

Curriculum Design 2024 - 2025

A Level OCR DESIGN ENGINEERING (H404)

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		Term1		Term2		Term3	
		Term 1.1	Term 1.2	Term 2.1	Term 2.2	Term 3.1	Term 3.2
12	Theme	Produmax Industry Project / Systems Team Project		Produmax Industry Project / Systems Team Project		Engineering Drawing	NEA
	Concept	Numeracy / Technical / Drawing	Numeracy / Technical / Drawing	Numeracy / Technical / Drawing	Numeracy / Technical / Materials	ENG Skills / Processes / Systems	Design Process
	Skills / Knowledge	<p>Theory:</p> <p>Numeracy:</p> <p>Units, powers, standard form and accuracy</p> <p>Working with formulas</p> <p>Equations of motion</p> <p>Technical Understanding:</p> <p>Reinforcing & Triangulation</p> <p>Mechanisms – Types of Motion / Conversion of Motion</p> <p>Mechanisms – Gears, Pulleys, Levers & Linkages</p> <p>Mechanisms – Bearings, Lubrication & Efficiency</p> <p>Identifying Requirements:</p> <p>Exploring Contexts</p> <p>Stakeholder Analysis</p> <p>Practical / Skills:</p> <p>Design Thinking & Communication:</p> <p>Orthographic Drawing / Isometric Drawing / Exploded</p> <p>2D/3D Sketching – Perspective / Rendering Techniques</p>	<p>Theory:</p> <p>Numeracy:</p> <p>Ratios, Areas and Volumes</p> <p>Ratios & Mechanisms</p> <p>Working with percentages</p> <p>Technical Understanding:</p> <p>Structural & Mechanical Efficiency</p> <p>Types of Forces / Mass / Weight</p> <p>Forces – Young’s Modulus (Stress & Strain)</p> <p>Electronics – Systems Approach</p> <p>Identifying Requirements:</p> <p>Exploring Contexts</p> <p>Stakeholder Analysis</p> <p>Practical / Skills:</p> <p>Design Thinking & Communication:</p> <p>Orthographic Drawing / Isometric Drawing / Exploded</p> <p>2D/3D Sketching – Perspective / Rendering Techniques</p> <p>3D CAD - Fusion 360</p> <p>Designs Ideas & Modelling</p> <p>Design Development & Modelling</p>	<p>Theory:</p> <p>Numeracy:</p> <p>Areas of 2D Shapes</p> <p>Surface area of 3D objects</p> <p>Volume of 3D objects</p> <p>Technical Understanding:</p> <p>Passive Components – Resistor / Capacitor / Diodes</p> <p>Electronics – Inputs & Sensors</p> <p>Programmable Devices</p> <p>Identifying Requirements:</p> <p>Designing Prototypes</p> <p>Practical / Skills:</p> <p>Design Thinking & Communication:</p> <p>Iterative Design Process / User Centred Design</p> <p>Circular Economy / Systems Thinking</p> <p>Project Management</p> <p>Circuit Wizard</p> <p>Accurate Scale Modelling</p> <p>2D Design / Fusion 360</p>	<p>Theory:</p> <p>Numeracy:</p> <p>Density & Mass of 3D objects</p> <p>Pythagoras Theorem</p> <p>Sine, Cosine & Tangent</p> <p>Sine & Cosine Rules</p> <p>Technical Understanding:</p> <p>Programmable Devices</p> <p>MOSFET, Drivers & IC’s</p> <p>Electronics – Output – Kinetic, Sound, Light</p> <p>Identifying Requirements:</p> <p>Designing Prototypes</p> <p>Materials & Components:</p> <p>Engineering Material Properties</p> <p>Engineering Materials – Classifications / Sources</p> <p>Practical / Skills:</p> <p>Design Thinking & Communication:</p> <p>Project Management</p> <p>Circuit Wizard</p> <p>Accurate Scale Modelling</p> <p>2D Design / Fusion 360</p> <p>Engineering Processes</p>	<p>Theory:</p> <p>Numeracy:</p> <p>Direction of movement</p> <p>Resolving Vectors</p> <p>Presenting Data</p> <p>Statistics / Managing & Presenting Data</p> <p>Technical Understanding:</p> <p>AC to DC Conversion</p> <p>Component Interfacing</p> <p>Wi Fi, RFID, NFC & Bluetooth Protocols</p> <p>Networking / Smart objects</p> <p>Ohm's Law & Power</p> <p>Analysing existing Products:</p> <p>Analysing existing products & Systems</p> <p>Practical / Skills:</p> <p>Design Thinking & Communication:</p> <p>Project Management</p> <p>Production Planning</p> <p>Circuit Wizard</p> <p>Accurate Scale Modelling</p> <p>2D Design / Fusion 360</p> <p>Engineering Processes</p>	<p>Theory:</p> <p>Numeracy:</p> <p>Interpreting & extracting Data</p> <p>Interpret statistical analysis</p> <p>Graphs of motion</p> <p>Engineering graphs</p> <p>Waveforms</p> <p>Technical Understanding:</p> <p>Smart Technologies</p> <p>Analysing existing Products:</p> <p>Technological Developments</p> <p>NEA Controlled Assessment:</p> <p>Exploring Contexts</p> <p>Design Briefs</p> <p>Stakeholder Analysis</p> <p>Primary & Secondary Research</p>
	Wider Curriculum	Engineering Sectors Produmax Industry Project	Engineering Sectors Produmax Industry Project National Engineering Day (1 st November 2023)	Produmax Industry Project	Engineering Professional Bodies Produmax Industry Project		INWED 2024 Diversity in Schools Week - Engineering

13	Theme	Exam Theory / NEA Design Process			NEA / Exam Ready		
	Concept	Numeracy / Design Viability / NEA	Wider Issues / Manufacturing / NEA	Wider Issues / Manufacturing / NEA	Wider Issues / NEA / Exam Ready	Exam Ready	
	Skills / Knowledge	<p>Theory:</p> <p>Numeracy:</p> <p>Coordinates in geometric shapes</p> <p>Anthropometric data</p> <p>Dimensional variations</p> <p>Probability</p> <p>Design Viability:</p> <p>Critical Evaluation</p> <p>Testing & Feasibility</p> <p>Standards BSI / ISO</p> <p>Physical Testing</p> <p>Commercial Viability</p> <p>Analysing existing products:</p> <p>Past & Present Developments</p> <p>NEA Controlled Assessment:</p> <p>Generation of Initial Ideas</p> <p>Design Developments</p> <p>Critical Thinking</p> <p>Ongoing evaluation to manage design decisions</p>	<p>Theory:</p> <p>Wider Issues:</p> <p>Lifecycle Assessment</p> <p>Source and origin of materials</p> <p>Depletion of resources</p> <p>Planned obsolescence</p> <p>Buying Trends</p> <p>Environmental incentives and directives</p> <p>Manufacturing Processes:</p> <p>Polymer moulding process</p> <p>Metal casting process</p> <p>Sheet metal processes</p> <p>Electronic industrial processing</p> <p>Automated materials handling.</p> <p>Analysing existing products:</p> <p>Product Lifecycles</p> <p>NEA Controlled Assessment:</p> <p>Design Developments</p> <p>Quality Planning</p> <p>Manufacturing final Prototypes</p> <p>Viability of final prototype</p>	<p>Theory:</p> <p>Wider Issues:</p> <p>Design for manufacture (DFM)</p> <p>Engineered Lifespans (maintenance)</p> <p>Environmental factors</p> <p>Sustainability Issues</p> <p>Materials Selection</p> <p>Product Distribution</p> <p>Manufacturing Processes:</p> <p>Scales of production</p> <p>ICT in Modern Manufacturing</p> <p>Quality Control</p> <p>NEA Controlled Assessment:</p> <p>Analysis & Evaluation of primary and/or secondary sources</p> <p>Ongoing evaluation</p> <p>Risk Assessments</p> <p>Feasibility of Design Solutions</p> <p>Evaluation of Final Prototypes.</p>	<p>Theory:</p> <p>Wider Issues:</p> <p>Intellectual Property Rights / Copyright</p> <p>Energy Factors</p> <p>Subject Knowledge from Other Subjects</p> <p>NEA Controlled Assessment:</p> <p>Analysis & Evaluation of primary and/or secondary sources</p> <p>Ongoing evaluation</p> <p>Risk Assessments</p> <p>Feasibility of Design Solutions</p> <p>Evaluation of Final Prototypes.</p> <p>!! NEA Final Submission !!</p> <p>Deadline EASTER</p> <p>Exam Ready:</p> <p>Use of Knowledge Organisers for Revision</p> <p>Exam Question Technique</p> <p>Extended Writing Questions</p> <p>Mind the GAP</p>	<p>Exam Ready:</p> <p>Use of Knowledge Organisers for Revision</p> <p>Exam Question Technique</p> <p>Extended Writing Questions</p> <p>Mind the GAP</p> <p>Topic Recap:</p> <p>Section 1 – Identifying Requirements</p> <p>Section 2 – Learning from Existing Products & Practice</p> <p>Section 3 – Implications of Wider Issues</p> <p>Section 4 – Design Thinking & Communication</p> <p>Section 5 – Material & Component Considerations</p> <p>Section 6 – Technical Understanding</p> <p>Section 7 – Manufacturing Processes & Techniques</p> <p>Section 8 – Viability of Design Solutions</p> <p>Section 9 – Health & Safety</p>	
	Wider Curriculum	Career Routes into Engineering	Career Routes into Engineering	Big Bang Competition??			

Wider Curriculum Rationale:

Exposing children to a wide range of experiences, enriching and deepening their knowledge and understanding of the curriculum and the world in which they live.

Engineering Sector Focus – Students to develop an understanding of how **diverse** Engineering. Each sector has been aligned to that core concept for that term. This will be supported with research into the sector, video resources, spotlight on famous engineers both past and present. Students will have access to profiles of current engineers to help them understand the different roles within engineering and the routes taken to get there.

INWED 2024 – International Women in Engineering Day is to highlight and celebrate the women within the field of engineering, as they still only currently represent 13% of the workforce. Guest speakers to provide talks to the students either via Assembly, Class Talks or Video call. This also fits within the Diversity Week. Students to be involved in a range of activities.

National Engineering Day 2023 – To showcase how engineering improves lives.



Produmax Industry Project – Students will be set a task/challenge by Produmax to design a solution to a problem they have identified within the manufacture of one of their parts. The students will have to research a range of materials, components and systems to design and model a solution to the problem. They will present their research, design ideas and developments to the staff at Produmax itself. This project provides a real insight into how a successful aerospace company works, and the challenges that they face. Students will also be tasked to research specifically into the Aerospace Engineering Sector and profile a role within that sector.

Career Routes into Engineering – The purpose of this focus is for students to identify the possible routes beyond Post 16, either via Degree or Advanced Level Apprenticeship. This will involve students researching the requirements/expectations to begin planning towards a career within the world of Engineering. External/Former students to provide talks and discussions to on their journey since leaving school. Research career profiles within their potential sector choice.

Big Bang Competition – A Science and Engineering competition for students to potentially enter their coursework and/or another project that they have been working on.

Sources of Information:

<https://www.engineeringuk.com/>

<https://www.engineerjobs.co.uk/>

<https://raeng.org.uk/>

<https://www.thisisengineering.org.uk/>

<https://www.theiet.org/>

<https://www.notgoingtouni.co.uk/>

<https://www.ucas.com/>

<https://www.thebigbang.org.uk/>