Sacred Heart Newcastle SCITT

Subject Knowledge Audit – COMPUTER SCIENCE

Please decide on your ability to teach the content/skills listed below at KS3/KS4	
KEY:	
4	No knowledge – Currently a gap in my subject area	
3	Limited knowledge – Would not feel confident to teach this content	
2	Good knowledge – Confident in ability to teach with some guidance	
1	Expert knowledge - Confident to teach	
The completed subject audit will be used by your Mentor to create your Individual Training Plan. Your progress will be reviewed on a fortnightly basis. **You should review and record your progress at each review window below (and share this with your Mentor)**	

Subject Area:	Computer Science	Baseline (4 -1)	Dec. (3 -1)	May (3 -1)	Target for ECT year if applicable
Algorithms	Be able to **follow** and **produce** algorithms represented as flowcharts which include sequence, selection and iteration.				
	Be able to **follow** and **produce** algorithms represented in pseudocode which include sequence, selection and iteration.				
	Understand and be able to implement standard **searching** algorithms including serial search and binary search.				
	Understand, be able to explain and implement standard **sorting** algorithms including insertion sort, bubble sort and quicksort.				
	Be able to evaluate the fitness for purpose of algorithms in meeting specified requirements efficiently.				
	Be able to decompose a problem into smaller sub-problems for solution in a high level language.				
	Understand how abstraction can be used				

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	effectively to model aspects of the real world.				

Subject Area:	Computer Science	Baseline (4 -1)	Dec. (3 -1)	May (3 -1)	Target for ECT year if applicable
Programming	Be able to program in at least **two** relevant **high level** programming languages to include the use of the following:				
	• Sequence				
	• Selection (IF and CASE statements)				
	• Iteration (FOR, WHILE, REPEAT)				
	• Variables and constants				
	• Local & global variables				
	• Data types				
	• Relational operators				
	• Arithmetic operators				
	• Logical operators				
	• String Manipulation				
	• One dimensional arrays				
	• Two dimensional arrays				
	• Functions / Procedures				
	• Parameter passing (By val & ref)				
	• Reading from a file				
	• Writing to a file				
	• GUI construction				
	Be able to convert an algorithm written in pseudocode or a flowchart into a program written in a high level language.				
	Understand and identify different types of programming error including: Logic; Syntax; Runtime.				
	Understand the characteristics, use and need for high-level programming languages.				
	Understand the characteristics use and need for low-level programming languages				

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Subject Area:	Computer Science	Baseline (4 -1)	Dec. (3 -1)	May (3 -1)	Target for ECT year if applicable
Representation & Storage of Data	Understand the use of standard data types in programming including: Integer; Real; Boolean; Character; String.				
	Understand data structures including records, one-dimensional and two-dimensional arrays.				
	Understand the representation of **positive whole** numbers in binary using 8 bits.				
	Understand the representation of **negative whole** numbers in binary including: Sign & Magnitude; Twos Complement.				
	Understand the representation of numbers in hexadecimal.				
	Be able to **convert** numbers between binary and denary.				
	Be able to **convert** numbers between hexadecimal, binary and denary.				
	Be able to carry out binary **addition**..				
	Be able to carry logical and arithmetic shifts on 8 bit binary numbers.				
	Understand the representation of **text** in binary (ASCII).				
	Understand the representation of **sound** in binary.				
	Understand the representation of **images** in binary.				
	Understand and be able to convert between data storage units: Bits; Bytes; Kilobytes; Megabytes; Gigabytes; Terrabytes.				

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Subject Area:	Computer Science	Baseline (4 -1)	Dec. (3 -1)	May (3 -1)	Target for ECT year if applicable
	Be able to estimate the size of a file in KB, MB, GB, TB				
	Understand the need for data compression and methods of compressing data (lossy, lossless and Run Length Encoding).				
Logic	Be able to explain and use Boolean logic including AND, OR and NOT to produce truth tables.				
	Be able to explain and use logical and comparison operators in programming. (<, >, <=, >=, ==, !=)				
Software	Be able to explain the purpose and functionality of various applications software.				
	Be able to explain the purpose and functionality of different operating systems.				
	Be able to explain the purpose and functionality of different utility software.				
Systems Architecture	Understand Von Neumann architecture.				
	Understand the fetch-execute cycle.				
	Understand the role of the processor and its components in the fetch-execute cycle.				
	Understand how secondary storage works and the role it plays within the running of a computer system. (Magnetic; Optical; Solid State)				

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Subject Area:	Computer Science	Baseline (4 -1)	Dec. (3 -1)	May (3 -1)	Target for ECT year if applicable
	Understand the purpose of a range of standard hardware devices.				
	Understand embedded systems.				

Subject Area:	Computer Science	Baseline (4 -1)	Dec. (3 -1)	May (3 -1)	Target for ECT year if applicable
Networks	Understand the advantages and disadvantages of common network topologies including: Bus; Star; Ring.				
	Understand the role of a server in a network.				
	Understand the function and purpose of various network protocols including: TCP/IP; HTTP; HTTPS; FTP; SMTP; POP; IMAP				
	Understand the principles of network security.				

Subject Area:	Computer Science	Baseline (4 -1)	Dec. (3 -1)	May (3 -1)	Target for ECT year if applicable
E-Safety / Security	Understand the risks to students, and how they can stay safe when using: Social media; Mobile technologies; World Wide Web etc.				
	Understand ways to protect computer systems when connected to the internet including: Firewalls; Anti-Virus; Proxies etc.				
	Understand different forms of cyberattack (based on technical weaknesses and behaviour) including social engineering (phishing, shoulder surfing), unpatched software, USB devices, digital devices and eavesdropping.				
	Understand methods of identifying vulnerabilities including penetration testing, ethical hacking,				

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	commercial analysis tools and review of network and user policies.				
	Understand the concept of Cryptography / Encryption.				
	Understand how encryption works using simple Caesar Ciphers.				
	Understand how encryption works using Public Key Encryption (PGP).				

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Digital Technology Issues	Understand the ethical issues surrounding digital technology and its uses.				
	Understand the legal issues surrounding digital technology and its uses.				
	Understand the environmental impacts of digital technology and its uses.				

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Knowledge of Subject Assessment & Pedagogy	Understand how the basics of the subject help students access higher level work and which topics relate to each other				
	The ability to differentiate complex topics of computer science to higher and lower ability students.				
	Understand and explain the link between literacy and the ability to program effectively in a text-based language				
	Know how to analyse code, identify problems and suggest ways of improving the coding techniques that have been implemented				
	Ability to assess written answers to questions and identify ways of improving the answer given				

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Subject Area:	Computer Science	Baseline (4 -1)	Dec. (3 -1)	May (3 -1)	Target for ECT year if applicable
	Be able to progress students from programming effectively in visual programming languages to programme effectively in text-based programming languages				
	Be able to use assessment data effectively to inform planning				
	Be able to use data from homework effectively to inform planning				
	Understand and be able to use various methods of progress measures, for example; stanines / targets / core / intermediate / mastery				
	Be able to use data to set appropriate targets for students both at KS3 and KS4				

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Evidence of subject knowledge development

Record below the things you have **read and researched** to improve your subject knowledge in the boxes below.

Term 1	September/ October	November/ December

Term 2	January/ February	March/ April

Term 3	May/ June	June/ July

Please sign this sheet off at the end of the training year:

Signed:_____ (Trainee)   Date: _____

Signed:_____ (Mentor)   Date: _____