# OCR Level 1/Level 2 Cambridge National Certificate in Engineering Programmable Systems (EPS)

# Curriculum Intent 2023-2025

| Core intent of subject at key stage 4 |
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| The intent of our Engineering Programmable Systems is to inspire and equip students with the confidence to use skills that are relevant to the design & maintenance, installation and repair sector and more widely. It covers electronic circuits, the components and devices used in electronic and programmable systems, and how to construct and test them.  This curriculum is to ensure students have the ultimate experience and understanding of Engineering Programmable Systems processes.<br><br>The Engineering Programmable Systems will encourage students to understand and apply the fundamental principles and concepts of Engineering Programmable Systems this will include the principles of electronic circuits, the components and devices used in electronic and programmable systems, and how to construct and test them. Students will also develop learning and practical skills that can be applied to real-life contexts and work situations, to think creatively, innovatively, analytically, logically and critically. Students will develop independence and confidence in using skills that would be relevant to the maintenance, installation and repair sector and more widely use computer aided design (CAD) software to produce diagrams and simulate circuits. Further development will be to develop the skill and knowledge to construct and test electronic circuits for a specific purpose, using tools and equipment to assemble printed circuit boards. To solve problems using microcontroller programs to develop programmable systems and test that they solve such problems.<br><br>The three components focus on the assessment of knowledge, skills and practices. These are all essential to developing a basis for progression and, therefore, learners need to achieve all units in order to achieve the qualification. The units are interrelated and they are best seen as part of an integrated course rather than as totally distinct study areas.<br><br>Students are given the opportunity to build their confidence in understanding the sector, vocational contexts and vocational attributes over a long period during the course of study before they are assessed.  Students taking this course are exposed to a wide range of engineering programable systems related to electronic processes including Computer Aided Design and machining. Students will be inspired by these experiences and motivated to develop and apply their gained engineering knowledge during the project tasks. Most pupils experience a massive sense of achievement as they complete the tasks and look back at their journey over the making of a product and on their personal development.<br><br>Engineering Programmable Systems is an essential key component of industry locally, nationally and globally. Students work on projects and gain community involvement through working with local companies. With the delivery of our course, the current Labour Market trends and the |

development of our careers provision, we are using engineering to help the students gain important skills and choose their desired pathway. The skills learned in engineering support many industry and employment types vocationally and academically.

Completing this course provides advantageous preparation for students wishing to undertake further Engineering, Electronics or technology-based education at KS5 and provides experience and knowledge sought by employers in the industrial engineering community.

## Trips and visits

NA

## Assessment

You will study how electronic and programmable technologies work and have the opportunity to apply what you learn through a number of practical experiences.  This will involve you studying three mandatory units:

### R047: Principles of electronic and programmable Systems
This is assessed by an exam.
In this unit you will learn about the relationships between voltage, current, resistance and power, and the ways in which systems are represented, tested and assembled.
Topics include:
- Basic electronic circuit principles
- Electronic and programmable systems, components and devices
- Methods of prototyping and testing systems and circuits
- Commercial circuit production and construction methods.

### R048: Making and testing electronic circuits
This is assessed by a set assignment.
In this unit you will learn how to use Computer Aided Design (CAD) software to simulate electronic circuits, as well as how to construct and test them.
Topics include:
- Drawing and simulating electronic circuits
- Constructing electronic circuits
- Testing electronic circuits

### R049: Developing programmable systems
This is assessed by a set assignment.

In this unit you will learn how to how to determine hardware and system requirements to meet a given brief, and select appropriate input and output devices.
Topics include:

- Plan the development of programmable systems
- Develop programmable systems
- Test programmable systems.

## Homework

Homework is set when required due to set hours for learning approximately 20 hrs all work will need to be completed. There will be a few set tasks that will need completing due to some tasks either not completed or missed due to absence will also need to be completed. It is essential that students have access to a computer to support the homework tasks for all units at school and at home

## Clubs and/or intervention

Catch up Unit sessions will be held at lunch times and after school. Timings TBC annually and will be found on the school website

## Parental/Carer support

Attendance to parents evening.
Support your son/daughter by purchasing the supporting textbook/revision guides.
Allow your child to attend catch up sessions, especially when producing the Unit Projects
Home access to a computer.

## Helpful sources of information

The course specification and support resources can be found here: OCR Website
www.technologystudent.com

## Connections to future pathways

**Careers:** Electrical Engineer, Design Engineer, Electronic Technician, Software Engineer, Robotics, Communications, Research & Development, Systems Designer, Programmer, 3D Designer.
**Future learning:** A Level: Design and Technology, Electronics. Vocational: Engineering. **T Level:** Maintenance, Installation and Repair for Engineering and Manufacturing. Apprenticeship: Design and Development Technician.

# Year 10 Overview

| Autumn 1 | Big Idea: Internally Assessed – Skills Based Project |
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| | Steady hand game project. In this project students will develop a basic understanding of electronic components, developing a circuit diagram and simulating the effects of change. 2022-2024 y10 students have not completed any electronics during KS3 mainly due to covid issues. So, this small project is to gain some understanding of the design and make process whilst working safely and understanding the application of a small number of components.

For this project we will cover all TA's of R048.

**Rationale:** Provides some progression from Key Stage 3 project work • Offers relevant and interesting content for study • Focuses on the production of a circuit • Students have the opportunity to work with a wide range of tools and components. |

| Term | Knowledge | Assessment | Connections to Learning |
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| | **Start with a simple skills-based project to develop supportive**<br><br>**Topic Area 1: Drawing and simulating electronic circuits**<br>You are to use appropriate Computer Aided Design (CAD) software to test the circuit functions correctly, and to produce a Printed Circuit Board (PCB) layout you will need to consider:<br><br>• draw the circuit schematic in the CAD software.<br>• simulate the circuit operation to show that the circuit functions correctly.<br>• produce a PCB layout showing both track and component views | All content will be assessed with feedback against the OCR Set Assignment criteria.<br><br>Produces circuit schematic diagram with using CAD software.<br><br>Undertakes testing of the circuit, using circuit simulation and test features of CAD software prior to PCB design, to show the circuit functions correctly. Making changes based on the outcomes of testing.<br><br>Uses CAD software to produce a PCB layout showing track and component views, with partial accuracy. | **Prior Learning**<br><br>Y9 skills development undertaking project work.<br><br>Skills developed in KS3 ICT working with computers.<br><br>**1 Personal development**<br><br>CAD software, hardware and equipment, application of mathematical principles.<br><br>➤ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits,* |

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| | | | *calculating area of volume of shapes.*<br>➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➢ *Oracy – saying key terminology, open discussions in the classroom.* |
| | **Topic Area 2: Constructing electronic circuits**<br><br>You are to use your PCB design from Task 1 to safely manufacture a PCB and construct a working circuit you need to consider:<br><br>• Safely produce a PCB<br>• Safely construct the circuit<br>• Assembling the PCB with components<br>• Using tools and equipment safely and correctly<br>• Wiring external connections and components to the completed PCB | Demonstrates skills to produce a PCB using an appropriate method to produce a PCB.<br><br>Demonstrates skills to populate and assemble a PCB using correct tools and equipment.<br><br>Worked safely with an understanding of safety requirements. | **Prior Learning**<br><br>Skills developed in KS3 ICT working with CAD software.<br><br>**1 Personal development**<br><br>CAD software, hardware and equipment, application of mathematical principles.<br><br>➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.* |

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| | | | ➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➢ *Oracy – saying key terminology, open discussions in the classroom.* |
| | **Topic Area 3: Testing electronic circuits**<br><br>On completion of the PCB and circuit construction, you must test and evaluate its construction and operation against the design specification of the kitchen timer you need to consider:<br><br>• Perform a visual inspection and functional testing of the assembled PCB<br>• Identify any faults in your own circuit, or another circuit supplied by your teacher if yours works first time<br>• Produce a final evaluation of the construction of the circuit and the operation of the circuit compared to the design specification. | Undertakes visual and functional testing of the operation of the electronic circuit.<br><br>Undertakes fault identification in electronic circuits.<br><br>Undertakes an evaluation of final circuit construction and its operation. | **Prior Learning**<br><br>Y9 skills in evaluating and improving artifacts in past projects.<br><br>**1 Personal development**<br><br>Knowledge and application of electrical and electronic principles. Application of mathematical principles.<br><br>➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.*<br>➢ *Literacy – reading instructions, key terminology* |

| | | | lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation. |
| | | | ➤ *Oracy – saying key terminology, open discussions in the classroom.* |

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| **Autumn 2** | **Big Idea: Internally Assessed – Unit R048: making and testing electronic circuits leading toward the Set Assignment.** TA1 - First part of this assessment will follow the same TA1 as the Steady Hand Game, but it will be expected that student will develop a comprehensive portfolio to meet the assessment expectations. Knowledge and understanding of basic electronic theory, components, PCB manufacture, construction and testing could be integrally taught alongside practical activities and skills developed for the other two NEA units. This should provide an excellent opportunity to contextualise electronic design and construction techniques and programable systems development alongside practice, to internalise learning and to prepare students for the terminal assessment. Students will be able to use CAD software to draw, simulate, modify, and virtually test an electronic circuit. Through practice they will become confident in placing components, wiring up circuits on screen and performing simulation and testing using virtual instruments. **Projects:** Lesson content will focus on a set assignment, subject still pending. **Rationale:** Provides sound progression from Key Stage 3 • Offers relevant and interesting content for study • Focuses on the production of an Electronic circuits and components • Students have the opportunity to work with a wide range of CAD. |

| Term | Knowledge | Assessment | Connections to Learning |
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| **Autumn 2** | **TASK 1: Drawing and simulating electronic circuits** | All content will be assessed with feedback against the OCR Set Assignment criteria. | **Prior Learning** |

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| | You are to use appropriate Computer Aided Design (CAD) software to test the circuit functions correctly, and to produce a Printed Circuit Board (PCB) layout you will need to consider:<br><br>• draw the circuit schematic in the CAD software.<br>• simulate the circuit operation to show that the circuit functions correctly.<br>• produce a PCB layout showing both track and component views | Produces circuit schematic diagram with using CAD software.<br><br>Undertakes testing of the circuit, using circuit simulation and test features of CAD software prior to PCB design, to show the circuit functions correctly. Making changes based on the outcomes of testing.<br><br>Uses CAD software to produce a PCB layout showing track and component views, with partial accuracy. | Y9 skills in evaluating and improving artifacts in past projects.<br><br>**1 Personal development**<br>Use of CAD software. Knowledge and application of electrical and electronic principles. Application of mathematical principles.<br><br>➤ *Numeracy – measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.*<br>➤ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➤ *Oracy – saying key terminology, open discussions in the classroom.* |

| Spring 1 | **Big Idea: Internally Assessed – Unit R048: making and testing electronic circuits leading toward the Set Assignment.** TA2 – 2nd part of this assessment will follow the same subject areas of the Steady Hand Game, but it will be expected that student will develop a comprehensive portfolio to meet the assessment expectations. Students will be able to take their on-screen circuits and produce PCB layouts ready for manufacture. They will be able to physically manufacture a PCB and practice using circuit construction techniques to be able to assemble components to the PCB to construct working circuits. Safe working in all practical activities will be an essential theme. This will prepare them well for undertaking the NEA assessment in R048 <br><br> **Projects:** Lesson content will focus on a set assignment, subject still pending. <br><br> **Rationale:** Provides sound progression from Key Stage 3 • Offers relevant and interesting content for study • Focuses on the production of an electronic circuits and components • Students can work with a wide range of components, CAD and CAM processes. |
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| Term | Knowledge | Assessment | Connections to Learning |
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| | **TASK 2: Constructing electronic circuits** <br><br> You are to use your PCB design from Task 1 to safely manufacture a PCB and construct a working circuit you need to consider: <br><br> • Safely produce a PCB <br> • Safely construct the circuit <br> • Assembling the PCB with components <br> • Using tools and equipment safely and correctly <br> • Wiring external connections and components to the completed PCB | All content will be assessed with feedback against the OCR Set Assignment criteria. <br><br> Demonstrates skills to produce a PCB using an appropriate method to produce a PCB. <br><br> Demonstrates skills to populate and assemble a PCB using correct tools and equipment. <br><br> Worked safely with an understanding of safety requirements. | **Prior Learning** <br><br> Skills developed in KS3 ICT working with CAD software. <br><br> **1 Personal development** <br> Knowledge and application of electrical and electronic principles. Application of CAD to manufacture PCBs. <br><br> ➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.* |

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| | | | ➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➢ *Oracy – saying key terminology, open discussions in the classroom.* |

| Term | Knowledge | Assessment | Connections to Learning |
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| **Spring 2** | **Big Idea: Internally Assessed – Unit R048: making and testing electronic circuits leading toward the Set Assignment.**<br>TA3 – 3rd part of this assessment will follow the same subject areas of the Steady Hand Game, but it will be expected that student will develop a comprehensive portfolio to meet the assessment expectations. Testing includes both virtual testing using virtual instruments in CAD software, and safe physical testing through visual inspection and using physical test instruments. Students will practice both virtual and physical testing, following safe working procedures, in preparation to undertake the NEA assessments in both R048 and R049.<br><br>**Projects:** Lesson content will focus on a set assignment, subject still pending.<br><br>**Rationale:** Provides sound progression from Key Stage 3 • Offers relevant and interesting content for study • Focuses on the production of an electronic circuits and components • Students can work with a wide range of components, CAD and CAM processes. | | |

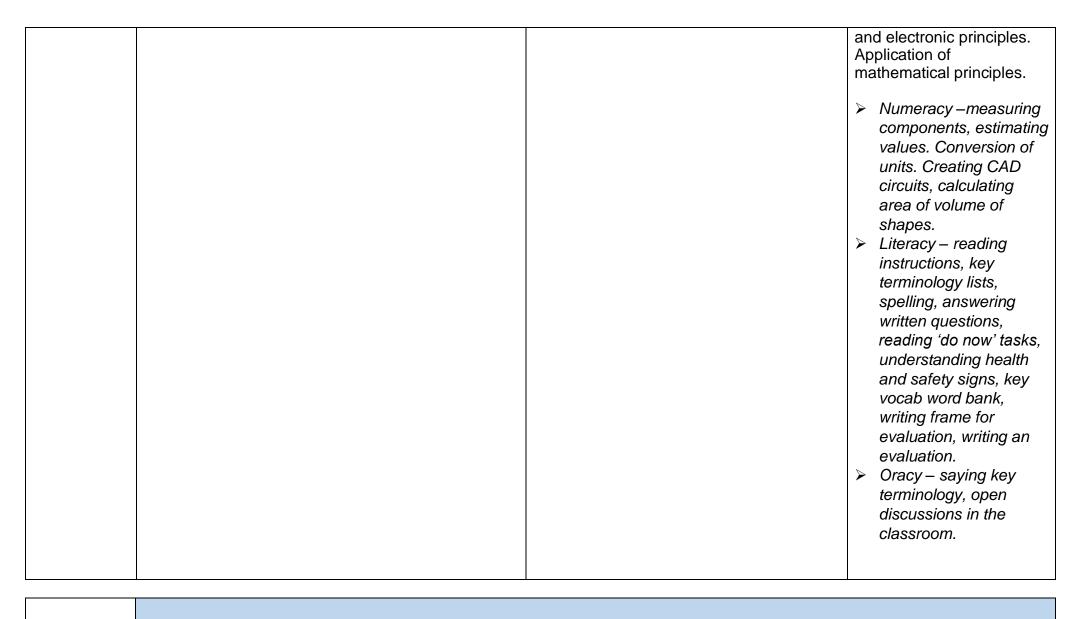| | | | |
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| | **TASK 3: Testing electronic circuits**<br><br>On completion of the PCB and circuit construction, you must test and evaluate its construction and operation against the design specification of the kitchen timer you need to consider:<br><br>- Perform a visual inspection and functional testing of the assembled PCB<br>- Identify any faults in your own circuit, or another circuit supplied by your teacher if yours works first time<br>- Produce a final evaluation of the construction of the circuit and the operation of the circuit compared to the design specification. | All content will be assessed with feedback against the OCR Set Assignment criteria.<br><br>Undertakes visual and functional testing of the operation of the electronic circuit.<br><br>Undertakes fault identification in electronic circuits.<br><br>Undertakes an evaluation of final circuit construction and its operation. | **Prior Learning**<br>Y9 skills development undertaking the magazine project.<br>Skills developed in KS3 ICT working with graphics.<br><br>**1 Personal development**<br><br>Knowledge and application of electrical and electronic principles. Application of mathematical principles. Using industry standard electrical test equipment.<br><br>➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.*<br>➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.* |

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| | | | ➢ *Oracy – saying key terminology, open discussions in the classroom.* |
| | **Set Assignment.**<br>Students have to complete a set assignment based on a Circuit project yet to be set by OCR<br><br>This is the outcome of the taught lessons covering TA1, TA2 & TA3 where student use their knowledge gained and apply through the above set assignment<br><br>Some exam restrictions may apply | All content will be assessed with feedback against the OCR Set Assignment criteria. | **Prior Learning**<br>Previous terms practice.<br><br>➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.*<br>➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➢ *Oracy – saying key terminology, open discussions in the classroom.* |

## R048 Unit to be handed in, assessed, and moderated by OCR

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| **Summer 1** | **Big Idea: Internally Assessed – Unit R049: Developing programmable systems.**<br>**Focus; Topic Area 1: Plan the development of programmable systems.**<br><br>The use of block diagrams and knowledge of programmable devices and programming languages will be required when practically developing a programmable system. How to use testing techniques and test equipment, both virtual and safe physical testing, will be required when constructing and testing a circuit and when connecting and testing a programmable system solution. Through integrating theory with practical activities required in NEA units, and using mock and practice assessments, students will be well prepared for the terminal examination in R047. They will be able to relate theory to practice, and to put into context responses to questions they are asked.<br><br>**Rationale:** Provides sound progression from Key Stage 3 • Offers relevant and interesting content for study • Focuses on the production of a Graphic Product • Students have the opportunity to work with a wide range of materials |

| Term | Knowledge | Assessment | Connections to Learning |
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| | **Topic Area 1: Plan the development of programmable systems.**<br><br>Linking to R047 students will Draw block diagrams of programmable systems, including, you need to consider:<br>• draw a block diagram to represent the system<br>• determine and justify the hardware and software requirements for the chosen programmable system including; Type of microcontroller, Programming language to be used, including method of downloading the program to the programmable device, Input and output devices required | All content will be assessed with feedback against the OCR Set Assignment criteria.<br><br>Draws a block diagram with accuracy for a programmable system.<br><br>Provides a justification of the hardware and software requirements to satisfy the programmable system problem. | **Prior Learning**<br>Supported learning and understanding will be gained from previous or taught in tandem lessons of R047 & R048<br><br>Knowledge developed in KS3 ICT working with graphics<br><br>**1 Personal development**<br>Using computer software to program electronic controllers.<br>Knowledge and application of electrical |

and electronic principles. Application of mathematical principles.

➢ *Numeracy – measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.*
➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*
➢ *Oracy – saying key terminology, open discussions in the classroom.*

| | **Big Idea: Internally Assessed – Unit R049: Developing programmable systems.** <br> **Focus; Topic Area 2: Develop programmable systems.** |
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| **Summer 2** | The use of block diagrams and knowledge of programmable devices and programming languages will be required when practically developing a programmable system. How to use testing techniques and test equipment, both virtual and safe physical testing, will be required when constructing and testing a circuit and when connecting and testing a programmable |

system solution. Through integrating theory with practical activities required in NEA units, and using mock and practice assessments, students will be well prepared for the terminal examination in R047. They will be able to relate theory to practice, and to put into context responses to questions they are asked.

**Rationale:** Provides sound progression from Key Stage 3 • Offers relevant and interesting content for study • Focuses on the production of a Graphic Product • Students have the opportunity to work with a wide range of materials

| Term | Knowledge | Assessment | Connections to Learning |
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| | **Topic Area 2: Develop programmable systems**<br><br>Linking to TA1 and learning in R047 you will program your programmable system planned in Task 1 to meet the requirement of the specification, you need to consider:<br>• select and use appropriate connection methods. Physically connect chosen input and output devices to the programmable system safely. There is no need to build any circuitry.<br>• produce a microcontroller program selecting the most appropriate programming functions<br>• simulate the operation of the program, making corrections as appropriate based on this simulation<br>• download the program to the programmable system safely<br>• ask your teacher to complete a Teacher Observation Record for this task | All content will be assessed with feedback against the OCR Set Assignment criteria.<br><br>Appropriate connection methods selected. Physically connect input and output devices to a programmable system safely.<br><br>Produces a program that solves aspects of the programmable system problem. Selects appropriate programming functions. Produce a program.<br><br>Undertakes simulation of the program to ensure its functionality. Make any necessary corrections. Safely download the program to a programmable system. | **Prior Learning**<br>Supported learning and understanding will be gained from previous or taught in tandem lessons of R047 & R048<br><br>Knowledge developed in KS3 ICT working with graphics<br><br>**1 Personal development**<br>Using computer software to program electronic controllers.<br>Knowledge and application of electrical and electronic principles. Application of mathematical principles.<br><br>➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.* |

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| | | | ➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➢ *Oracy – saying key terminology, open discussions in the classroom.* |

# Year 11 Overview

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| **Autumn 1** | **Big Idea: Internally Assessed – Continue, review, and refine.**<br>**Unit R049: Developing programmable systems.**<br>**Focus; Task 2: Develop programmable systems.**<br><br>The use of block diagrams and knowledge of programmable devices and programming languages will be required when practically developing a programmable system. How to use testing techniques and test equipment, both virtual and safe physical testing, will be required when constructing and testing a circuit and when connecting and testing a programmable system solution. Through integrating theory with practical activities required in NEA units, and using mock and practice assessments, students will be well prepared for the terminal examination in R047. They will be able to relate theory to practice, and to put into context responses to questions they are asked.<br><br>**Rationale:** Provides sound progression from Key Stage 3 • Offers relevant and interesting content for study • Focuses on the production of a Graphic Product • Students have the opportunity to work with a wide range of materials |

| Term | Knowledge | Assessment | Connections to Learning |
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| **Autumn 1** | **Topic Area 2: Develop programmable systems**<br><br>You will have completed part of Task 2 in Y10. During this term we will complete any outstanding work from T1 & T2. Work will be handed in and assessed for improvements. Students will ensure all below is completed:<br>• select and use appropriate connection methods. Physically connect chosen input and output devices to the programmable system safely.  There is no need to build any circuitry.<br>• produce a microcontroller program selecting the most appropriate programming functions | All content will be assessed with feedback against the OCR Set Assignment criteria.<br><br>Appropriate connection methods selected. Physically connect input and output devices to a programmable system safely.<br><br>Produces a program that solves aspects of the programmable system problem. Selects appropriate programming functions.  Produce a program.<br><br>Undertakes simulation of the program to ensure its functionality. Make any necessary corrections. Safely download the program to a programmable system. | **Prior Learning**<br>Supported learning and understanding will be gained from previous or taught in tandem lessons of R047 & R048<br><br>Knowledge developed in KS3 ICT working with graphics<br><br>**1 Personal development**<br>Using computer software to program electronic controllers.<br>Knowledge and application of electrical and electronic principles. Application of mathematical principles. |

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| | <ul><li>simulate the operation of the program, making corrections as appropriate based on this simulation</li><li>download the program to the programmable system safely</li><li>ask your teacher to complete a Teacher Observation Record for this task</li></ul> | | <ul><li>*Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.*</li><li>*Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*</li><li>*Oracy – saying key terminology, open discussions in the classroom.*</li></ul> |

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| **Autumn 2** | **Big Idea: Externally Assessed – Unit R047: Principles of electronic and programmable systems.**<br>**Focus; Topic Area 1: Basic electronic circuit principles.**<br>**Focus; Topic Area 2: Electronic and programmable systems, components, and devices.**<br>**Topic Area 3: Methods of prototyping and testing systems and circuits & Topic Area 4: Commercial circuit production and construction methods.**<br><br>In this unit, you will learn the key principles that underpin how electronic and programmable technologies work. You will learn about the relationships between voltage, current, resistance and power, and the ways in which systems are represented, tested |

and assembled commercially.  You will also develop your knowledge and understanding of electronic circuit components, including what different types of sensors and output devices do, and the methods used to program microcontrollers.

This unit is supported and supports units R048 & R049.
**Unit R047 is a written exam paper and will lead to a 1 hour 30 minute exam in January (Y11)**

**Rationale:** Provides sound progression from Key Stage 3 • Offers relevant and interesting content for study • Focuses on the production of a Graphic Product • Students have the opportunity to work with a wide range of materials

| Term | Knowledge | Assessment | Connections to Learning |
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| | **Topic Area 1: Basic electronic circuit principles.**<br><br>Linking to R048 students will cover electronic circuit parameters, you need to consider:<br>• Electronic circuit parameters and their SI or SI derived units of measurement<br>• Unit multiples and submultiples<br>Students also need to consider electronic circuit theory, laws and associated calculations which examines:<br>• Circuit theory<br>• The relationship between voltage, current and resistance<br>• The relationship between power, current and voltage | Focused Mock exam base on prior units and R048 and this unit R047-TA1 will be set. This will be demonstrated by showing an understanding of the content of the opposite tasks.<br><br>Assessment will be done during lessons and practice papers/mock exams | **Prior Learning**<br>Supported learning and understanding will be gained from previous or taught in tandem lessons of R048 and support R049<br><br>Knowledge developed in KS3 ICT working with graphics<br><br>➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.*<br>➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health* |

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| | | | *and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➤ *Oracy – saying key terminology, open discussions in the classroom.* |
| | **Topic Area 2: Electronic and programmable systems, components and devices.**<br><br>Linking to R049 students will cover Methods of representing electronic circuits and systems and interpretation of them, you need to consider:<br>• The systems approach and system block diagrams<br>• Circuit schematics<br>• Printed circuit board (PCB) layouts<br>Students also need to consider the purpose, function and typical applications of electronic circuit components and devices including the recognition and interpretation of circuit symbols which examines:<br>• Input components and devices, switches and sensors<br>• Process components and devices<br>• Output components and devices<br>• Drivers and interface devices<br>• Passive components<br>• Power supplies<br>• Wiring types and their characteristics | Focused Mock exam base on prior units and R048 and this unit R047-TA1 will be set. This will be demonstrated by showing an understanding of the content of the opposite tasks.<br><br>Assessment will be done during lessons and practice papers/mock exams | **Prior Learning**<br>Supported learning and understanding will be gained from previous or taught in tandem lessons of R048 and support R049<br><br>Knowledge developed in KS3 ICT working with graphics<br>➤ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.*<br>➤ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key* |

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| | Students also need to consider programmable components and systems which examines:<br>• The main characteristics and typical applications of programmable components<br>• Types of programming languages and systems and their main features | | *vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➢ *Oracy – saying key terminology, open discussions in the classroom.*<br><br>**1 Personal development**<br>Using computer software to program electronic controllers.<br>Knowledge and application of electrical and electronic principles. Application of mathematical principles. |
| | **Topic Area 3: Methods of prototyping and testing systems and circuits.**<br><br>Linking to R048 & R049 students will cover the purpose and characteristics of methods of prototyping circuits and systems, you need to consider:<br>• CAD modelling and simulation of circuits and programmable systems, Modular systems kits, Breadboards, Stripboarding and Printed circuit boards (PCBs)<br>Students also need to consider the main characteristics, purpose and use of physical and virtual measurement and test equipment which examines:<br>• Multimeter, Continuity tester, Oscilloscope, Signal generator & Logic probe | Focused Mock exam base on prior units and R081 LO1 will be set. This will be demonstrated by showing an understanding of the content of the opposite tasks.<br><br>Assessment will be done during lessons and practice papers/mock exams | **Prior Learning**<br>Supported learning and understanding will be gained from previous or taught in tandem lessons of R048<br><br>Knowledge developed in KS3 ICT working with graphics<br><br>**1 Personal development**<br>Using computer software to program electronic controllers.<br>Knowledge and application of electrical and electronic principles. |

| | | | Application of mathematical principles. |
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| | | | ➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.* |
| | | | ➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.* |
| | | | ➢ *Oracy – saying key terminology, open discussions in the classroom.* |
| | **Topic Area 4: Commercial circuit production and construction methods**<br><br>Linking to R048 & R049 students will cover linking to R048 & R049 students will cover printed circuit boards (PCBs), you need to consider:<br>• The methods and processes for safely producing printed circuit boards (PCBs) | Focused Mock exam base on prior units and R081 LO2 will be set. This will be demonstrated by showing an understanding of the content of the opposite tasks.<br><br>Assessment will be done during lessons and practice papers/mock exams | **Prior Learning**<br>Supported learning and understanding will be gained from previous or taught in tandem lessons of R048<br><br>**1 Personal development** |

| | | | Using computer software to program electronic controllers. Knowledge and application of electrical and electronic principles. Application of mathematical principles. |
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| | • The types, characteristics and typical uses of commercial PCBs<br>Students also need to consider the characteristics and processes of commercial circuit assembly methods which examines:<br> • M The types, characteristics and typical uses of commercial PCBs | | ➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.*<br>➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➢ *Oracy – saying key terminology, open discussions in the classroom.* |

| Spring 1 | **Big Idea: Externally Assessed - Unit R047: Pre-Production Skills – Review and January Exam\*** |
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**Big Idea: Internally Assessed – Unit R049: Developing programmable systems.**
**Focus; Topic Area 3: Test programmable systems.**

The use of block diagrams and knowledge of programmable devices and programming languages will be required when practically developing a programmable system. How to use testing techniques and test equipment, both virtual and safe physical testing, will be required when constructing and testing a circuit and when connecting and testing a programmable system solution. Through integrating theory with practical activities required in NEA units, and using mock and practice assessments, students will be well prepared for the terminal examination in R047. They will be able to relate theory to practice, and to put into context responses to questions they are asked.

**Rationale:** Provides sound progression from Key Stage 3 • Offers relevant and interesting content for study • Focuses on the production of a Graphic Product • Students have the opportunity to work with a wide range of materials

| Term | Knowledge | Assessment | Connections to Learning |
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| **Spring 1** | **Task 3: Test programmable systems**<br><br>Linking to TA1 & TA2 and learning in R047 you are required to test the programmable system; you need to consider:<br>• complete a test plan to test that the system meets the specification. You should include; the requirements of the system, test methods to be used, expected outcomes<br>• visually and functionally test your system against the test plan and record your results<br>• produce a final evaluation based on the results of your testing, including; the effectiveness of the program compared to | All content will be assessed with feedback against the OCR Set Assignment criteria.<br><br>Produces a test plan to enable functionality of the programmable system to be tested.<br><br>Records outcomes of testing against the test plan<br><br>Undertakes visual and functional testing of the programmable system, recording outcomes against the test plan.<br><br>Undertakes an evaluation of the programmable system based on testing. | **Prior Learning**<br>Supported learning and understanding will be gained from previous or taught in tandem lessons of R047 & R048<br><br>Knowledge developed in KS3 ICT working with graphics<br><br>➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating* |

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| | the specification, the operational performance of the system hardware, any improvements or changes you would make | | *area of volume of shapes.*<br><br>➤ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br><br>➤ *Oracy – saying key terminology, open discussions in the classroom.* |
| **Spring 2** | **Set Assignment.**<br>Students have to complete a set assignment based on a Systems and Control project yet to be set by OCR<br><br>This is the outcome of the taught lessons covering TA1, TA2 & TA3 where student use their knowledge gained and apply through the above set assignment<br><br>Some exam restrictions may apply | All content will be assessed with feedback against the OCR Set Assignment criteria. | **Prior Learning**<br>Previous terms practice.<br><br>**1 Personal development**<br>Use of CAD software. Knowledge and application of electrical and electronic principles. Application of mathematical principles.<br><br>➤ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating* |

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| | | | *area of volume of shapes.*<br>➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.*<br>➢ *Oracy – saying key terminology, open discussions in the classroom.* |

**R049 Unit to be handed in, assessed, and moderated by OCR**

| Summer 1 | **Big Idea: Externally Assessed – Continue with Unit R047: Principles of electronic and programmable systems. Focus; Topic Area 1: Basic electronic circuit principles, Topic Area 2: Electronic and programmable systems, components and devices, Topic Area 3: Methods of prototyping and testing systems and circuits & Topic Area 4: Commercial circuit production and construction methods.**<br><br>**1 hour 30 minute exam in early June (Y11)** |
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| Term | Knowledge | Assessment | Connections to Learning |
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| | **Topic Area 1: Basic electronic circuit principles, Topic Area 2: Electronic and programmable** | Focused Mock exam base on prior units and R047 TA1-4 will be set. This will be demonstrated by showing an understanding of the of Topic Araes and be able to discuss the production of the opposite. | **Prior Learning** Supported learning and understanding will be gained from previous or |

| | **systems, components and devices,** **Topic Area 3: Methods of prototyping and testing systems and circuits &** **Topic Area 4: Commercial circuit production and construction methods.** | • Assessment will be done during lessons and practice papers/mock exams | taught in tandem lessons of R047, R048 & R049 |
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| | | | **1 Personal development** Use of CAD software. Knowledge and application of electrical and electronic principles. Application of mathematical principles. |
| | | | ➢ *Numeracy –measuring components, estimating values. Conversion of units. Creating CAD circuits, calculating area of volume of shapes.* |
| | | | ➢ *Literacy – reading instructions, key terminology lists, spelling, answering written questions, reading 'do now' tasks, understanding health and safety signs, key vocab word bank, writing frame for evaluation, writing an evaluation.* |
| | | | ➢ *Oracy – saying key terminology, open discussions in the classroom.* |

| | **EXAM – to be taken June in Y11**<br><br>**Students do not complete Summer 2** |
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