Year 10 Computer Science – System Architecture

West Kirby Grammar School

Learning about this topic is important because:
Modern desktop and laptop computers are designed based on Von Neuman architecture. The 'stored program concept' is the basis for all multi-purpose computers today.

This builds on:
Computer Systems Part 3 (Year 9) where we were introduced to the CPU cycle

This leads to:
Computer Architecture – Structure and Function of the Processor (Year 12)

We will learn:

- **The concept of Von Neuman architecture.**
- **The CPU, its components and the CPU cycle.**
- **Factors which affect the performance of the CPU.**
- **The concept of embedded systems.**

We will develop/practise skills including:

- **Comparing different systems for different purposes (general purpose vs embedded)**
- **Basic coding skills using assembly language (Little Man Computer)**
- **Problem solving/de-bugging assembly language code.**

Some of the vocabulary that we will use includes:

CPU cycle, RAM, ROM, architecture, arithmetic logic unit, control unit, address bus, data bus, control bus, registers, stored program concept, embedded system, cores, cache memory, clock speed

You could learn more about this topic by:

System Architecture – BBC Bitesize – Click here
Craig n Dave – System Architecture Videos – Click here

Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are:
1.1 Workbook.
System Architecture Topic Test

Year 10 Computer Science – Programming Techniques

West Kirby Grammar School

Learning about this topic is important because:
You will learn how to code in a programming language which is widely used in industry but also about programming concepts/techniques which can be applied to other languages.

This builds on:
Python Programming – Part 3 (Year 9) where the basics of programming will have been introduced.

This leads to:
2.3 Producing Robust Programs - where we will learn about coding validation and verification algorithms.

We will learn:

- **Understand and use data types: integer, real, Boolean, character and string**
- **Declare and use constants and variables**
- **Use input, output and assignment statements**
- **Use random number generation**
- **Write algorithms in pseudocode involving sequences**
- **Use arithmetic operators including MOD and DIV**
- **Use string handling and conversion functions**
- **Use selection and nested selection statements**
- **Use NOT, AND and OR when creating Boolean expressions**
- **Write algorithms involving sequence, selection and iteration**
- **Use one- and two-dimensional arrays**
- **Understand the concept of subroutines**
- **Understand and use basic file handling operations:**
- **Use SQL statements to search for data**

We will develop/practise skills including:

- **Coding skills in Python**
- **Testing and debugging code**
- **Refining / optimising code**
- **Planning and coding algorithms for real world problem solving**

Some of the vocabulary that we will use includes:

Variables, constants, operators, inputs, outputs, assignment, sequence, selection, iteration, arithmetic operators, Boolean operators, AND, OR, NOT, MOD, DIV, ^, exponentiation, data types, integer, real, Boolean, character, string, casting, string manipulation, file handling, open, read, write, close, records, SQL, arrays, one-dimensional array, two-dimensional array, sub program/subroutine, functions, procedures, random numbers, concatenation, slicing, SQL, SELECT, FROM, WHERE.

You could learn more about this topic by:

BBC Bitesize – Programming Constructs – Click here
BBC Bitesize – Programming Techniques – Click here
Craig n Dave – Programming Fundamentals Videos – Click here
Code Academy (online programming tutorials) – Click here

Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are:

Year 10 Computer Science – Programming Techniques

West Kirby Grammar School

Programming Techniques Workbook.
End of Unit Test

Year 10 Computer Science – Memory and Storage /

West Kirby Grammar School

Learning about this topic is important because:
This topic follows on from Computer Architecture (the CPU) and will help develop your understanding further about how computer systems function. We introduced the concept of memory and storage in the last topic, here we will learn more specifics about both primary and secondary storage.

This builds on:
Year 9 Computer Systems – We looked at the role of the hard drive, RAM and ROM in the CPU cycle. Also this builds on the data representation topics we studied in year 7, 8 and 9.

This leads to:
Input/Output/Storage topic and Data Types topic, both studied in Year 12.

We will learn:

- **The need for primary storage in computer systems.**
- **The purpose of (and difference between) RAM and ROM.**
- **Virtual Memory**
- **The need for secondary storage in computer systems.**
- **About different categories of secondary storage (magnetic, solid state and optical).**
- **The advantages and disadvantages of different types of storage considering capacity, speed, cost, durability, portability.**

We will develop/practise skills including:

- **Comparison of particular technologies for different purposes along with being able to justify a choice.**

Some of the vocabulary that we will use includes:

RAM, ROM, Magnetic, Optical, Solid State, Virtual Memory, Capacity, Durability, Portability

You could learn more about this topic by:

BBC Bitesize – Memory and Storage GCSE – Click Here
Craig n Dave Videos – Memory and Storage – Click Here

Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are:
Topic test, key homework, 1.2 Workbook part 1 (memory/storage)

Year 10 Computer Science – Data Representation

West Kirby Grammar School

Learning about this topic is important because:
We learn about the most fundamental unit of storage, the bit (0 or 1), why we use this notation to represent data and how elements we are familiar with in computer applications (text, image, sound) are all ultimately represented in binary. We will also learn about different methods of data compression which are important for the efficient transmission of data between devices.

This builds on:
Year 9 – (KS3) Data Representation 3

This leads to:
Year 11 – Boolean Logic (Spring 2)

We will learn:

- **Units of storage (from bit to petabyte) and how to convert between different units.**
- **The binary number system, conversion of denary to binary and vice versa up to numbers of 8 bits.**
- **Addition of binary values (up to 8 bits)**
- **Halving and doubling of binary numbers using left and right shift.**
- **The hexadecimal number system, conversion of denary/binary to hexadecimal and vice versa with numbers up to 8 bits (2 hex characters)**
- **How text is represented using the ASCII, Extended ASCII and Unicode character sets.**
- **How bitmap images are represented – including image file size calculations.**
- **How sounds are represented – including sound file size calculations.**
- **Data compression – lossy compression vs lossless**
- **Lossless compression methods – run time encoding and dictionary encoding.**

We will develop/practise skills including:

- **Mathematical Skills (binary/decimal/hexadecimal conversion)**
- **Addition of binary numbers.**
- **Conversion between different storage units (bits/bytes/kilobytes etc)**
- **File size calculations.**

Some of the vocabulary that we will use includes:

You could learn more about this topic by:

Year 10 Computer Science – Data Representation

Bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte, binary shift, overflow, resolution, file size, sample rate, bit depth, colour depth, lossless compression, lossy compression.	**BBC Bitesize OCR Data Units and Representation – Click here** **Craig n Dave – J277 Data Representation videos – Click here** **Isaac Computing – Number Representation – Click here** **Isaac Computing – Text Representation – Click here** **Isaac Computing – Image Representation – Click here** **Isaac Computing – Sound Representation – Click here**
Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are: **Topic test, key homework, 1.2 Workbook part 2 (Data Representation)**	

Year 10 Computer Science – Networks, Protocols and Layers

West Kirby Grammar School

Learning about this topic is important because:
Computer networks are used everywhere in the modern world: the home, school, workplaces and many more contexts. We will learn about the different types of network that exist, the equipment used to build these networks and how data is transmitted across them. We learn about the biggest network of all, one which plays a huge part in our everyday lives: the Internet.

This builds on:
Year 9 – Computer Networks 2

This leads to:
Year 11 – Network Security (Spring 2)

We will learn:

- **Types of networks: LAN, WAN**
- **Factors that affect the performance of networks**
- **The different roles of computers in a client-server and peer-to-peer network.**
- **The hardware needed to connect stand-alone computers to a LAN**
- **The Internet as a worldwide collection of computer networks: DNS, Hosting, The Cloud, Web servers and clients**
- **Star and Mesh network topologies**
- **Modes of connection: Wired (Ethernet), Wireless (Wi-Fi, Bluetooth)**
- **Encryption**
- **IP addressing and MAC addressing.**
- **Network standards and common protocols used.**
- **The concept of network layers.**

We will develop/practise skills including:

- **Application of knowledge to different scenarios**
- **Research skills**

Some of the vocabulary that we will use includes:

LAN, WAN, Client-server network, Peer-to-peer network, Wireless access point, Router, Switch, NIC, Transmission media, The internet, Client, Network topology, Star topology, Mesh topology.

You could learn more about this topic by:

Craig n Dave Videos – Computer Networks – Click Here
BBC Bitesize – OCR Networks – Click Here
Isaac Computing – Network Fundamentals – Click here
Isaac Computing – The Internet – Click here
Isaac Computing – Network Hardware – Click here

Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are: Topic test, key homework, 1.3 Workbook	

Year 10 Computer Science – System Software

West Kirby Grammar School

Learning about this topic is important because:
Operating Systems are vital components of all computer systems whether they be desktop PCs, laptops or mobile phones. We would not be able to run the applications we like to use without them. We learn about the different roles of the operating system and also about utility software which is used for various background tasks to make your computer more secure, efficient and easier to use.

This builds on:
Y9 Computer Systems 3

This leads to:
Y12 – Operating Systems / Nature of Applications (Autumn 2)

We will learn:

- **The purpose and functionality of operating systems: User interface, Memory management and multitasking, Peripheral management and drivers, User management, File management**
- **The purpose and functionality of utility software**
- **Utility system software: Encryption software, Defragmentation, Data compression.**

We will develop/practise skills including:

- **Research Skills**
- **Creating/labelling/annotating diagrams**

Some of the vocabulary that we will use includes:

Operating system, User interface, Memory management, Multitasking, Peripheral management, Driver, User management, File management, Utility software, Encryption, Defragmentation, Data compression

You could learn more about this topic by:

BBC Bitesize OCR System Software – Click Here
Craig n Dave Videos – System Software – Click Here
Isaac Computing – Operating Systems – Click Here

Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are: Topic test, key homework, 1.5 Workbook

Year 10 Computer Science – Language Categories and Translators

West Kirby Grammar School

Learning about this topic is important because:
We learn about how IDEs (Integrated Development Environments) help programmers write, debug and run their code. This will help with the programming element of the GCSE, especially the 'producing robust programs' topic in Year 13.

This builds on:
2.2 Programming Techniques (Y10 Autumn 1)

This leads to:
2.3 Producing Robust Programs (Y11 Spring 1)

We will learn:

- **Characteristics and purpose of different levels of programming language: High-level languages, Low-level languages**
- **The purpose of translators**
- **The characteristics of a compiler and an interpreter**
- **Common tools and facilities available in an IDE: Editors, Error diagnostics, Run-time environment, Translators**

We will develop/practise skills including:

- **Practical experience of using the tools and facilities of Python IDLE for debugging Python code.**

Some of the vocabulary that we will use includes:

Low-level language, Translator, Compiler, Interpreter, IDE, Error diagnostics, Run-time environment

You could learn more about this topic by:

Craig n Dave Translators and Facilities of Languages – Click Here
BBC Bitesize – Programming Languages and IDEs – Click Here
Isaac Computing – High and low level languages – Click Here
Isaac Computing – Translators – Click Here
Isaac Computing – IDEs – Click Here

Your teacher will assess your knowledge & understanding throughout the topic by looking at your work, questioning, discussion and giving you feedback in lots of different ways. The key pieces of work in this topic are: Topic test, key homework, 2.5 Workbook

Year 10 Computer Science – Language Categories and Translators