KS4 Curriculum Map: ELECTRONICS

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Year 10	Electronic systems & subsystems/Circuit concepts Core Ideas: Block diagrams; Input, process, output. Circuit symbols. Current & Voltage rules in series & parallel circuits. Voltage, current, resistance, energy & power calculations.	Resistive components in circuits/Switching circuits Core Ideas: Resistors in series & parallel. Use of resistive sensors, i.e. LDR, Thermistor. Use of Voltage Dividers and their application in sensing sub-systems. Pull-up & pull-down resistors. Calculating current limiting resistor values.	Switching circuits Core Ideas: Describe & analyse the behaviour of npn transistor and MOSFET switching circuits. Select formulae and perform appropriate calculations on npn transistor & MOSFET switching circuits. Describe and analyse the behaviour of Op-Amp Comparator circuits. Compare behaviour of npn transistor, MOSFET, and Comparator switching circuits. Use data sheets to design npn transistor, MOSFET, and Comparator switching circuits.	Application of Diodes/Combinational logic Core Ideas: Describe I-V characteristics of a silicon diode. Describe use of diodes for component protection and half-wave rectification. Describe the use of Zener Diodes in voltage regulation circuits. Recognise the difference between Analogue & Digital signals. Identify & use NOT, AND, OR, NAND, NOR gates & their corresponding truth tables. Produce truth tables for a given specification or given logic circuit. Use truth tables to analyse a system of logic gates. Apply Boolean Algebra to describe & simplify a combination of logic gates. Design Logic Systems to solve problems. Simplify Logic Systems using NAND gate redundancy.	Timing circuits Core Ideas: Describe how an RC network can provide a time delay. Describe how the voltage across a Capacitor and RC network will change over time (charging & discharging). Interpret Voltage-Time graphs for Monostable & Astable circuits. Describe the action of a Monostable timing circuit and apply the timing formula. Describe the action of an Astable timing circuit. Apply formulae to calculate frequency and Mark-Space ratio of a n Astable circuit. Use of Oscilloscope to measure frequency and amplitude of waveforms.	NEA - Begin coursework Core Ideas: Identify problem & formulate brief. Research problem. Write specification in qualitative and quantitative terms. Apply knowledge of Sub-system development to generate design ideas.
	Core Skills: Applying knowledge of components & systems in unfamiliar contexts. CAD development of circuits. Prototype board circuit construction. Selection & application of formulae. Use of test equipment.					
Year 11	NEA/Sequential logic systems Core Ideas: NEA - Sub-system development. Building & testing sub-systems. Edge triggered flip flops used in data transfer, latches, 1 & 2-bit binary up-counters. Use of 7 segment displays. Describe action of and draw timing diagrams for binary & BCD counters. Recognise & analyse block diagrams &	Interfacing Digital to Analogue Circuits Core Ideas: NEA - Final construction and testing. Describe the action of a Scmitt Inverter and its use in debouncing signals produced by mechanical switches & analogue sensors. Compare properties of transistors, Comparators, and Schmitt Inverters as interfaces between analogue & digital	Control circuits Core Ideas: NEA - Evaluation. Definition of a Microcontroller as a Programmable integrated circuit. Interface Sensing sub-systems & output devices to microcontrollers. Design & analyse flowcharts. Describe applications of microcontrollers. Understand the reasons for their adoption as standard	Operational Amplifiers Core Ideas: State that amplifiers increase the power or voltage of signals and apply the power formulae. Draw a Gain-Frequency graph for an amplifier and measure Bandwidth. Understand the application of Gain-Bandwidth Product. Produce & interpret Voltage-Time graphs for the input & outputs signals of	Revision Core Ideas: Re-visit theory covered in Year 10 & 11. Past paper questions.	

	timing diagrams for single digit decimal counting systems. Design & analyse counters (which reset at a given value) and combinational logic required to produce a given sequence. Design a sequencer using a 4017 decade counter.	systems. Design interface circuits using npn transistors, MOSFETs, and Comparators to interface input sensors to outputs.	technology in the vehicle and domestic appliance industry. Use the following operations in flowcharts - input/output, counting, branching, testing, time delays, and simple arithmetic operations. Describe the use of a servo for positional control in a microcontroller system.	amplifiers. Draw & analyse circuits for Op-Amp non-inverting & inverting amplifiers. Show graphically how clipping distortion may affect the output signal of an amplifier. Select and use amplifier gain formulae. Draw and analyse circuit diagrams for mixers based upon a Summing amplifier Apply the Summing amplifier equation. Draw a block diagram of a typical amplifier system consisting of signal source, preamplifier, power amplifier and loudspeaker.	
	Core Skills: CAD development of circuits. Prototype board circuit construction. Selection & application of formulae. Use of test equipment.				