

### Link to course Spec

- <https://qualifications.pearson.com/en/qualifications/btec-nationals/engineering-2016.coursematerials.html#%2FfilterQuery=category:Pearson-UK:Category%2FSpecification-and-sample-assessments>

## Unit 1 Engineering Principles

Modern life depends on engineers to develop, support and control the products and systems that are all around us. For example, cars, heart rate monitors and manufacturing and transport systems. To make a contribution as an engineer you must be able to draw on an important range of principles developed by early engineering scientists, such as Newton, Young, Faraday and Ohm. There is an increasing demand for 'multi-skilled' engineers who can apply principles from several engineering disciplines to develop solutions. This unit will develop your mathematical and physical scientific knowledge and understanding to enable you to solve problems set in an engineering context. You will explore and apply the algebraic and trigonometric mathematical methods required to solve engineering problems. The mechanical problems you will encounter cover static, dynamic, fluids and thermodynamic systems. The electrical and electronic problems you will encounter cover static and direct current (DC) electricity, DC circuit theory and networks, magnetism, and single-phase alternating current theory. You will apply these engineering principles to solve problems involving more than one of these topic areas.

## Unit 2 Delivery of an Engineering Process as a Team

The use of engineering processes is integral to the manufacture of engineered products and the delivery of engineering services. Thousands of engineering processes are used in the manufacture and service of a complex product, such as an aeroplane. To ensure that these engineering processes can be planned and carried out safely and effectively, engineers must be able to work together to get the job done. It is for this reason that so many engineering companies focus time and effort on understanding engineering processes and developing teamwork. In this unit, you will examine common engineering processes, including health and safety legislation, regulations that apply to these processes and how individual and team performance can be affected by human factors. You will learn the principles of another important process, engineering drawing, and develop two-dimensional (2D) computer-aided drawing skills while producing orthographic projections and circuit diagrams. Finally, you will work as a team member and team leader to apply a range of practical engineering processes to manufacture a batch of an engineered product or to safely deliver a batch of an engineering service. It is important that engineers understand how engineering processes are used to safely transform ideas and materials into products and services, and how critical it is to be able to work as a valuable member of an effective team or as a team leader. This involves the acquisition of both knowledge and practical skills. This unit will help to prepare you for an engineering apprenticeship, a higher education engineering degree or for a technician-level role in a wide range of specialist engineering areas.

## Unit 3 Engineering Product Design and Manufacture

Engineering products are part of our daily lives, from aircraft to the smallest electronic circuits found in medical devices. Engineering products are designed as a result of the identification of a need or opportunity, and then engineers using creative skills and technical knowledge to devise and deliver a new design or improvements to an existing design. For example, advances in the development of fuels led to the first internal combustion engine, and engineers have been improving its design ever since. In this unit, you will examine what triggers changes in the design of engineering products and the typical challenges that engineers face, such as designing out safety risks. You will learn how material properties and manufacturing processes impact on the design of an engineering product. Finally, you will use an iterative process to develop a design for an engineering product by interpreting a brief, producing initial ideas and then communicating and justifying your suggested solution. You will draw on and apply knowledge and understanding from Unit 1: Engineering Principles and Unit 2: Delivery of Engineering Processes Safely as a Team, for example by using calculations to demonstrate a reduction in mass, by sketching using orthographic projection drawing methods or by justifying an engineering process as its use reduces the carbon footprint of a product. In this unit you will draw on your learning from across your programme to complete assessment tasks. It is important that engineers use creative and technical knowledge, understanding and skills to transform ideas into viable products, and that they understand the critical importance of this activity in ensuring that products are both safe and effective. This unit will help prepare you for an engineering apprenticeship, engineering courses in higher education or for technician-level roles in a variety of engineering sectors.

## Unit 10 Computer Aided Design

Computer-aided design (CAD) spans most areas of engineering, as well as aspects of other disciplines such as construction and media. Engineering is a multi-disciplinary vocational subject that uses CAD as part of other processes to develop (design and manufacture), improve and maintain cutting edge products and systems. For example, Formula 1® racing teams test all their cars on bespoke CAD packages to analyse performance and stresses, and make modifications to the cars as a result. In this unit you will use CAD software and hardware to produce 2D and 3D drawings. You will acquire the skills to produce models of products, editing and modifying these, and exploring materials and their properties. You will output a portfolio of drawings, for example orthogonal, 3D shaded or solid model, and detail view drawings, to an international standard. As an engineer it is important to be able to interpret and produce engineering drawings that help individuals and organisations to communicate ideas, design and manufacture products and improve product performance. Studying this unit will help you to progress to employment as a draftsman and gain other technician level roles in engineering. It also prepares you for an engineering-based apprenticeship, and for higher education.

- **Recommended Reading:**

- <https://www.amazon.co.uk/Engineering-Mathematics-John-Bird/dp/1138673595>;
- [https://www.amazon.co.uk/Electrical-Electronic-Principles-Technology-John/dp/1138673528/ref=pd\\_sbs\\_14\\_1/257-6405620-4284059?encoding=UTF8&pd\\_rd\\_i=1138673528&pd\\_rd\\_r=4d7b34a3-5715-4e41-8035-51774263d35d&pd\\_rd\\_w=4sJSH&pd\\_rd\\_wg=8hEFY&pf\\_rd\\_p=2304238d-df78-4b25-a9a0-b27dc7bd722e&pf\\_rd\\_r=YVW93VGM81059QK2SHQM&psc=1&refRID=YVW93VGM81059QK2SHQM](https://www.amazon.co.uk/Electrical-Electronic-Principles-Technology-John/dp/1138673528/ref=pd_sbs_14_1/257-6405620-4284059?encoding=UTF8&pd_rd_i=1138673528&pd_rd_r=4d7b34a3-5715-4e41-8035-51774263d35d&pd_rd_w=4sJSH&pd_rd_wg=8hEFY&pf_rd_p=2304238d-df78-4b25-a9a0-b27dc7bd722e&pf_rd_r=YVW93VGM81059QK2SHQM&psc=1&refRID=YVW93VGM81059QK2SHQM)
- [https://www.amazon.co.uk/Mechanical-Engineering-Principles-3rd-ed/dp/1138781576/ref=pd\\_lpo\\_14\\_img\\_1/257-6405620-4284059?encoding=UTF8&pd\\_rd\\_i=1138781576&pd\\_rd\\_r=3b63d5af-ed4e-47bf-9dc2-31f31d6952f9&pd\\_rd\\_w=WxZjN&pd\\_rd\\_wg=V1xin&pf\\_rd\\_p=7b8e3b03-1439-4489-abd4-4a138cf4eca6&pf\\_rd\\_r=EZPZ6VKBPSEP5K0CSEFE&psc=1&refRID=EZPZ6VKBPSEP5K0CSEFE](https://www.amazon.co.uk/Mechanical-Engineering-Principles-3rd-ed/dp/1138781576/ref=pd_lpo_14_img_1/257-6405620-4284059?encoding=UTF8&pd_rd_i=1138781576&pd_rd_r=3b63d5af-ed4e-47bf-9dc2-31f31d6952f9&pd_rd_w=WxZjN&pd_rd_wg=V1xin&pf_rd_p=7b8e3b03-1439-4489-abd4-4a138cf4eca6&pf_rd_r=EZPZ6VKBPSEP5K0CSEFE&psc=1&refRID=EZPZ6VKBPSEP5K0CSEFE)