CAMBRIDGE ADVANCED NATIONALS IN ENGINEERING (AAQs)
ENGINEERING IN PRACTICE

Year 13

What are the aims and intentions of this curriculum?

The OCR Level 3 Alternative Academic Qualification Cambridge Advanced National in Engineering (Certificate and Extended Certificate) is designed for students aged 16 to 19 who are interested in pursuing a career or further study in the engineering sector. This qualification helps learners develop a solid foundation in engineering principles, problem-solving, and technical knowledge, with a focus on real-world applications. It supports progression to undergraduate engineering courses, higher apprenticeships, or direct employment within the industry. Students will gain practical and theoretical skills through a combination of project-based learning, industry-relevant scenarios, and hands-on experience, ensuring they are well-equipped for the demands of the modern engineering workplace. Available in two sizes: the Certificate (equivalent to half an A Level) and the Extended Certificate (equivalent to one A Level). This qualification can be taken alongside other A Levels or vocational qualifications, offering flexibility in a student's study programme.

Overall, the Cambridge Advanced National in Engineering is ideal for learners who want a focused, technical education with clear pathways to further study or a professional career in engineering.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Autumn 1	Unit F132: Engineering in practice **Topic area 1** **Product analysis**	This unit is assessed by NEA. In this unit you will learn how to analyse products, produce engineering CAD drawings and make a mechanical prototype and a prototype of an electronic circuit. Working on a product with several components, you will focus on one mechanical prototype and one prototype electronic circuit that contributes to the product. You will also evaluate your manufactured prototypes to see how successful they have been. **Topics:** Topic Area 1: Product analysis	By the end of this topic, students will be able to: Identify and analyze the function and purpose of an engineering product, understanding how it meets user needs and requirements. Examine the design features of the product, including materials, components, and construction methods used. Evaluate the performance and quality of the product based on factors such as durability, reliability, safety, and sustainability. Understand and explain the manufacturing processes involved in producing the product. Consider environmental and ethical factors that influence product design and manufacturing,	Internal assessment and NEA

			including sustainability and lifecycle impact. Present a detailed product analysis report, using appropriate technical terminology and supporting evidence.	
Autumn 2	Unit F132: Engineering in practice **Topic area 2 Produce Computer Aided Design (CAD) mechanical and electronic engineering drawings**	This unit is assessed by NEA. This topic area develops students' skills in producing and interpreting technical drawings essential for engineering practice. It focuses on the use of Computer-Aided Design (CAD) software to create precise 2D drawings for both mechanical components and electronic circuits. **Topics:** • Produce a 2D CAD engineering drawing of a mechanical component • Engineering drawing standards • Mechanical features and component • Produce a CAD engineering drawing of an electronic circuit • Engineering drawing standards • Electronic circuit diagrams • Circuit simulation	Proficiency in CAD software for mechanical and electronic engineering. Understanding and application of standard conventions in engineering drawings. Ability to communicate engineering designs clearly and accurately. Practical skills in circuit simulation to test and refine electronic designs.	Internal assessment and NEA
Spring 1	Unit F132: Engineering in practice **Topic area 3 Plan the safe manufacture of a mechanical prototype and an electronic circuit prototype**	This unit is assessed by NEA. In this topic area, students will explore the practical aspects of manufacturing processes and the importance of quality control in engineering production. **Topics:** • Plan the safe manufacture of a mechanical prototype • Plan the safe manufacture of an electronic circuit prototype	By the end of this topic, students will be able to: Produce detailed 2D CAD drawings of mechanical components with accurate dimensions and annotations according to accepted engineering standards. Identify and correctly represent common mechanical features such as holes, slots, threads, fillets, and chamfers in engineering drawings. Create CAD drawings of electronic circuits using correct symbols and layout conventions. Interpret and construct electronic circuit diagrams that clearly illustrate component connections and	Internal assessment and NEA

			functionality. Use circuit simulation software to model and analyze electronic circuits, identifying faults or design improvements. Apply engineering drawing standards consistently to ensure clarity, precision, and professionalism in all technical drawings. Communicate technical information effectively through well-prepared engineering drawings and circuit diagrams.	

Spring 2	Unit F132: Engineering in practice **Topic area 4 Manufacturing processes**	This unit is assessed by an exam. This topic area focuses on the various manufacturing processes used in engineering to transform raw materials into finished products. Students will explore a wide range of techniques and understand how they are selected based on material properties, product design, and production requirements. **Topic:** • **Manufacture a mechanical prototype**	By the end of this task, students will be able to: Interpret engineering drawings and specifications to accurately guide the manufacturing of a mechanical prototype. Select appropriate materials, tools, and equipment for the manufacturing process based on design requirements and safety considerations. Apply suitable manufacturing techniques, such as cutting, drilling, shaping, assembling, or 3D printing, to produce mechanical components. Follow safe working practices and health & safety regulations during the manufacturing process. Assemble and finish the mechanical prototype to meet design tolerances and functional requirements. Carry out quality checks during and after manufacturing to ensure the prototype meets required standards. Evaluate the finished prototype against the original design and identify any areas for improvement or modification..	Internal assessment and NEA
Summer 1	Unit F132: Engineering in practice **Topic area 4 Manufacturing processes**	• Manufacture an electronic circuit prototype	By the end of these topics, students should be able to: Interpret and follow electronic circuit diagrams accurately to guide prototype assembly. Select suitable electronic components and manufacturing tools based on circuit requirements.	Internal assessment and NEA

			Assemble electronic circuit prototypes using appropriate techniques such as soldering and wiring. Apply safe working practices and comply with health and safety regulations during circuit manufacture. Test and troubleshoot the electronic prototype to ensure it functions according to specifications. Conduct quality checks to verify circuit integrity and performance. Evaluate the manufacturing process and prototype outcome, suggesting improvements for efficiency and reliability.	
Summer 2	Unit F132: Engineering in practice **Topic area 5 Evaluate a prototype**	This topic area focuses on the critical aspects of health, safety, and environmental (HSE) practices within engineering environments. Students will develop an understanding of the legal requirements, industry standards, and best practices that ensure safe and sustainable engineering operations. **Topics:** • Evaluate a mechanical prototype • Evaluate an electronic circuit prototype	By the end of these topics, students should be able to: Assess the prototype against its original design specifications and functional requirements. Identify strengths and weaknesses in the prototype's design, materials, and manufacturing quality. Test the prototype's performance under different conditions and record the results. Analyze any faults, failures, or deviations from expected performance and suggest possible causes. Recommend improvements or modifications to enhance the prototype's functionality, durability, or manufacturability.	Internal assessment and NEA

			Reflect on the manufacturing process and evaluate efficiency, cost, and sustainability aspects. Communicate evaluation findings clearly using appropriate technical language and supporting evidence.	