The Cornerstone Academy

Design & Technology Curriculum

United Learning
The best in everyone™

The Cornerstone Academy Design & Technology Curriculum for Years 7-11

The Cornerstone Academy Design & Technology Curriculum is studied by all students at Cornerstone in Key stage 3.

At Key Stage 4 options students study the AQA Design & Technology full course option with a focus on Technical Principles, Specialist Principles and Designing and Making Principles.

1. Intent of the Design & Technology curriculum

The Cornerstone Academy Curriculum for Design & Technology, based on The Curriculum Framework for Design & Technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others' needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education make an essential contribution to the creativity, culture, wealth and well-being of the nation.

The Cornerstone Academy Curriculum for Design & Technology will ensure that all students

- Know about and understand the core principles around which Design & Technology is based.
- Develop and generate design ideas through a process of iterative design.
- Ensure learners develop an appropriate breadth and depth of knowledge and understanding in design and technology.

The subject content at GCSE is presented under three headings: technical principles, specialist principles and designing and making principles. Within each area, the content is further divided into core knowledge and understanding and in-depth knowledge and understanding.

The ambition is for all students to achieve the expectations which are outlined in the curriculum. That is, that all pupils are taught the full content of the curriculum and that all pupils are taught to achieve the key performance indicators by the end of key stage 3. Mastery means that pupils should be able to recall and apply what they have learnt at another point in the future rather than just at the time they first meet an idea or technique. This is embedded in to the practical tasks and understanding of theory behind the application of skills. Achievements through the year contribute to evidence of mastery by the end of the year. Re-visiting a key performance indicator can provide opportunities to:

- demonstrate mastery
- address any gaps in learning

- widen and deepen learning as pupils apply their knowledge in a different context or tackle more complex design tasks within Design & Technology.

At KS4 students will follow the AQA scheme of learning, where the curriculum knowledge from Key stage 3 will be built upon. Students will develop more specific knowledge around the broader concept of Design & Technology and our world. At KS4 students are assessed using knowledge tests (self-quizzing) and summative assessments based on GCSE past papers and specimen papers.

2. Implementation of the Design & Technology Curriculum

KS3 Design & Technology teaching takes 1 x 100 minute lesson per week for three years across years 7, 8 and 9. It is taught by a specialist and forms part of the Creative Performing Arts rotation. KS4 Design & Technology is an option at GCSE and students have one single lesson and a double lesson.

The Design & Technology curriculum at The Cornerstone Academy is implemented according to the teaching and learning policy of the school. Rosenshine and Teach Like a Champion techniques are the basis of the schools teaching and learning practice. Staff will follow dedicated schemes of work to ensure that all students follow The Cornerstone Academy Design & Technology curriculum.

All lessons at each key stage should use quizzing to promote recall, retention, application and mastery of content. Students will have knowledge organisers with key subject content and key vocabulary which will be set for homework. This low stakes assessment for learning will be used by staff to inform their planning and class interventions.

Modelling should be used frequently with the aid of visualisers to guide student practice and improve the quality of student response.

Assessment in KS3 uses KPI assessments. These assessments are completed independently throughout a rotation, as well as at the end of topic to assess key knowledge or a skill. Certain KPI's can be applied to a range of topics and can be assessed multiple times across the year thus allowing for improvement, development and mastery. The KPI assessments are used to inform planning and intervention by the class teacher to address gaps in knowledge and to ensure students master the KPI's leaving them well prepared for the next stage of their education.

The Cornerstone Academy Design & Technology assessment outcomes (KPIs) can be found at Annex 1.

	Rotation 1	**Rotation 2**
Year 7	**Hex Bug** • Polymers • Simple Circuits	**Beach Huts** • Modelling • CAD – 2D Design
Year 8	**Pewter Casting** • Modelling • CAD - On Shape	**TBC** • Metals • Environmental impact

Year 9	**Candy Dispenser** • Timbers • Environmental Impact	**Scaletrix Challenge** • Modelling • CAD - On Shape

3. Impact of the Design & Technology Curriculum

By the end of Key Stage 3 students will be familiar with where materials originate from and how they are manufactured and produced.

Students will be able to identify a range of issues that relate to Design and Technology and the World, include scales of production and the impact on the environment. Students will develop skills in research and development of initial design ideas which will allow them to produce models and prototypes of their work. Students will gain confidence in working independently and will be competent within the workshop. By adopting the iterative design process, concepts and ideas can be strengthened and comprehensive analysis undertaken.

By the end of Key Stage 4 students will demonstrate knowledge and understanding in design and technology and its impact on daily life. Students at KS4 should develop a broad understanding of materials, systems and processes and have the opportunity to apply knowledge and understanding from other subject areas including mathematics and science.

The expectation is that students with have a core understanding of the following areas; Smart materials, Electronic systems and programmable components, Mechanical components and devices and Materials. In addition to this, they will have an in-depth knowledge and understanding in the following area: Natural & manufactured timber.

This knowledge and understanding is assessed by termly assessments based on exam questions and knowledge organisers, along with practical design tasks which show the application of the theory.

ANNEX 1 - The United Learning KS3 Design & Technology curriculum and assessment outcomes (KPIs)

	Curriculum topic and content		Key performance indicators
Year	***Topic/Overarching Theme***	***Content/Knowledge***	***The student can… (code and statement)***
Design & Technology			
7	**Introduction to the workshop**	• Understanding of **workshop rules** and **procedures relating to the materials/processes beign used.** • Knowledge of how to identify **hazards** in a workshop and take action to **reduce risk.** • Understand what is meant by a 'control measure'. • Understanding of what **polymers** are. • Knowledge of where **natural and synthetic polymers** are **sourced.** • Understanding of how polymers are **categorised**. • Understanding of **how the two polymer categories are different.** • Knowledge on the **impact** that polymers are having **on our environment.** • Understanding of how to **shape and form** polymers in a school workshop. • Knowledge on assembling electrical **components** to produce simple circuits. • Develop a range of **skills and processes** to **manufacture** products in a school workshop.	
7	**Hex Bug**		TBC
7	**Beach Hut (Modelling)**	• Understanding of **workshop rules** and **procedures relating to the materials/processes being used.** • Knowledge of how to identify **hazards** in a workshop and take action to **reduce risk.** • Understand what is meant by a 'control measure'. • Understand the term **Computer-Aided Design (CAD)** • Develop knowledge of using 2D Design for **design generation** and **manufacturing.** • Be able to explain the advantages/disadvantages of using CAD in design and manufacture. • **React to local needs**	TBC

	Curriculum topic and content		Key performance indicators
Year	***Topic/Overarching Theme***	***Content/Knowledge***	***The student can… (code and statement)***
		• **Research** the work of an inspirational person/ designer or design movements as **inspiration** for their designs. • Generate design ideas. • Be able to name the tools and equipment used in their making process. • Use CAD (2D Design) to produce a net of their chosen design as a means of communicating their intentions. • Evaluation and suggestions for improvement of initial prototypes.	
Design & Technology			
8	**On Shape 3D Printing (Pewter Casting)**	• Understanding of **workshop rules** and **procedures relating to the materials/processes beign used.** • Knowledge of how to identify **hazards** in a workshop and take action to **reduce risk.** • Understand what is meant by a 'control measure'. • Look at the work of a designer and incorporate their style. • Learn about design strategies to help stimulate idea generation (10x10, 4x4). • Apply design strategies to generate a range of different ideas. • Understand the properties of pewter. • Develop knowledge of using 3D Design for **design generation** and **manufacturing.** • Be able to explain the advantages/disadvantages of using CAD in design and manufacture. • Use three-dimensional CAD software (On Shape) to produce patterns for casting. • Understand the process of 3D printing and the advantages and disadvantages of using it.	TBC
8	**TBC**	• Understanding of how metals are **categorised**.	

	Curriculum topic and content		Key performance indicators
Year	***Topic/Overarching Theme***	***Content/Knowledge***	***The student can… (code and statement)***
	(Metal)	Understand the difference between **Ferrous and Non-ferrous metals.** • Explain what an **alloy** is. • Knowledge of the **impact** that the use of metals are having **on our environment.** • Marking out materials using the correct tools • Using a selection of hand tools and machinery • Recall of tool names and uses	
Design & Technology			
9	**Candy Dispenser (Timbers)**	• Understanding of how timbers are **categorised**. • Understanding of **how the two timber categories are different.** • Understand the properties and characteristics of a range of timbers. • Knowledge on the **impact** that polymers are having **on our environment.** • Understand the different scales of manufacture; one-off, batch, mass. • Understanding of how to **shape and form** polymers in a school workshop. • Knowledge on assembling electrical **components** to produce simple circuits. • Develop a range of **skills and processes** to **manufacture** products in a school workshop. •	TBC
9	**On Shape (Scaletrix Challenge)**	• Develop working as part of a design team • Produce initial design ideas using CAD. • Develop a chosen design with careful consideration. • Use of CAD to support the manufacture of the final outcome. • Evaluation and suggestions for improvement	TBC

ANNEX 2 - The United Learning KS4 Design & Technology curriculum. AQA exam board.

The subject content is presented under three headings: technical principles, specialist principles and designing and making principles. Within each area, the content is further divided into core knowledge and understanding and in-depth knowledge and understanding. The specification content and assessment requirements are designed to ensure learners develop an appropriate breadth and depth of knowledge and understanding in design and technology.

The exam is based on two components; the first being a written examination which assesses their general knowledge and understanding about core materials as well as a providing students with an opportunity to demonstrate their wider understanding relating to one of those materials in more depth. The second is an (NEA) Non-examined assessment, which requires students to produce a folio of evidence based around a context set by the exam board, alongside a working prototype of their final design solution.

Core and Specialist Technical Principles (Theory 50%)

Core knowledge and understanding is presented in six clear and distinct topic areas: • New and emerging technology • Energy generation and storage • Developments in new materials • System approach to designing • Mechanical devices • Materials and their working properties	Core specialist technical principles are presented in nine clear and distinct topic areas: Selection of materials and components • Forces and stresses • Ecological and social footprint • Sources and origins • Using and working with materials • Stock forms, types and sizes • Scales of production • Specialist techniques and processes • Surface treatments and finishes	In-depth knowledge and understanding is presented in six clear and distinct topic areas: • Papers and boards • Timber based materials • Metal based materials • Polymers • Textile based materials • Electronic and mechanical systems
Learners are required to study all of the content in these six areas, to ensure they have a broad knowledge and understanding of design and technology and that they are able to make effective choices in relation to which materials, components and systems to utilise within design and make activities.	Learners are required to study these six areas, to ensure they have an in-depth knowledge and understanding of all of these areas delivered through at least one material category.	Learners are required to study at least one of these six areas, to ensure they have an in-depth knowledge and understanding of a specific material area and/or components and systems to support their design and make activities.

All topics within the core knowledge and understanding, the in-depth knowledge and understanding, and designing and making principles must be addressed. In each case, the left-hand column identifies the content topic, and the amplification indicates the areas that need to be covered. The amplification column provides more information on the content presented in the left-hand column, including the breadth and depth of study required. Where 'e.g.' is used in the amplification column, the list which follows is illustrative only. In all other instances, the list of items in the amplification column must be covered. Centres are not restricted to how they will deliver this to the learner, but it is anticipated that there will be an integrated approach between the core and the in-depth content.

Designing & Making Principles (NEA 50%)

Learners should know that all design activities take place in a range of contexts. They should also understand that the prototypes they develop must satisfy wants and needs and be fit for their intended use. For example, the home, school, work or leisure. They will need to demonstrate and apply knowledge and understanding of designing and making principles in relation to the following areas: • Investigation, primary and secondary data • Environmental, social and economic challenge • The work of others • Design strategies • Communication of design ideas • Prototype development	In-depth knowledge and understanding is presented in five clear topic areas: • Selecting and working with materials and components • Tolerances - marking out • Material Management • Using specialist tools and equipment • Ussing specialist techniques
Learners are required to cover all of the content in these areas, to ensure they are able to apply a broad knowledge and understanding of design and technology principles within design and make activities.	Learners are required to cover all of the content in these five areas, in relation to at least one of the topic areas identified in the in-depth knowledge and understanding section of technical principles.