

## Engineering Curriculum Intent

### Our ambitious aims

***By the end of their time with us at Gloucester Academy, our students will be able to:***

- To have a good understanding of Engineering concepts relating to design and manufacture.
- To have the confidence to apply their knowledge of problem solving to be able to solve complex Engineering problems with ease.
- To understand how Engineering has helped shape the world we live in today and the part it has to play in developing our future.

### Big ideas

***To achieve our aims, students will be exposed to and develop a deep understanding of several powerful Engineering concepts***

Concept	Definition	Rationale
<b>Problem</b>	An engineering Problem is an essential initiating phase of any product development.	Engineering is about solving complex problems. The ability to identify what the problem is and get to the root cause of the problem is important so that solutions can be developed.
<b>Solution</b>	To engineer a solution is to configure and carry out a course of action that produces desired results.	There any number of possible solutions to solve a problem. The job of an engineer is to develop the most effective solution for the given problem to ensure that their product is fit for purpose.
<b>Sustainability</b>	Sustainability means meeting our own needs without compromising the ability of future generations to meet their own needs. In addition to natural resources, we also need social and economic resources	In our ever changing the world, there has never been a greater demand for more sustainable design. Learning not only how to become more sustainable in our daily lives, but how to drive sustainable design is the key.
<b>Design</b>	Design in mechanical engineering refers to creating, designing and building new machines that improve the efficiency of existing ones	The ability to design within Engineering is of the utmost importance. Being able to take a concept from
<b>Manufacturing</b>	The branch of engineering that specialises in the design, production, and uses of machine to create engineered products. A handheld device that aids in accomplishing a task with the cutting or shaping part in a machine or machine tool.	It has been said by some that manufacturing is the hardest part of engineering, due to its many complexities. Students will become familiar and comfortable with a range of machinery that will allow them to manufacture products. As well as a good foundation in the use of machinery, students will also develop their skills with the use of hand tools. By the end of year 11, students will have a solid foundation to take with them onto the next steps of their journey.

### Curriculum journey



***In Engineering, our students will study an ambitious curriculum that is both challenging for all and broad and balanced in scope.***

Year	Summary of study	Narrative & Rationale
7	Students will be introduced to basic hand tools and machinery and will make a variety of practical projects.	To be a good Engineer, one needs a solid foundation of practical skills. In KS3, we aim to develop our students practical skills through use of hand tools and machinery such as hack saws, files, belt sanders, pillar drills, engineers squares and more. Knowledge is progressively developed so that students are then able to design and improve their own ideas.
8	Students will develop the knowledge that they learnt in year 7 to add an element of design to their projects allowing them to manufacture more interesting final pieces,	Students will create a number of small practical projects that will allow them to use a wide variety of tools and machinery and thus allow them to develop a wide variety of skills and experiences within engineering. Alongside these practical skills, students will start to learn about sustainability and the capacity to endure in and Engineering setting. Students will also learn about materials and their properties, so that they are able to make informed choices in selecting the most appropriate materials for projects with sound reasoning.
9	Have the opportunity to interpret different types of engineering information in order to plan how to manufacture engineering products. Develop knowledge, understanding and skills in using a range of engineering tools and equipment in order to manufacture and test a final product.	Students will use all of these skills to be able to design and manufacture their own projects. They will do this by creating engineering drawing, creating CAD models and then developing manufacturing plans of their own. Knowledge is built on week by week. Once one skill is learnt the next skill is taught to lead on from the previous one, thus allowing students to make rapid and sustained progress due to the sequencing of taught concepts. Each concept that is taught will add on to the previous one.
10	Explore how an engineered product is adapted and improved over time. It offers the opportunity to apply your knowledge and understanding to adapt an existing component, element or part of the product that you will have manufactured for Unit 1.	During key stage 4 Engineering students will learn about manufacturing engineering products, designing engineering products and solving engineering problems. Engineering is about identifying problems and creating effective solutions to meet the problem. The reason we have chosen to teach students these topics, and in this order, is to ensure that all students have the ability to solve engineering problems. By starting with manufacturing, students will learn the valuable skills they need to produce engineering products. Once they have good knowledge of this they will then learn how to design. By developing their manufacturing skills first, students will be able to create practical solutions to problems by building on their manufacturing knowledge to ensure their designs are technically sound.
11	Introduced to a range of considerations that impact on engineering design and how modern engineering has had an impact on modern day life at home, work and in society in general.	Without the practical skills being developed first, its possible students' designs may be unfeasible. Lastly, we will teach solving engineering problems after manufacturing and designing so that students have a solid foundation of knowledge to build on. Without this knowledge it can be very difficult to spot issues and even harder to solve them. However, as students will already have good knowledge in manufacturing and designing, problem solving will be much clearer to students as they will have a base of knowledge to draw on. The content students will learn will be challenging as identifying problems, redesigning and manufacturing solutions is a tough challenge faced by many Engineers all over the world. We have chosen to teach this content in this sequence so that students are able to take small steps each week that will eventually lead them to being able to spot a problem, design a solution to their problem and then manufacture their solution just as an Engineer would do in industry. The ultimate aim of our curriculum, from year 7 to year 11, is for all students to be able to leave Gloucester Academy and be able to start an Engineering apprenticeship, join an Engineering company or study at Sixth Form or college with an excellent foundation of Engineering knowledge.