ROAD MAP TO

COMPUTING & COMPUTER SCIENCE CURRICULUM

A level Computer Science and courses in further and higher education

Software Engineer
Data Scientist
Machine Learning Engineer
Engineering Manager
DevOps Engineer
Artificial Intelligence Engineer
Robotics Engineer
Business Analyst
Network Manager
Forensic Computer Analyst

98% of jobs require a level of Computer Science skills!

YEAR 7

COMPONENT 2: EXAM PREP
Tailored to specific students

COMPONENT 1: EXAM PREP
Tailored to specific students

COURSEWORK FOR RESIT
As published by OCR

Zone 11 Programming

COMPONENT 2: PREP
Exam paper walk through.
Computational Thinking
Algorithms/Pseudocode
Programming
Validation
Data Structures
File Handling
Records
SQL
Design
Compare
Write a program
Benefits
Identify
Describe
Explain
Discuss (2-mark questions)
Discuss (3-mark questions)
Discuss (4-mark questions)
Discuss (6-mark questions)
Revisit topics student find difficult from the exam paper walk through

Zone 11 theory

COMPONENT 1: PREP
Exam paper walk through by command word:
Describe
Define
Compare
Explain
Discuss (4-mark questions)
Discuss (8-mark questions)
Revisit topics student find difficult from the exam paper walk through

Zone 11 coursework

YEAR 11

BOOLEAN LOGIC, LANGUAGES & IDE
Simple logic diagrams using the operations AND, OR and NOT
Truth tables
Combining Boolean operators using AND,OR and NOT
Applying logical operators in truth tables to solve problems
Characteristics and purpose of different levels of programming language
The purpose of translators
The characteristics of a compiler and interpreter
Common tools and facilities available in an integrated development environment (IDE)

Zone 10 starts

ADDITIONAL PROGRAMMING TECHNIQUES, DEFENSIVE DESIGN AND TESTING
The use of SQL to search for data
Defensive design consideration
Input validation
Maintainability (the use of subprograms)
The purpose of testing
Types of testing
Identify syntax and logic errors
Selecting and using suitable test data
Refining algorithms

SYSTEMS ARCHITECTURE(UNITS) & ADDITIONAL PROGRAMMING TECHNIQUES
Units (Numbers)
How to convert positive denary whole numbers to binary and vice versa
How to add two binary integers together
How to convey denary to hexadecimal and vice versa
How to convert binary to hexadecimal and vice versa
Binary shifts

Two-dimensional array
Combination of One- and Two-dimensional arrays

SYSTEMS SOFTWARE & ADDITIONAL PROGRAMMING TECHNIQUES
Operating Systems
The purpose and functionality of operating systems
User interface
Memory management and multitasking
Peripheral management and drivers
User management
File management

Utility Software
The purpose and functionality of utility software
Utility system software
Encryption software
Defragmentation
Data compression
The use of arrays when solving problems, Standard searching algorithms, standard sorting algorithms

NETWORK SECURITY & ADDITIONAL PROGRAMMING TECHNIQUES
Threats to computer systems and networks
Forms of attack
Malware
Social engineering
Brute force attacks
DDOS
Data interception and theft
SQL Injection Identifying and preventing vulnerabilities
Common prevention methods
Anti-malware software
Firewalls
User access levels
Passwords
Encryption
Physical security
The use of arrays when solving problems
One dimensional arrays & Linked arrays

Coding club run by Year 10s

Step into Network Security

YEAR 10

NETWORK SECURITY & ADDITIONAL PROGRAMMING TECHNIQUES
Wired and wireless networks, protocols and layers
Modes of connection
Encryption
IP address and MAC addressing
Standards
Protocol suites
The concept of layers
The use of Functions and Procedures when solving problems, Object oriented programming.

SYSTEMS ARCHITECTURE, DATA STORAGE AND PROGRAMMING FUNDAMENTALS
Define the terms bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte and petabyte.
Understand the use of binary codes to represent characters.
Understand how a bitmap graphic is made up of individual pixels.
Explain the need for image metadata.
Understand how sound is sampled and stored in digital form
Explain the need for compression
Describe the difference between lossy and lossless compression
The use of three basic programming constructs used to control the flow of a program; Sequence, Selection and Data types

Step into Computer Science with the Coding Club

ETHICAL, LEGAL, CULTURAL AND ENVIRONMENTAL IMPACTS OF DIGITAL TECHNOLOGY AND COMPUTATIONAL THINKING, ALGORITHMS AND PROGRAMMING FUNDAMENTALS
Discuss the impacts of digital technology on the wider society.
Environmental Issues
Discuss the impacts of digital technology on the environment.
Legislation & Privacy
Discuss the impacts of digital technology on wider society.
Principles of Computational Thinking (Abstraction, Decomposition, pattern recognition and algorithmic thinking) and programming fundamentals (variables, operators, constants, inputs and outputs)

Sign up as a Computer Science Ambassador

YEAR 9

STRAND 3: PROGRAMMING
Introduction of text-based programming language
GUI design and interface, GUI Properties
Fundamentals of text based programming language variables, data types, operators, type casting
Functions of the Math unit
Sequential programming & problem solving
Selection & Boolean operators
Testing & debugging programs

Make Guided Choices selections - Computer Science

STRAND 4: DATA STORAGE & EXECUTION UNITS
Understand what a database is.
Display a knowledge of the uses and advantages of a database.
Knowledge of basic concepts and terms (field, record, primary key)
Understand how to design a database Distinguish between different types of data in a database table.
Populate the database with quality data Understand how to find the right information using databases and websites.
Understand how to build searches using Boolean logic.
Define the terms bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte and petabyte
Link these measurements to computer components and specifications.
Compare different laptop specifications in terms of megabyte, gigabyte, terabyte
Understand that data needs to be converted into a binary format to be processed by a computer.
Understand ASCII and UNICODE tables

GCSE taster week

STRAND 1: ABSTRACTION
STRAND 2: ALGORITHMS AND COMPUTATIONAL THINKING
Understand the principles of computational thinking
Abstraction
Decomposition
Algorithmic thinking
Pattern recognition
Fundamentals of text-based programming language variables, data types, operators, type casting
Functions of the Math unit
Sequential programming & problem solving
Selection & Boolean operators
Testing & debugging programs

STRAND 1: ABSTRACTION
STRAND 2: ALGORITHMS AND COMPUTATIONAL THINKING
Understand the principles of computational thinking
Abstraction
Decomposition
Algorithmic thinking
Pattern recognition
Understand flowchart symbols
Create, interpret, correct, complete, and refine algorithms using flowcharts
Understand arithmetic operators and variables
Write algorithms in pseudocode
GUI design and interface, GUI properties
Introduction of text-based programming language
Sequential programming

STRAND 7:CREATIVE USE OF ICT
STRAND 8:ICT FOR AN AUDIENCE
STRAND 9:CYBER AWARENESS
Create digital content to achieve a given goal
Recognize the audience when creating digital content
Combine at least 2 applications in a creative project
Analyse content used in creative projects

Make judgements about digital content for a different audience
Evaluate the appropriateness of digital devices and software

Recognize ethical issues surrounding IT use
Threats to personal data and how to mitigate them

Sign up to be a Computing Ambassador

Year 8s run Microbit club

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Microbit Club – one group per half term

YEAR 8

STRAND 7,8,9 CREATIVE USE OF ICT, ICT FOR AN AUDIENCE, CYBER AWARENESS
Understand the need to keep personal information private
Know what to do if contacted by a stranger or sees inappropriate content
Recognise unacceptable behaviour online
Show a range of ways to report inappropriate content/contact
Recognise ethical issues surrounding IT use

STRAND 7,8,9 CREATIVE USE OF ICT, ICT FOR AN AUDIENCE, CYBER AWARENESS
Obtain content from the WWW using a web browser
Use a variety of software to present digital content
Creates digital content for an audience

Create, store, and edit digital content
Independently organises digital content
Collects, organises, and presents data in digital content
Make judgements about digital content for a different audience
Evaluates the appropriateness of digital devices and software

STRAND 5: COMPUTER COMPONENTS
Identify how have electronic computers developed over time.
Describe the purpose of hardware and software.
Describe different methods of data storage.
Describe the function of internal computer components.
Name the hardware required to set up a network.
Describe different network topologies.
Understand how Cloud Computing works.
Identify different Cloud storage applications.
Understand how to store data on the Cloud (OneDrive)
Understand how to use Class Notebook in Teams as a software application.

STRAND 6: DATA STORAGE AND EXECUTION
Understand how digital data is represented and stored.
Differentiate between data and information.
Describe how to use a search engine.
Assess the validity of different websites.
Analyse the reliability information on the Internet.
Understand searching techniques.

Understand what a database is
Display a knowledge of the uses and advantages of a database
Knowledge of basic concepts and terms (field, record, table)
Understand how to design a database
Distinguish between different types of data in a database table.
Understand the key features of a database table.
Gain knowledge and understanding of how to apply filters to a database and be able to manipulate a database.

STRAND 1: ABSTRACTION
STRAND 2: ALGORITHMS AND COMPUTATIONAL THINKING
Understand the principles of computational thinking
Abstraction
Decomposition
Algorithmic thinking
Pattern recognition
Understand flowchart symbols
Create, interpret, correct, complete, and refine algorithms using flowcharts
Understand arithmetic operators

STRAND 1: PROGRAMMING
Students will be able to use non text-based programming to:
Code an object to make it move
Code an object to change its appearance
Code an object to make it interreact with another object
Code an object to start in a specific place
Use the repeat function to code an object

SYSTEMS ARCHITECTURE,CPU PERFORMANCE AND EMBEDDED SYSTEMS AND PROGRAMMING FUNDAMENTALS
The purpose of the CPU
Common CPU components and their function
Von Neumann architecture
How common characteristics of the CPU affect their performance
Clock speed
Cache size
Number of cores
The purpose and characteristics of embedded systems
Examples of embedded systems
The use of basic programming constructs used to control the flow of a program
Sequential Programming

COMPUTER SYSTEMS, SYSTEMS ARCHITECTURE: MEMORY AND STORAGE PROGRAMMING FUNDAMENTALS
Primary Storage (memory)
The need for primary storage
The difference between RAM & ROM
The purpose of ROM in a computer system
The purpose of RAM in a computer system
Virtual memory
Secondary storage
The need for secondary storage
Common types of storage
Storage devices & storage media
Advantages & disadvantages of different storage devices.
Iteration: for loop, while loop, repeat loop

NETWORKS & TOPOLOGIES AND ADDITIONAL PROGRAMMING TECHNIQUES
Computer networks, connections and protocols
Types of networks
Factors that affect performance of networks
Client-server vs peer-to-peer networks
Hardware needed to connect computers to a LAN
The internet as a world wide collection of computer networks
Star & mesh networks
String class: Functions And Procedures