



Engineering

Curriculum Overarching Intent

We aim to use an iterative and explorative design cycle to empower students to become creative and critical thinkers. To find solutions to everyday problems that meet users' needs and make the world a better environment for all in an inclusive way.

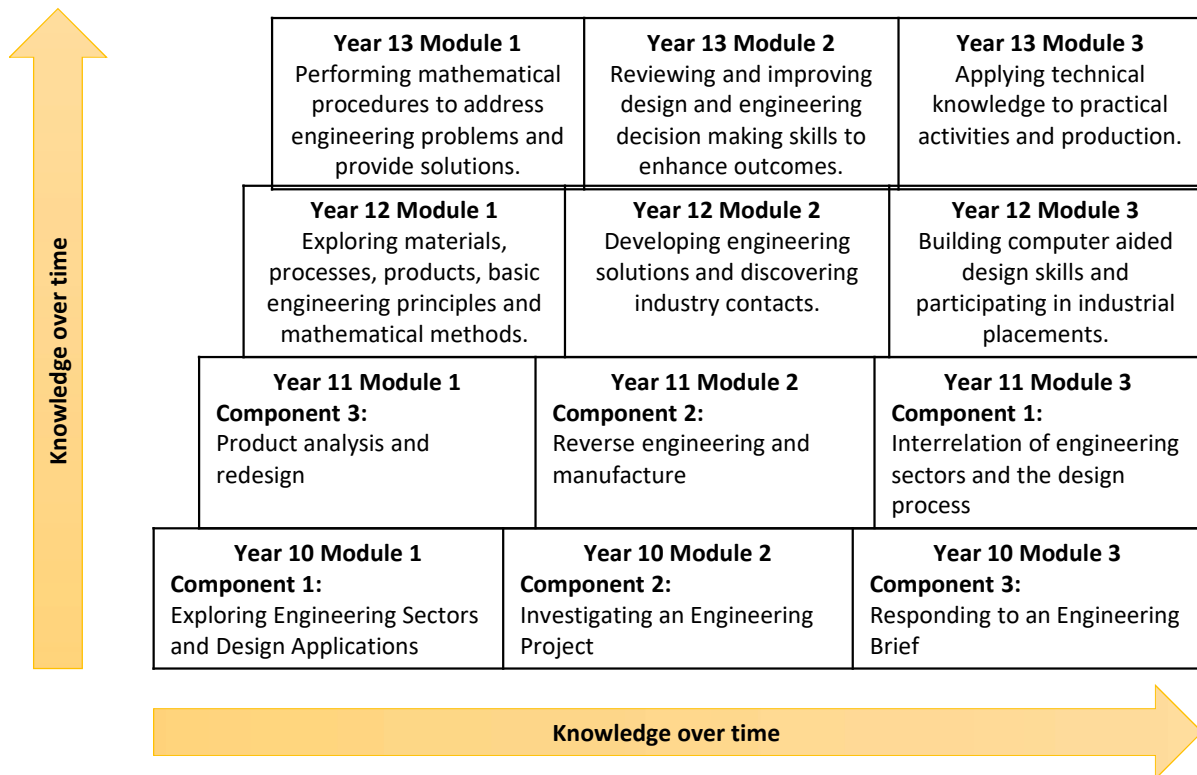
Prior Learning

- Experience of the product design cycle through research, design and manufacture at KS3.
- Considering user needs. Development of human centred design in Year 9.
- Environmental pressures. Awareness of the environmental impact of materials, processes and the product life cycle explored through design analysis at KS3.

	Vision	Key Concepts and Key Skills
Year 10	Pupils will gain understanding of engineering sectors, products and organisations, and how they interrelate. They will explore materials, components and processes and carry out processes to meet the needs of an engineering brief, exploring engineering skills through the design process.	<ul style="list-style-type: none"> • Explore the interconnections between engineering sectors, organisations and job roles. • Investigate the materials, components and processes used in the production of engineered products. • Develop an understanding of practical procedures and explore how to record, collect and interpret data in an engineering context.
Year 11	Through practical activity pupils will investigate engineered products and provide a design solution for an engineered product considering the requirements of an engineering brief. They will then Plan the manufacture of and safely reproduce, inspect and test a given engineered component.	<ul style="list-style-type: none"> • Develop an understanding of how to interpret a brief and explore design ideas, including their viability as a final solution. • Analyse information in an engineering context and explore how to select a suitable solution and implement it to meet the brief. • Reproduce a component from the previously dismantled product using the same materials and making processes.
Year 12	Level 3 engineering provides a broad basis of study for the engineering sector. In year one pupils explore materials, processes and product development to expand their awareness of industrial practice and partake in real life industrial placements. The course has been designed to support progression to higher education when taken as part of a programme of study that includes other appropriate BTEC Nationals or A Levels.	<ul style="list-style-type: none"> • Carry out work experience tasks to meet set objectives • Reflect on how work experience influences own personal and professional development. • Analyse data and information and make connections between engineering concepts, processes, features, procedures, materials, standards and regulatory requirements • Evaluate engineering product design ideas, manufacturing processes and other design choices • Be able to develop and communicate reasoned design solutions with appropriate justification
Year 13	Year two sees pupils transfer their knowledge and experience of industry into given briefs. They will apply their awareness of processes and materials to planning and delivering batches of products. They will also utilise their mathematical and electronic skills to solve a wide range of engineering problems.	<ul style="list-style-type: none"> • Perform mathematical procedures to solve engineering problems • Integrate and apply electrical, electronic and mechanical principles to develop an engineering solution • Develop two-dimensional computer-aided drawings that can be used in engineering processes • Carry out engineering processes safely to manufacture a product or to deliver a service effectively as a team.



Engineering



Key texts and websites that you can access to support their knowledge development in this subject include:

	Year 12	Year 13
Exam Board website: https://qualifications.pearson.com/content/dam/pdf/BTEC-Nationals/Engineering/2016/specification-and-sample-assessments/SPEC-BTEC-NAT-ENG-ExtCert.pdf		
Websites	https://www.engineeringtoolbox.com https://www.globalspec.com https://www.eng-tips.com https://www.eurekamagazine.co.uk/	https://interestingengineering.com/ https://www.efunda.com https://www.theengineer.co.uk/ https://www.gadgette.com/
Key texts and books	<ul style="list-style-type: none"> Railhead Philip Reeve Where Futures End Parker Peevyhouse Success Through Failure: The Paradox of Design Henry Petroski Engineering in Society Rob Lawlor The New Science of Strong Materials – or Why You Don't Fall Through the Floor J.E. Gordon 	<ul style="list-style-type: none"> Mortal Engines Philip Reeve Ready Player One Ernest Cline How to Fail at Almost Everything and Still Win Big Scott Adams How Do Wings Work? Holger Babinsky Cats' Paws and Catapults: Mechanical Worlds of Nature and People Steven Vogel
	Year 10	Year 11
Exam Board website: https://qualifications.pearson.com/en/qualifications/btec-tech-awards/engineering.html		
Websites	https://www.stem.org.uk/design-technology https://www.data.org.uk/news/ https://www.vam.ac.uk/ https://discovere.org/stem-careers	https://www.jamesdysonfoundation.co.uk/ https://www.instructables.com/ https://www.theiet.org/about/ https://www.fun-engineering.net/
Key texts and books	<ul style="list-style-type: none"> Structures – or Why Things Don't Fall Down J.E. Gordon The Design of Everyday Things Don Norman Sustainable Energy – Without the Hot Air David J.C. MacKay Engineering: A Beginner's Guide Natasha McCarthy 	<ul style="list-style-type: none"> The Gecko's Foot: How Scientists are Taking a Leaf from Nature's Book Peter Forbes Engineer to Win Caroll Smith An Astronaut's Guide to Life Chris Hadfield Sustainable Materials – With Both Eyes Open Julian Allwood and Jonathan Cullen