

The English Martyrs Catholic School and Sixth Form College

Engineering Y11	<u>Module 1</u>	<u>Module 2</u>	<u>Module 3</u>
<u>Topic Theme and Intent</u>	The purpose of this module is for learners to analyse engineered products in order to propose design solutions to meet requirements. This module also acts as Unit 1 for the overall qualification.	The purpose of this module is for learners to use skills previously developed to produce an engineered product. This module also acts as Unit 2 for the overall qualification.	The purpose of this module is for learners to use their knowledge and understanding of engineering processes and material properties to solve problems. This module also acts as Unit 3 for the overall qualification.
<u>Knowledge</u>	<p>Students will:</p> <ul style="list-style-type: none"> • Understand the basics of flight. • Understand the principles of 'aspect ratio'. • Understand the purpose of a specification. • Understand how to safely produce models. • Understand how to test models. • Understand how to test against the specification. 	<p>Students will:</p> <ul style="list-style-type: none"> • Understand standard symbols and conventions used in engineering drawings. • Understand the importance of identifying the required resources before starting manufacturing. • Understand why it is important to plan for production in engineering. • Understand why it is important to work to 'tolerances' in engineering and understand the consequences of manufacturing products 'out of tolerance'. • Understand why it is important to evaluate and check the accuracy of a piece of work in engineering. • Understand how to conduct tests to evaluate and check the accuracy of a piece of work in engineering. 	<p>Students will:</p> <ul style="list-style-type: none"> • Understand the difference between a range of different materials. • Understand why it is important to test the various properties of different materials. • Understand heat can be used to alter the properties of different materials. • Understand the difference between a 'temporary' and a 'permanent' joint. • Understand what is meant by the terms 'area' and 'volume' in relation to geometric shapes. • Understand what is meant by the terms 'mean', 'median' and 'mode'. • Understand how to calculate the 'mean', 'median' and 'mode' when given a set of data. • Understand the basic principles of electricity and electronics. • Understand what is meant by the term 'energy efficiency'. • Understand what is meant by the term 'CAD CAM' and 'Automation'. • Understand what is meant by the terms 'recycling' and 'sustainability'. • Understand why it is important for the environment for engineering companies to recycle and adopt a

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			sustainable approach to engineering and manufacturing.
<p><u>Skills</u></p>	<p>Students will:</p> <ul style="list-style-type: none"> • Be able to use an existing product to identify and explain the primary features and function of a glider. • Be able to use an existing product to evaluate the primary features and function of a glider. • Demonstrate an understanding of basics of flight. • Demonstrate an understanding of an airfoil. • Demonstrate and explain different types of aspect ratio. • Demonstrate and explain how to calculate aspect ratio. • Demonstrate how to produce a specification. • Demonstrate how to produce a range of 2D ideas. • Demonstrate high quality drawing and rendering skills. • Demonstrate how to safely produce models • Demonstrate how to safely and accurately produce models. • Demonstrate how to accurately test models. • Interpret test data to accurately determine most successful development. • Demonstrate how to test against the specification. • Use test results to accurately explain and justify the success of final design proposal. • Demonstrate an understanding of isometric drawing. 	<p>Students will:</p> <ul style="list-style-type: none"> • Demonstrate the ability to interpret most information given in a set of engineering drawings. • Accurately interpret a wide range of appropriate information given in a set of engineering drawings. • Demonstrate the ability to interpret engineering information. • Demonstrate safe working practice in the workshop. • Demonstrate manufacturing and assembly skills. • Demonstrate high level finishing skills. • Demonstrate how to use appropriate measuring equipment to check the accuracy of a practical piece of work. • Demonstrate the ability to use good written language to explain findings and suggest improvements to a piece of work in engineering. 	<p>Students will:</p> <ul style="list-style-type: none"> • Be able to define and provide examples of different materials and their properties. • Explain why specific materials are used for different products based on their different properties. • Explain in detail how to carry out a range of tests designed to test a number of different material properties. • Be able to describe four different heat treatments used to alter the properties of materials. • Be able to explain a range of different techniques used to forming and joining different materials. • Solve a number of engineering problems using mathematical theories and formulas. • Explain how energy is transferred from one form to another in typical, everyday products. • Describe the relationship between CAD CAM and automation in the design and manufacture of engineering products. • Explain how engineering companies can adopt a sustainable approach to engineering and manufacturing.

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	<ul style="list-style-type: none"> • Demonstrate accurate orthographic drawing skills. • Demonstrate British Standard dimensioning. • Demonstrate an understanding of sectional drawing. • Demonstrate the accurate use of CAD to produce a sectional drawing to British Standards. 		
<u>Literacy Links</u>	<p>Reading – reading key words and subject specific vocabulary. Identifying the correct descriptions of equipment.</p> <p>Writing – writing key words and subject specific vocabulary correctly. Written information to be included in title block.</p> <p>Oracy – using the name of specific equipment in the correct context while demonstrating the correct understanding of these words. Using the name of specific software and hardware in the correct context while demonstrating the correct understanding of these words. Using the names and technical terms relating to sectional drawing in the correct context while demonstrating the correct understanding of these words. Using key words and subject specific vocabulary in the correct context while demonstrating the correct understanding of these words.</p>	<p>Reading – reading key words and subject specific vocabulary. Identifying the correct descriptions of tools and equipment.</p> <p>Writing – writing key words and subject specific vocabulary correctly. Processing and writing the steps required to carry out a metal work task.</p> <p>Oracy – using the name of specific tools and equipment in the correct context while demonstrating the correct understanding of these words.</p>	<p>Reading – reading key words and subject specific vocabulary. Reading and accurately interpreting exam questions.</p> <p>Writing – writing key words and subject specific vocabulary correctly. Writing both short and extended answers to exam questions.</p> <p>Oracy – using key words to accurately answer questions in class when asked subject teacher.</p>
<u>Essential Vocabulary</u>	Dimensioning, Border, Hardware, Software, Dimensions, Diameter, Radius, 3-Dimensional, Grid, Light Source, Circle and Cylinder.	Engineering Drawings, Accuracy, Timings Production Plan, Materials, Components, Tools, Equipment, Machinery, Quality Checks and Health and Safety.	Materials, Availability, Stock, Properties, Testing, Heat Treatment, Shaping, Forming, Joining Techniques, Mathematical Engineering, Environmental Issues, Engineering Drawings and Practical Engineering.



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Matthew Wrigley (2019) **WJEC Vocational Award Engineering Level 1/2**

Guru Madhavan (2016) **Think Like An Engineer: Inside the Minds that are Changing our Lives**

Pamela McCauley (2021) **Engineering for Teens: A Beginner's Book for Aspiring Engineers**

Jacie Maslyk (2021) **Fascinating Engineering Book for Kids: 500 Dynamic Facts! (Fascinating Facts)**