
| **Covid recovery** | Although there has been no direct disruption to this course, for this cohort, we acknowledge students may have has an interrupted education during the pandemic and take this into account throughout the course and when planning intervention sessions as needed. |
| **Careers** |  | Careers Case Study 1 – Spreadsheet Specialist/Data Analyst |  | Careers Case study 2 –App Developer |  | Careers summary – Which is the most appealing case study? What skills do you have that match? What further skills are required? What is the best pathway to get there and where can I find out more? |
| Year 11 Computer Science Pathway | Title and objectives | **Robust Programming****& Algorithms 1** | **Algorithms 2****& Programming Languages & IDEs** | **Ethical, Legal, Cultural & Environmental Issues (ELCE)** | **Revision & Exam Practice** |  |
| Core knowledge | Flowcharts Accurately apply logic and data types/arithmetic operatorsHigh/low level languageIdentifying the different types of errors in defensive designSQL/SQL Injection | Pseudocode/python code/ flowchart comparisonRefining programsSearching and sorting algorithms2D arrays | Knowledge of a variety of examples of digital technology and how these impact on society.Impacts on the ELCE | Bespoke revision activities identified for the class.Exam question techniques and practice. |  |
| Skills | AND/OR/NOTMOD, DIV and exponentiation operatorsTranslators - benefits/drawbacksMaintainability and input validationRuntime and error diagnostic toolsTesting - Normal/ boundary/erroneous test dataRead/write SQL code using the correct structure | Binary and Linear SearchBubble, Merge and Insertion SortsFunctions, procedures and parameters | Know how legislation can protect and provide guidance.Open source and proprietary software licences - benefits and drawbacks | As per revision activity topicsExam techniquesResilience and IndependenceStrategies for responding to long answer questions |  |
| Covid recovery | Although there has been no direct disruption to this course, for this cohort, we acknowledge students may have has an interrupted education during the pandemic and take this into account throughout the course and when planning intervention sessions as needed. |  |
| Careers | Careers Case Study 1 – Network Technician | Careers Case Study 2 – Software Developer | Careers Case Study 3 – Hardware Engineer |  |  |  |
| Year 11 IT (iMedia) Pathway | Title and objectives | **R082 – Creating Digital Graphics****Exam Board Set Assignment** | **R087 - Creating interactive multimedia products****Exam Board Set Assignment** |  |
| Core knowledge | Understand the purpose and properties of digital graphicsPlan the creation of a digital graphicCreate a digital graphicReview a digital graphic | Understand the uses and properties of interactive multimedia productsPlan interactive multimedia productsCreate interactive multimedia productsReview interactive multimedia products |  |
| Skills | Effective researchDesign ToolsImage Editing Software (Photoshop) | Effective researchDesign ToolsSoftware Skills – Presentation, Image Editing, Sound Editing and Video Editing |  |
| Covid recovery | Although there has been no direct disruption to this course, for this cohort, we acknowledge students may have has an interrupted education during the pandemic and take this into account throughout the course and when planning intervention sessions as needed. |  |
| Careers | Careers Case Study – Graphics Designer | Careers Overview – Job roles within the IT and Multimedia Industries |  |
| Year 12 Level 2 IT (1 Year Course) | **Title and objectives** | **Unit 2- Essentials of Cyber Security****Unit 17 – Using Data Analysis Software – Tasks 1 & 2** | **Unit 1- Essentials of IT****Unit 17 – Using Data Analysis Software – Task 3** | **Unit 1 & 2 - Exams****Unit 17 – Using Data Analysis Software – Task 4 and completion** | **Unit 8 - Emerging Technologies – All Tasks****Unit 1 and 2 – Revision for any resit exams.** | **Unit 1 and 2 – Resit exam session (as required)** |
| **Core knowledge** | Cyber security threats and preventions to both individuals and organisations | Internal/external components of a computer system and how applications can be used to support Businesses | Be able to select and use software to analyse data for business purposes.Be able to present the results of data analysis to the client. | Research emerging technologies and understand the changes in technology to reflect user needs.Focussed research on emerging technologies in healthcare. | Revision of Unit 1 & 2 content for students resitting these exams.*All other students will have completed the course at this stage.* |
| **Skills** | Different forms of attacksLogical and physical prevention methodsVulnerabilities | Understanding Hardware/Software componentsInstallation of software and upgrades | Use Excel features and functions to create a spreadsheet for a given scenario. | Know the characteristics of emerging technologies and how they function.Structure a report based on research and making recommendations. | Revision techniques.Resilience & Independence |
| **Covid recovery** | Although no prior knowledge is assumed in order to take this one-year course, we acknowledge students may have has an interrupted education during the pandemic and take this into account throughout the course and when planning intervention sessions as needed. |
| **Careers** | Careers Case Study – Job roles in Cyber Security | Careers Case Study – Being an IT Technician  |  |

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| Year 12 Level 3 IT | **Title and objectives** | **Unit 1 – Fundamentals of IT** | **Unit 2 – Global Information** | **Units 5 & 9 – Producing a Virtual/Augmented Reality****Product**  |
| **Core knowledge** | Computer HardwareComputer SoftwareBusiness IT SystemsEmployability and Communication Skills used in an IT EnvironmentEthical and Operational IssuesThreats to Computer Systems | Where information is held globally and how it is transmittedThe styles, classification, and the management of global informationThe use of global information and the benefits to individuals and organisationsThe legal and regulatory framework governing the storage and use of global informationThe process flow of informationThe principles of information security | Commencing the first Non-Exam Assessment (NEA) units of work (carries through to Year 13). |
| **Skills** | Identify and describe characteristics core computer hardware.Describe types of computer software including advantages and disadvantages.Explain the use of different business IT systems and suitability for a given scenario.Discuss the key ethical and operational issues which occur in an IT-based business.Identify the key threats to IT systems and select appropriate prevention measures.  | Explain where information is held globally and categorise organisations which hold information.Categorise example information into classifications, styles and formats.Justify the benefits of Information use across business and individual categories.Discuss applicable laws to a given scenario.Interpret Data Flow DiagramsIdentify the key risks of managing information and justify appropriate prevention measures. | Product design and creation. Professional design documents, report writing. AR development skills. |
| **Covid recovery** | Although there has been no direct disruption to this course, for this cohort, we acknowledge students may have has an interrupted education during the pandemic and take this into account throughout the course and when planning intervention sessions as needed. |
| **Careers** | Focus on Technical Careers within the IT sector.*Including the use of Unifrog.* | Focus on Date & Information Careers within the IT sector and beyond.*Including the use of Unifrog.* |  |
| Year 13 Level 3 IT | Title and objectives | **Unit 5 – Virtual and Augmented Reality****and****Unit 9 – Product Development****Developing an AR Product Coursework Assignment** | **Unit 13 – Social Media and Digital Marketing****Developing a Social Media Marketing Coursework Assignment** |  |
| Core knowledge | Unit 5 – Virtual and Augmented RealityUnderstand virtual and augmented reality and how they may be used.Be able to design virtual and augmented reality resources.Be able to create a virtual or augmented reality resource.Be able to predict future applications for virtual and augmented reality.Unit 9 – Product DevelopmentUnderstand the product development life cycle.Be able to design products that meet identified client requirements.Be able to implement and test products.Be able to carry out acceptance testing with clients. | Understand digital marketing.Understand the use of social media in a business.Be able to plan content and propose appropriate social media channels for a digital marketing campaign.Be able to develop a social media digital marketing campaign. |  |
| Skills | Following the product development life cycle:*Analyse > Design > Implement > Test > Review > Maintain*Software Skills – Adobe Aero | Understanding and selecting the most appropriate tools available for digital marketing.Understanding how social media may be used to gather data.Understanding the legal and ethical restrictions on the use of social media as part of digital marketing campaigns.Proposing a digital marketing campaign across different social media channelsto meet identified business objectives. |  |
| Covid recovery | Although there has been no direct disruption to this course, for this cohort, we acknowledge students may have has an interrupted education during the pandemic and take this into account throughout the course and when planning intervention sessions as needed. |  |
| Careers | Use of Unifrog to highlight careers and pathways within the field of IT. |  |