INCLUDED ON THE
KS4 PERFORMANCE TABLES

ENGINEERING PROGRAMMABLE SYSTEMS

It's easy to join us

Moving to the Cambridge National in Engineering Programmable Systems (J824) from BTEC Tech Award in Engineering (2017)

Are you currently teaching BTEC Tech Award in Engineering (2017)?

This short guide will take a look at our Cambridge National in Engineering Programmable Systems, show you how it compares to the BTEC and how you can easily move to teaching our specification.

Developed with the support of teachers, employers, and subject experts, our Cambridge National in Engineering Programmable Systems has lots of key benefits for teachers and students.

Your students will build:

- real and **relevant** skills for the future
- valuable practical skills in engineering manufacture that are **highly sought after** in the workplace
- a **deep understanding** of the key principles that underpin how electronic and programmable technologies work.

Our specification offers:

- **a highly relevant curriculum** developed with teachers and relating to modern Engineering
- **clear and accessible** course information
- delivery that can be **tailored** to suit your needs
- a simple and intuitive assessment model, with **customisable assessments** to suit your resource base
- a **range of resources and CPD events** to help you understand the requirements of the curriculum
- support from a team of **expert OCR Subject Advisors** who you can call on to provide guidance
- **seamless progression** to Level 3 Vocational Engineering, Design and Technology at A Level, or a range of related Apprenticeships in the sector.

Cambridge Nationals

OCR
Oxford Cambridge and RSA

About our Cambridge Nationals suite

We believe in developing specifications that help you bring the subject to life and inspire your students to achieve more.

We've created teacher-friendly specifications based on extensive research and engagement with the teaching community. They're designed to be straightforward and accessible so that you can tailor the delivery of the course to suit your needs.

You may be interested in this qualification if you want an engaging qualification where your students will use their learning in practical, real-life situations.

We offer a range of support services to help you at every stage, from preparation to delivery:

- **textbooks and teaching and learning resources from leading publishers.** For details of all the published resources that we endorse, check the Cambridge Nationals page on our website
- **free OCR resources** to help you plan your teaching and get your students **ready for assessment**
- an extensive **range of free professional development courses** covering everything from getting started to hands-on assessment practice. There are also regular Q&A opportunities with moderators and examiners. To find out more, visit our professional development page
- Active Results: our **free results analysis service** to help you review the performance of individual students or whole school
- ExamBuilder: our **free question-building platform** that helps you to build your own tests using past OCR exam questions
- **expert Subject Advisors** who are part of their subject communities and here to support you with advice, updates on resources, and information about training opportunities.

Building a future for *all* your students

At a glance specification comparison

	Cambridge National in Engineering Programmable Systems (Included on KS4 performance tables in England)	BTEC Tech Award in Engineering (2017)
Structure	There are three units of assessment. Students must complete all three units of assessment to achieve the qualification.	There are three units of assessment. Students must complete all three units of assessment to achieve the qualification.
Grading	All results are awarded on the following scale: Level 2 – Distinction* (*2), Distinction (D2), Merit (M2), Pass (P2) Level 1 – Distinction (D1), Merit (M1), Pass (P1) and Unclassified.	All results are awarded on the following scale: Level 2 – Distinction* (*2), Distinction (D2), Merit (M2), Pass (P2) Level 1 – Distinction (D1), Merit (M1), Pass (P1) and Unclassified.
Assessment	**R047:** Principles of electronic and programmable systems Exam 1 hour 15 minutes **R048:** Making and testing electronic circuits Internally marked and moderated by OCR OCR-set assignment Approximately 10-12 hours **R049:** Developing programmable systems Internally marked and moderated by OCR OCR-set assignment Approximately 10-12 hours **Set assignments** provided for all NEA units by OCR **June 1 each year**. Teacher guidance highlights typical length to complete and other useful information. **Terminal assessment:** students can take exam as 'practice attempt' before all NEA units completed but can only take the exam for certification once all NEA units have been completed and entered. Can resit the externally assessed unit.	**Component 1** Exploring Engineering Sectors and Design Applications Internally marked and verified, external standards verification by Pearson. Authorised assignment brief set by Pearson, duration not specified and set by IV/SV process. **Component 2:** Investigating an Engineering Project Internally marked and verified, external standards verification by Pearson. Authorised assignment brief set by Pearson, duration not specified and set by IV/SV process. **Component 3** Responding to an Engineering Brief Set task/external assessment taken under supervised conditions. Set and marked by Pearson. Made up of two parts: • Two hours for Part 1: Practical experiment • One and a half hours for Part 2: External Exam Completed during a one-week period timetabled by Pearson. Available in February and May/June. Only one resit available for external assessment New assessment task required. One resubmission of internal assessments possible as part of the IV/SV process Level 1 Pass required in all components to receive an overall grade from P1-D2.

	Cambridge National in Engineering Programmable Systems (Included on KS4 performance tables in England)	BTEC Tech Award in Engineering (2017)
Administration	Traditional paper-based exams in January and June. **NEA Assessments**: students have one resubmission opportunity for NEA units, but any resubmission must be in a series in which the OCR-set assignment is still live. For example, if students have completed the OCR-set assignment in Year 10, they would not be able to resubmit in Year 11 as the OCR-set assignment will be changed annually. This is covered in section 6.4.4 of the specification (page 50). **NEA Assessments**: simple internal assessment processes and structured external moderation of all NEA units by OCR. No requirement for specialist, trained internal verification or centre standards verification. Familiar administration for exam officers	Exam available in February and May/June. NEA Assessments: Internal Verification (for both setting and marking) by trained internal verifier with external standards verification. Standards verification process common across BTEC Entry to Level 3.

Like the delivery of the Engineering qualification through project based learning and the ability to be able make things.

Comparing assessment models

Cambridge National in Engineering Programmable Systems (Included on KS4 performance tables in England)	BTEC Tech Award in Engineering (2017)
Unit R047 **Principles of electronic and programmable systems** 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. OCR-set and marked 70 marks 48 GLH (40%) 1 hour 15 minutes written examination Terminal Assessment	**Component 1** **Exploring Engineering Sectors and Design Applications** Authorised assignment brief set by Pearson, duration not specified and set by IV/SV process. Internally marked and verified, external standards verification by Pearson. Grading – U, P1, M1, P2, M2, D2 (converted to points score from 0 to 36). 36 GLH (30%).
Unit R048 **Principles of electronic and programmable systems circuits** In this unit you will learn the skills required to construct and test electronic circuits. You will learn how to simulate circuits using CAD software and physically inspect and test them once assembled. You will learn how to produce printed circuit boards (PCBs) similar to those used in commercial products and use tools and equipment to populate and assemble them with components. NEA centre-assessed, OCR moderated 60 marks 36 GLH (30%)	**Component 2** **Investigating an Engineering Project** Internally marked and verified, external standards verification by Pearson. Authorised assignment brief set by BTEC, duration not specified and set by IV/SV process. Grading – U, P1, M1, P2, M2, D2 (converted to points score from 0 to 36) 36 GLH (30%)
Unit R049 **Developing programmable systems** In this unit you will learn the skills required to develop programmable systems. You will learn how to draw block diagrams of systems and how to determine hardware and system requirements to meet a given brief, including the selection of appropriate input and output devices. You will use software to program microcontrollers and test systems to make sure that they work correctly. NEA centre-assessed, OCR moderated 60 marks 36 GLH. (30%)	**Component 3** **Responding to an Engineering Brief** Set and marked externally – taken under supervised conditions. Made up of two parts: • Two hours for Part 1: Practical experiment • One and a half for Part 2: External exam Grading – U, P1, M1, D1, P2, M2, D2 (converted to points score from 0 to 48) 48 GLH (40%)

Next steps

If you are an OCR-approved centre, all you need to do is download the specification and start teaching. Your exams officer can complete an intention to teach form which enables us to provide appropriate support. When you're ready to enter your students, you just need to speak to your exams officer.

Unit R047 is examined.

Units R048 and R049 are centre-assessed and OCR moderated.

This specification has two series of assessment availability, each January and June, and does contain a terminal rule for the externally assessed unit. For full details please see section 7.1 and 7.2 of the specification.

1. Get to know the specification, sample assessment materials and teaching resources on the Cambridge National in Engineering Programmable Systems web page.
2. Sign up to receive subject updates by email.
3. Sign up to attend a training event or take part in a webinar on specific topics running throughout the year and our Q&A webinar sessions every half term.

"Popular subject option with our students and engineering has a positive perception with parents which also helps."

And finally...

Detailed comparison of units

Cambridge National in Engineering Programmable Systems (Included on KS4 performance tables in England)			BTEC Tech Award in Engineering (2017)		
R047 Principles of electronic and programmable systems OCR-set and marked 70 marks 48 GLH 1 hour 15 minutes written examination			**Components**		
			Component 1	**Component 2**	**Component 3**
Topic Area 1: Basic electronic circuit principles	1.1	Electronic circuit parameters			
	1.2	Electronic circuit theory, laws and associated calculations			
Topic Area 2: Electronic and programmable systems, components and devices	2.1	Methods of representing electronic circuits and systems and interpretation of them	✘		✘
	2.2	The purpose, function and typical applications of electronic circuit components and devices including the recognition and interpretation of circuit symbols		✘	
	2.3	Programmable components and systems			
Topic Area 3: Methods of prototyping and testing systems and circuits	3.1	The purpose and characteristics of methods of prototyping circuits and systems		✘	
	3.2	The main characteristics, purpose and use of physical and virtual measurement and test equipment			
Topic Area 4: Commercial circuit production and construction methods	4.1	Printed circuit boards (PCBs)		✘	
	4.2	The characteristics and processes of commercial circuit assembly methods			

Cambridge National in Engineering Programmable Systems (Included on KS4 performance tables in England)			BTEC Tech Award in Engineering (2017)		
R048 Making and testing electronic circuits NEA centre-assessed, OCR moderated 60 marks 36 GLH			**Components**		
			Component 1	**Component 2**	**Component 3**
Topic Area 1: Drawing and simulating electronic circuits	1.1	Use Computer Aided Design (CAD) software to produce diagrams and electronic circuits	✘		✘
	1.2	Use CAD software to simulate/test circuit schematics			
Topic Area 2: Constructing electronic circuits	2.1	Safely produce printed circuit boards (PCBs)			
	2.2	Safely use tools and equipment to populate and assemble PCBs with components			
Topic Area 3: Testing electronic circuits	3.1	Safely test and evaluate electronic circuits			
	3.2	Identify common faults in circuits			

Cambridge National in Engineering Programmable Systems (Included on KS4 performance tables in England)	BTEC Tech Award in Engineering (2017)		
Unit R049 Developing programmable systems NEA centre-assessed, OCR moderated 60 marks 36 GLH	**Components**		
	Component 1	**Component 2**	**Component 3**
Does not map to BTEC units			

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on
01223 553998

Alternatively, you can email us on
support@ocr.org.uk

For more information visit
ocr.org.uk/qualifications/resource-finder
ocr.org.uk
facebook.com/ocrexams
twitter.com/ocrexams
instagram.com/ocrexaminations
linkedin.com/company/ocr
youtube.com/ocrexams

We really value your feedback

Click to send us an autogenerated email about this resource. Add comments if you want to. Let us know how we can improve this resource or what else you need. Your email address will not be used or shared for any marketing purposes.

I like this **I dislike this**

Please note – web links are correct at date of publication but other websites may change over time. If you have any problems with a link you may want to navigate to that organisation's website for a direct search.

CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT