

## Level 3 Cambridge Technicals in Engineering

### Diploma in Engineering (2 A level equivalent) Mechanical Engineering and Design(720GLH)

#### What is a Technical Level?

Cambridge Technicals are vocational qualifications at Level 3 for students aged 16+. They are designed with the workplace in mind and provide a high-quality alternative to A Levels. Vocational education is about educating people in the knowledge and skills required for employment and for the community as a whole. It is also about developing the behaviours and attributes needed to progress and succeed in education and in work. They are for learners over the age of 16 who wish to specialise or progress into a specific sector or occupational group, through advanced/higher apprenticeships, further study or employment. This course seeks to develop your knowledge, understanding and skills required in industry.

For Engineering, there is recognition that a scientific and mathematical core is required. Both employers and higher education institutions need to clearly see evidence of this taught content. It is important that, in an applied/technical qualification, the maths and science content is clearly focussed on Engineering. The course has mandatory content, centre assessment and external assessment to meet the DfE technical guidance.

#### Why study a Technical Level in Engineering?

To provide you with an exciting and practical course that enables you to produce high quality products. During the course, you will develop skills in designing, practical application, manufacturing techniques and problem solving. You will be utilising knowledge from other subjects and you are encouraged to work outside the classroom to get a feel for real life situations and contexts.

#### What makes a successful Technical Level student?

An interest in design, practical work, the use of ICT and a passion for improving products used in society. The ability to work independently and effectively in a team with passion drive and determination.

#### To study this course, what qualifications will I need and in which subjects?

Maths at Grade 5 plus a minimum of 5 GCSEs Grade 4 including English (Lit or Lang). It is desirable that the applicant has at least a Grade 5 equivalent in either GCSE Technology or Level 2 Merits in BTEC Construction or Engineering.

If you have a passion for Design and Technology and Engineering but did not study these courses at GCSE or BTEC you will be considered after discussion with teachers. This course compliments Maths, Science, Physics, Business studies and creative subjects.

#### What is the structure of the course?

Year 12/13	Year 12/13
<p><b>Unit 1 – Mathematics for Engineering</b> This unit will develop your knowledge and understanding of the mathematical techniques commonly used to solve a range of engineering problems.</p> <p><b>You will develop an understanding of how the following are applied in the context of engineering problems :</b> Algebra, the use of geometry and graphs, exponentials and logarithms, the use of trigonometry, calculus, statistics and probability.</p>	<p><b>Unit 3 – Principles of Mechanical Engineering</b> This unit explores how machines and structures are constructed using the principles of mechanical engineering and made up of components and mechanisms working in combination.</p> <p><b>You will develop an understanding of:</b> Systems of forces and types of loading on mechanical components, the fundamental geometric properties relevant to mechanical engineering, levers, pulleys and gearing, the properties of beams and the principles of dynamic systems.</p>
<p>Assessment - Externally assessed examination Percentage of overall qualification (60 GLH)</p>	<p>Assessment - Externally assessed examination Percentage of overall qualification (60 GLH)</p>
<p><b>Unit 2 – Science for Engineering</b> This unit will focus on the science that supports engineering.</p> <p><b>You will develop an understanding of the principles of engineering science listed below and consider how these are applied to a range of engineering situations.</b></p> <p>Applications of SI units and measurement , fundamental scientific principles of mechanical engineering, electrical and electronic engineering, properties of materials, principles of fluid mechanics and the basic principles of thermal physics.</p>	<p><b>Unit 4 – Principles of Electrical and Electronic Engineering</b> This unit covers how electrical and electronic engineers design, test and produce electronic systems and devices that are present in almost every aspect of modern life.</p> <p><b>You will develop knowledge and understanding of fundamental principles of electrical and electronic engineering such as;</b></p> <p>Fundamental electrical principles, alternating voltage and current, electric motors and generators, power supplies and power system protection, analogue electronics and digital electronics.</p>

<p>Assessment - Externally assessed examination (1hr 45mins) Percentage of overall qualification (60 GLH)</p> <p><b>Unit 9 – Mechanical Design</b> This unit is to develop the knowledge, understanding and skills to be successful in the design of mechanical engineering components and products. <b>You will develop knowledge and understanding of:</b> Engineering drawings, both freehand graphical techniques, and more formal drawing techniques. Selecting appropriate engineering materials to achieve design solutions. Producing a design that can be successfully manufactured, and how to optimise a design to improve performance.</p>	<p>Assessment - Externally assessed examination (1hr 45mins) Percentage of overall qualification (60 GLH)</p> <p><b>Unit 10 – Computer Aided Design</b> This unit is to develop the ability to be able to create 3D models using CAD. <b>You will develop the skills of:</b> Producing 2D CAD engineering drawings to appropriate standards and the use of simulation tools within commercial CAD systems. Creating 3D models using CAD and creating 3D assemblies of components.</p>
<p>Assessment - centre assessed /externally quality assured Percentage of overall qualification (60 GLH)</p> <p><b>Unit 11 – Materials Science</b> This unit is to understand material structure and classification, common properties, standard forms and failure modes of engineering materials. <b>You will develop an understanding of:</b> Industrial material processing techniques, and how these are affected by materials' properties, the application and uses of modern and smart materials, testing the suitability of different engineering materials for their intended application.</p>	<p>Assessment - centre assessed /externally quality assured Percentage of overall qualification (60 GLH)</p> <p><b>Unit 13 – Mechanical Operations</b> This unit is to develop the ability to plan for production, and to manufacture components safely. <b>You will develop knowledge of:</b> Manufacturing techniques to include marking out, use of hand tools and the operation of manually controlled machines such as lathes and milling and drilling machines to produce mechanical component. Quality assurance</p>
<p>Assessment - centre assessed /externally quality assured Percentage of overall qualification (60 GLH)</p> <p><b>Unit 17 – Computer Aided Manufacture (CAM)</b> This unit is to gain an understanding of how CAM systems are used within manufacturing. <b>You will learn to:</b> Program and use Computer Numerical Control (CNC) machines to produce components. Produce components using additive manufacturing techniques.</p>	<p>Assessment - centre assessed /externally quality assured Percentage of overall qualification (60 GLH)</p> <p><b>Unit 20 – Business for Engineering</b> This unit is to develop an understanding of how engineering businesses of all sizes survive, develop and manage the different constraints on their activities, through innovation, entrepreneurship and investment. <b>You will learn about:</b> Project management tools and will develop an understanding of financial planning techniques and financial analysis in an engineering context.</p>
<p>Assessment - centre assessed /externally quality assured Percentage of overall qualification (60 GLH)</p> <p><b>Unit 21 – Maintenance</b> This unit is to develop knowledge and understanding of different maintenance strategies and operations, then to be able to plan and undertake maintenance operations. <b>You will be able to:</b> Analyse maintenance data, develop an understanding of failure modes and develop an understanding of how maintenance issues can inform future design.</p>	<p>Assessment - centre assessed /externally quality assured Percentage of overall qualification (60 GLH)</p> <p><b>Unit 22 – Engineering and the Environment</b> This unit is to develop understanding of how engineering impacts on the environment. From legislative, regulatory and ethical perspectives, minimising the impact of engineering on the environment is a high priority. <b>You should be able to evaluate:</b> How environmental concerns both constrain and drive engineering activities and how engineering has developed to keep up with these demands against the backdrop of globalisation and global manufacturing.</p>
<p>Assessment - centre assessed /externally quality assured Percentage of overall qualification (60 GLH)</p>	<p>Assessment - centre assessed /externally quality assured Percentage of overall qualification (60 GLH)</p>

### What opportunities are there for me to study beyond the classroom?

You will be expected to work with real clients and user groups. Therefore, building links with local businesses / industries.

### What kind of career does this subject/qualification prepare me for?

You will learn problem solving and practical skills beneficial to any job or career you may decide to follow. More specific pathways can include: Industrial Product Design / Engineering / Technician & Maintenance / Civil Engineering / 3 Dimensional Design / Constructional Engineering / Surveying / Interior Design / Architecture / Building Control / Design and Marketing / Product Development / Pathways to Teaching and Lecturing.