Microsoft

Edexcel GCSE in Computer Science – Microsoft IT Academy Mapping

Topic 1: Problem solving		
Subject Content: 1.1 Algorithms	*MOAC course and lesson(s)*	*MVA course and module(s)*
Outcomes 1.1.1 Understand what an algorithm is, what algorithms are used for and be able to interpret algorithms [flowcharts, pseudo code, structured English, written descriptions, program code] 1.1.2 Be able to create an algorithm to solve a particular problem, making use of programming constructs [sequence, selection, repetition] and using an appropriate notation [flowchart, written description, program code] 1.1.3 Be able to describe the purpose of a given algorithm and explain how a simple algorithm works 1.1.4 Be able to identify the correct output of an algorithm for a given set of data 1.1.5 Be able to identify and correct errors in algorithms 1.1.6 Be able to code an algorithm into a high-level language 1.1.7 Understand how the choice of algorithm is influenced by the data structure and data values	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 1: Introduction to Programming • Lesson 3: Understanding General Software Development	Software Development Fundamentals: • Module 1 “General Software Development” • Module 2 “Core Programming”

that need to be manipulated 1.1.8 Understand how standard algorithms [quick sort, bubble sort, selection sort, linear search, binary search, breadth first search, depth first search, maximum/minimum, mean, count] work 1.1.9 Understand factors that affect the efficiency of an algorithm		
Subject Content: 1.2 Decomposition		
Outcomes 1.2.1 Be able to analyse a problem, investigate requirements [inputs, outputs, processing, initialisation] and design solutions 1.2.2 Be able to decompose a problem into smaller sub-problems	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 1: Introduction to Programming	Software Development Fundamentals: • Module 1 "General Software Development"

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Topic 2: Programming		
Subject Content: 2.1 Develop code	*MOAC course and lesson(s)*	*MVA course and module(s)*
Outcomes 2.1.1 Be able to write programs in a high-level programming language 2.1.2 Understand the benefit of producing programs that are easy to read, and be able to use techniques [comments, descriptive variable names, indentation] to improve readability and to explain how the code works 2.1.3 Be able to differentiate between types of error in programs [logic, syntax, runtime] 2.1.4 Be able to design and use test plans and test data 2.1.5 Be able to interpret error messages and identify, locate and fix errors in a program 2.1.6 Be able to identify what value a variable will hold at a given point in a program [trace table] 2.1.7 Be able to make effective use of tools offered in an integrated development environment [watcher, break points, single-step, stepthroughs] 2.1.8 Be able to evaluate the strengths and weaknesses of a program and suggest improvements	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 1 Introduction to Programming • Lesson 2: Introduction to Object-Oriented Programming • Lesson 3: Understanding General Software Development • Lesson 5: Understanding desktop applications	Software Development Fundamentals: • Module 2 “Core Programming” • Module 3 “Object-Oriented Programming” Software Testing with Visual Studio 2012 • Lesson 1 “Overview and Create and Configure Test Plans (Part 1)”
	Web Development Fundamentals – MTA EXAM 98-363 Web Development Fundamentals • Lesson 3: Working with XML, Data objects and WCF • Lesson 4: Working with data • Lesson 5: Working with Client-Side scripting • Lesson 6: Trouble shooting and debugging web applications	n/a
	Microsoft.NET Fundamentals: MTA EXAM 98-372 Microsoft .NET Fundamentals • Lesson 2: Understanding data types and collections • Lesson 3: Understanding events and exceptions	C# Fundamentals: Development for Absolute Beginners • Module 18 “Understanding Scope and Utilizing Accessibility Modifiers” • Module 20 “Gracefully Handling Exceptions”

2.1.9 Be able to work safely, respectfully, responsibly and securely when using computers		
Subject Content: 2.2 Constructs		
Outcomes 2.2.1 Be able to identify the structural components of a program [variable and type declarations, initialisations, command sequences, conditionals, repetition, data structures, subprograms] 2.2.2 Be able to use sequencing, selection and repetition constructs in their programs	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 1 Introduction to Programming	Software Development Fundamentals: • Module 1 "General Software Development"
Subject Content: 2.3 Data types and structures		
Outcomes 2.3.1 Understand the need for and be able to select and use data types [integer, real, Boolean, char] 2.3.2 Understand the need for and be able to select and use data structures [one-dimensional arrays, two-dimensional arrays]	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 1 Introduction to Programming • Lesson 2: Introduction to Object-Oriented programming • Lesson 3: Understanding General Software Development • Lesson 6: Understanding Databases	Software Development Fundamentals: • Module 2 "Core Programming" • Module 3 "Object Oriented Programming"

2.3.3 Understand the need for and be able to manipulate strings 2.3.4 Understand the need for and be able to use variables and Constants 2.3.5 Understand the need for and be able to use global and local Variables	Web Development Fundamentals – MTA EXAM 98-363 Web Development Fundamentals • Lesson 3: Working with XML, Data Objects, and WCF • Lesson 4: Working with Data	C# Fundamentals: Development for Absolute Beginners • Module 9 "Creating Arrays of Values" • Module 12 "Working with Strings" • Module 13 "Working with DateTime"
	Microsoft.NET Fundamentals: MTA EXAM 98-372 Microsoft .NET Fundamentals • Lesson 1: Understanding Object-Oriented Programming • Lesson 2: Understanding Data Types and Collections	C# Fundamentals: Development for Absolute Beginners • Module 18 "Understanding Scope and Utilizing Accessibility Modifiers"
Subject Content: 2.4 Input/output		
Outcomes 2.4.1 Be able to write code that accepts and responds appropriately to user input 2.4.2 Understand the need for and be able to implement validation 2.4.3 Be able to write code that outputs information to a screen and understand and use Cartesian x/y coordinates 2.4.4 Be able to design and code a user interface [textual, graphical] 2.4.5 Be able to write code that opens/closes, reads/writes, deletes, inserts, appends from/to a file	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 2: Introduction to Object-Oriented Programming • Lesson 3: Understanding General Software Development	Software Development Fundamentals: • Module 2 "Core Programming" • Module 3 "Object Oriented Programming"
	Microsoft.NET Fundamentals: MTA EXAM 98-372 Microsoft .NET Fundamentals • Lesson 5: Understanding Input / Output Classes	C# Fundamentals: Development for Absolute Beginners • Module 14 "Understanding and Creating Classes"
Subject Content: 2.5 Operators		
Outcomes	Software Development – MTA EXAM 98-361	Software Development Fundamentals:

2.5.1 Understand the purpose of and be able to use arithmetic operators [plus, minus, divide, multiply, modulus, integer division] 2.5.2 Understand the purpose of and be able to use relational operators [equal to, less than, greater than, not equal to, less than or equal to, greater than or equal to] 2.5.3 Understand the purpose of and be able to use Boolean operators [AND, OR, NOT]	Software Development Fundamentals • Lesson 1 Introduction to Programming	• Module 1 "General Software Development"
Subject Content: Subprograms		
Outcomes 2.6.1 Understand the benefits of using subprograms and be able to write code that uses user-written and pre-existing [built-in, library] subprograms 2.6.2 Understand the concept of passing data into and out of subprograms [procedures, functions, return values] 2.6.3 Be able to create subprograms that perform generalisation	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 3: Understanding General Software Development • Lesson 2: Introduction to Object-Oriented Programming	Software Development Fundamentals: • Module 3 "Object Oriented Programming"

Topic 3: Data		
Subject Content: 3.1 Binary	*MOAC course and lesson(s)*	*MVA course and module(s)*
Outcomes 3.1.1 Understand that computers use binary to represent data and Instructions 3.1.2 Understand how computers represent and manipulate numbers [unsigned integers, signed integers (sign and magnitude, Two's complement) real numbers] 3.1.3 Be able to convert between binary and denary whole numbers (0-255) and vice versa 3.1.4 Be able to perform binary arithmetic [add, subtract, multiply] and understand the concept of overflow 3.1.5 Understand why hexadecimal notation is used and be able to convert between hexadecimal and binary and vice versa	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 1 Introduction to Programming	Software Development Fundamentals: • Module 1 "General Software Development"
Subject Content: 3.2 Data representation		
Outcomes 3.2.1 Understand how computers encode characters [ASCII, Unicode] 3.2.2 Understand how bitmap images are represented in binary [pixels, resolution, colour depth] 3.2.3 Understand how analogue data [sound,	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 1 Introduction to Programming • Lesson 3: Understanding general software development	n/a

temperature, light intensity] is represented in binary 3.2.4 Understand the limitations of binary representation of data [quantisation, sampling frequency] and how bit length constrains the range of values that can be represented		
Subject Content: 3.3 Data storage and Compression		
Outcomes 3.3.1 Understand and be able to convert between the terms 'bit, nibble, byte, kilobyte (KB), megabyte (MB), gigabyte (GB), terabyte (TB)' 3.3.2 Understand the need for data compression and methods of compressing data [lossless, lossy] and that JPEG and MP3 are examples of lossy algorithms 3.3.3 Understand how a lossless, run-length encoding [RLE] algorithm Works 3.3.4 Understand that file storage is measured in bytes and that data transmission is measured in bits per seconds, and be able to calculate the time required to transmit a file and storage requirements for files		n/a
Subject Content: 3.4 Encryption		
Outcomes 3.4.1 Understand the need for data encryption	Security Fundamentals - MTA Exam 98-367 Security Fundamentals	

3.4.2 Understand how a Caesar cipher algorithm works	• Lesson 2: Authentication, Authorization, and Accounting	
Subject Content: 3.5 Databases		
Outcomes 3.5.1 Understand the characteristics of structured and unstructured Data 3.5.2 Understand that data can be decomposed and organised in a structured database [tables, records, fields, relationships, keys] 3.5.3 Understand the need for and be able to use SQL statements	Database Administration Fundamentals – MTA EXAM 98-364 Database Administration Fundamentals • Lesson 1: Understanding Core Database concepts • Lesson 2: Creating Database objects • Lesson 3: Manipulating Data • Lesson 4: Understanding Data storage • Lesson 5: Administering a Database	Software Development Fundamentals: • Module 6 "Understand Databases"
	Software Development – MTA EXAM 98-361 Software Development Fundamentals Lesson 6: Understanding Databases	n/a

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Topic 4: Computers		
Subject Content: 4.1 Machines and computational models	*MOAC course and lesson(s)*	*MVA course and module(s)*
Outcomes 4.1.1 Understand the concept of a computer as a hardware machine or as a virtual machine 4.1.2 Understand that there is a range of computational models [sequential, parallel, multi-agent] 4.1.3 Understand the input-process-output model	Windows Server Administration Fundamentals: MTA Exam 98-365 Windows Server Administration Fundamentals • Lesson 1 "Server Overview"	n/a
Subject Content: 4.2 Hardware		
Outcomes 4.2.1 Understand the function of hardware components of a computer system [processor (CPU), memory, secondary storage, input devices, output devices] and how they work together 4.2.2 Understand the concept of a stored program and the role of components of the processor [control unit (CU), arithmetic/logic unit (ALU), registers, clock, address bus, data bus] in the fetch-decode execute Cycle 4.2.3 Understand the function of assembly code and be able to interpret a block of assembly code using a given set of commands 4.2.4 Understand how data is stored on physical	Windows Server Administration Fundamentals: MTA Exam 98-365 Windows Server Administration Fundamentals • Lesson 1 "Server Overview"	n/a

devices [magnetic, optical, solid state] 4.2.5 Understand how microcontrollers can be programmed to control actuators and take input from sensors		
Subject Content: 4.3 Logic		
Outcomes 4.3.1 Be able to construct truth tables for a given logic statement [AND,OR, NOT] 4.3.2 Be able to produce logic statements for a given problem		n/a
Subject Content: 4.4 Software		
Outcomes 4.4.1 Understand what an operating system is and the functions of an operating system [file management, input/output, resource allocation, process management, network management, user management]	Windows Operating Systems Fundamentals: MTA Exam 98-349 Windows Operating Systems Fundamentals • Lesson 1: Introducing, Installing... • Lesson 2: Understanding Operating System Configurations	n/a
4.4.2 Understand that application software such as a web browser, word processor, spreadsheet or apps are computer programs 4.4.3 Understand how software can be used to simulate and model aspects of the real world and be able to create software models	Please see Microsoft Digital Literacy: Computer Basics: • Lesson 4 "Computer Operating Systems" Productivity Programs: • Lesson 1 "Introduction to Productivity Programs"	n/a
Subject Content: 4.5 Programming languages		
Outcomes 4.5.1 Understand what is meant by high-level	Software Development Fundamentals – MTA EXAM 98-361	Software Development Fundamentals: • Module 1 "General Software Development"

and low-level programming languages and assess their suitability for a particular task 4.5.2 Understand what is meant by a compiler and an interpreter	Software Development Fundamentals • Lesson 1 “Introduction to Programming” Microsoft.NET Fundamentals: MTA EXAM 98-372 Microsoft.NET Fundamentals • Lesson 4 “Understanding Code Compilation and Deployment”	• Module 2 “Core Programming” • Module 3 “Object-Oriented Programming” • Module 4 “Web Applications” • Module 5 “Desktop Applications”

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Topic 5: Communication and the internet		
Subject Content: 5.1 Networks	*MOAC course and lesson(s)*	*MVA course and module(s)*
Outcomes 5.1.1 Understand why computers are connected in a network 5.1.2 Understand the different types of networks [LAN, WAN, PAN,VPN] 5.1.3 Understand the network media [copper cable, fibre optic cable, wireless] 5.1.4 Understand that network data speeds are measured in bits per second [Mbps, Gbps] 5.1.5 Understand the role of and need for network protocols 5.1.6 Understand that data can be transmitted over networks using packets [TCP/IP] 5.1.7 Understand the need to detect and correct errors in data transmission [check sums] 5.1.8 Understand the concept of and need for network addressing and host names [MAC addresses] 5.1.9 Understand characteristics of network topologies [bus, ring, star, mesh]	Networking Fundamentals: MTA Exam 98-366 Networking Fundamentals • Lesson 1: Understanding local area networking • Lesson 2: Defining Networks with the OSI Model • Lesson 3: Understanding wired and wireless networks • Lesson 4: Understanding internet protocol • Lesson 6: Working with networking services • Lesson 7: Understanding wide area networks	Networking Fundamentals: • Module 1 “Understanding Local Area Networking” • Module 2 “Defining Networks with the OSI Model” • Module 3 “Understanding Wired and Wireless Networks” • Module 4 “Understanding Internet Protocol” • Module 5 “Implementing TCP/IP in the Command Line” • Module 6 “Working with Networking Services” • Module 7 “Understanding Wide Area Networks” • Module 8 “Defining Network Infrastructures and Security”

Microsoft

Subject Content: 5.2 The internet and the world wide web		
Outcomes 5.2.1 Understand what is meant by the internet and how the internet is structured [IP addressing, routers, connecting backbone, domain names] 5.2.2 Understand what is meant by the world wide web (WWW) and components of the WWW [web server URLs, ISP, HTTP, HTTPS, HTML] 5.2.3 Be able to use HTML and CSS to construct web pages [formatting, links, images, media, layout, styles, lists] 5.2.4 Understand the client-server model, the difference between client-side and server-side processing and the role of cookies	Software Development – MTA EXAM 98-361 Software Development Fundamentals • Lesson 4: Understanding web applications • Lesson 6: Understanding databases	Software Development Fundamentals: • Module 4 “Web Applications”
	Networking Fundamentals: MTA Exam 98-366 Networking Fundamentals • Lesson 4: Understanding internet protocol • Lesson 8: Defining Network Infrastructures and Network Security	Networking Fundamentals: • Module 4 “Understanding Internet Protocol” • Module 5 “Implementing TCP/IP in the Command Line”
	Web Development Fundamentals – MTA EXAM 98-363 Web Development Fundamentals • Lesson 1: Creating a web page • Lesson 2: Creating an interactive web page • Lesson 3: Working with XML, Data objects and WCF • Lesson 4: Working with data • Lesson 5: Working with Client-Side scripting • Lesson 6: Trouble shooting and debugging web applications	Software Development Fundamentals: • Module 4 “Web Applications”

Topic 6: The bigger picture		
Subject Content: 6.1 Emerging trends, issues and impact	*MOAC course and lesson(s)*	*MVA course and module(s)*
Outcomes 6.1.1 Be aware of current and emerging trends in computing technology [quantum computing, DNA computing, artificial intelligence (AI), nano technology] 6.1.2 Be aware of the impact of computing on individuals, society and the environment 6.1.3 Be aware of ethical and legal issues arising from the use of Computers 6.1.4 Be aware of ownership issues relating to computing [intellectual property, patents, licensing, open source and proprietary software]	n/a	n/a

Microsoft

Below is an overview of utilising MOAC resources to deliver the GCSE Computer Science and cover MTA exam objectives. The MTAs are listed with those providing the most relevant coverage at the top.

Using the various MTA MOAC resources to deliver the GCSE Computer Science will enable you to cover both the GCSE specification and the exam objectives for a number of MTA certifications. In particular Software Development, Networking Fundamentals and Database Administration Fundamentals. Web Development Fundamentals and Microsoft .Net Fundamentals would further complement the GCSE specification.

The additional MTA MOAC lesson resources listed below will support the delivery of the GCSE Computer Science, however, the specifications do not align completely with MTA exam objectives.

	Topic 1 Problem solving	Topic 2 Programming	Topic 3 Data	Topic 4 Computers	Topic 5 Communication and the internet	Topic 6 The bigger picture
Software Development – MTA EXAM 98-361	Lesson 1 & 3	Lesson 1,2,3,5,6	Lesson 1,3,6	Lesson 1	Lesson 4,5,6	
Networking Fundamentals: MTA Exam 98-366					Lesson 1,2,3,4,6,7,8	
Database Administration Fundamentals – MTA EXAM 98-364			Lesson 1,2,3,4,5,			
Web Development Fundamentals – MTA EXAM 98-363		Lesson 3,4,5,6			Lesson 1,2,3,4,5,6	
Microsoft.NET Fundamentals: MTA EXAM 98-372		Lesson 1,2,3,5		Lesson 4		
Windows Operating Systems Fundamentals: MTA Exam 98-349				Lesson 1 & 2		
Windows Server Administration Fundamentals: MTA Exam 98-365				Lesson 1		
Security Fundamentals - MTA Exam 98-367			Lesson 2			