Curriculum Intent
Subject …Y10 & Y11 Design Technology

PRIORITIES IN WHOLE SCHOOL CURRICULUM INTENT

- Enjoyment of learning
- Knowledge acquisition and recall
- Extensive vocabulary
- Effective communication through writing, speaking & listening, and use of technology
- Numeracy
- Critical evaluation of information
- Enterprise and problem-solving
- Working with others

KEY QUESTIONS TO CONSIDER

1. Why has content been selected? Is there sufficient focus on the most powerful knowledge, concepts and skills?
2. Does learning provide sufficient challenge? Is there sufficient challenge for all learners in all year groups?
3. Why is learning sequenced in this way? Does the sequence enable students to build on prior learning, and learn in increasing breadth and depth over time?
4. How is learning sequenced or spaced to promote long-term memory?

SUBJECT CURRICULUM INTENT

Design and Technology (D&T) is the inspiring, rigorous and practical subject which prepares all young people to live and work in the world of designing and industry. Design and technology build on the skills and knowledge that students will need when entering the working environment and leverages increasingly sophisticated resources like 3D printer and laser cutters to keep up with the ever-evolving industry and practices. Design and Technology provides opportunities to learn about manufacturing and advancements in new technology, using a wide variety of skills from using hand tools to developing their understanding of virtual modeling and the use of sophisticated CNC machines. Additionally, it provides excellent opportunities for students to develop and apply value judgments of an aesthetic, economic, moral, social, and technical nature both in their own designing and when evaluating the work of others.

PDE Links

- Developing responsible, respectful and active citizens who are able to play their part and become actively involved in public life as adults
- Promoting an inclusive environment that meets the needs of all students, irrespective of age, disability, gender reassignment, race, religion or belief, sex or sexual orientation.
- Developing students' character, which is defined as a set of positive personal traits, dispositions and virtues that informs their motivation and guides their conduct so that they reflect wisely, learn eagerly, behave with integrity and cooperate consistently well with others – this gives students the qualities
- Financial decisions: income and expenditure
- Making Ethical Financial Decisions
- Financial exploitation in different contexts

Essential knowledge

- Key names of materials and their properties Woods, Metal, Plastics
- Materials and their working properties, specialist techniques and processes – surface treatments and finishes
- Design strategies and appropriate techniques used to communicate design ideas
- Types of motion and names of common mechanisms
- Links to maths looking at gear ratios, calculating angles in degrees, action of forces.
- Development in new materials, Smart materials, Composite materials, Technical Textiles
- Specialist techniques and processes (the use of production aids, tolerance, commercial processes and QC)
- Scales of production, Industry, robotics, Commercial processes
- Society, Enterprise, ethics, obsolescence, design for maintenance, People, society and culture
- Investigation, primary and secondary
- Energy generation and storage, Fossil fuels, Nuclear power, Renewable energy, Energy storage, Nuclear energy, Energy storage, Kinetic pumped storage systems Alkaline and rechargeable batteries
- Environment – pollution, global warming, Sustainability – finite/non-finite, the six Rs (reduce, refuse, re-use, repair, recycle and rethink
- ecological issues, life cycle of products
- Market pull and technology push
- Functionality, Aesthetics, Environmental factors, Availability, Cost, Social factors
- Ethical factors
- Market research, interviews, human factors
- Materials are selected based on functionality, cost and availability, how materials can be altered to change their properties

Essential Skills

- Modelling using card, Manufacturing specification/working drawings
- Sketching and Designing, production techniques and systems, use of Computer Aided Design (CAD) 2D, 3D drawing
- Isometric and perspective designs
- Exploded diagrams
- Working drawings
- Use appropriate marking out methods, data points and coordinates
- Use Specialist tools and equipment and Select and use appropriate hand tools and machinery safely, using and working with materials – how to shape and form using abrasion, cutting and addition, Shape, fabricate and construct a high-quality prototype
- Testing
- Prototype development, how materials are cut shaped and formed to a tolerance
- Working accurately, cutting, shaping and forming materials to tolerance, planning the cutting of materials to minimize waste (linking to tolerance)
- Selection of the correct hand tools and machinery
- Safe use of tools
- Selection and use of specialist techniques (used to shape, fabricate, construct)
- Preparing a material for a surface finish
- Applying a surface finish

	YEAR 10				
	KNOWLEDGE	**CONCEPTS**	**SKILLS**	**RATIONALE**	**FUTURE DEVELOPMENT**
Term 1	Material categories, breakdown of the different material categories specifically woods into Hardwoods, softwood and Manufactured boards where these are used and why. Modelling. Developing additional skills in CAD software students learn how to create design independently. Specialist techniques. Students gain an understanding of specialist techniques I.E cutting a particular angle using a specific saw (Woods). Tapping and screw threads (Metals). Material categories. Breakdown of the different material categories specifically Metals into ferrous and Non-ferrous where these are used and why the different properties of the metals. Ferrous metal contains Iron (FE) being iron on the periodic table. Iron is what make the metal rust oxidize and magnetic. The environment. Developing their understanding of the 6'Rs why we need to consider them when design and making. The environment. Understanding what production miles are and how they affect the environment. Build theory knowledge through note taking activities – research packs on ferrous, non-ferrous and alloys – used to collect and record information. Links made to sources and origins, finite/non-finite resources New and emerging technologies. Types of Manufacture. I.e. Mass, batch and JIT	**(Plane)** -Appropriate techniques used to communicate design ideas. -Material categories -Key names of materials and their properties -Sketching -Modelling -Modelling – using card -Iteration Design -Select and use specialist techniques and processes. -Consider accuracy - Surface treatments and finishes -Quality control -Sustainability and the environment **(Pewter Casting)** -Material categories -Key names of materials and their properties. -Sustainability and the environment -Critical evaluation of new and emerging technologies – planned obsolescence -Design for maintenance -The environment **(Jaguar Lander rover trip.)** -Robotics, automation and production in industry -Production techniques and systems – automation -Enterprise -Market pull and technology push -People, society and culture Production techniques and systems – automation	Sketching – Drawing skills using 3D design software google sketch up. Modelling – Virtual modelling skills Quality control- Controlled steps taken to ensure each product is to a high standard at each stage. Maths skills- addition subtraction, multiplication and division. Developing Practical skills further. Allowing students to be able to analyse their finding and make conclusions also allowing student to make independent decisions in their iterative design stages. (Metal and Wood) Shape, fabricate and construct a high-quality prototype. (Metal and Wood) The preparation and application of surface treatments and finishes. (Metal and Wood) Practical skills – using design and technology equipment. Planning and investigation. Writing a method. Photographing results. Evaluating work. Mathematical calculations angles, degrees. CAD design work using 2D Design tools. Note taking used to record information. New and emerging technologies. look at an example factory such as Jaguar Land In groups students discuss the benefits and disadvantages of being a fully automated manufacturing system and the use of robotics. Use the following key terms to discuss production methods in industry: Computer Aided Design (CAD) Computer Aided Manufacture (CAM) Flexible Manufacturing (FMS) Just in time (JIT) Lean Manufacturing. Students see examples of where these production techniques and systems may be used in the factory. Discussion of different methods of creating business and making a product successful.	In Design and Technology (D&T) the GCSE course NEA begins at the end of Year 10 this counts towards 50% of the GCSE. Therefore, for the first part of the year is used to build the skills, concepts and knowledge to equip them for GCSE NEA and exam. As part of this we enrich students with knowledge of a thriving industrial and technology age. We also offer a visit to go and see industry at Jaguar land rover factory so that they can develop their knowledge and understanding of how industry works. We also over them aspirations days for the students to build upon the skills they have learnt through the years.	

Term 2	Polymers. Discussion of when polymers replace other materials and why? This should link into the properties that these materials have. Analysing common products that we use every day and discussing the specific type of polymers, names, types and properties. Demonstration of heating and processing thermoforming polymers to understand plastic memory. Students look at moving toys made of a variety of polymers and identify which polymer has been used and why. Links made to sources and origins, finite/non-finite resources (3.1.1, 3.2.4). The environment. Developing their understanding of the 6'Rs why we need to consider them when design and making. The environment. Understanding what production miles are and how they affect the environment. finite and non-finite resources, the disposal of waste, pollution and global warming continuous improvement and efficient working planned obsolescence, design for maintenance. understand what a design brief is and be able to write their own know what a manufacturing specification is and be able write one for their own product. Highlight the difference between renewable and non-renewable fuels. Give advantages and assess prior knowledge.	**(Vacuum Forming mould and outcome)** -Appropriate techniques used to communicate design ideas. -Material categories -Key names of materials and their properties -production in industry. -Production techniques and systems – automation -Ethics -The environment **(Exam Theory/ NEA practice)** Renewable and non-renewable resources -Energy generation and storage -Nuclear energy -Energy storage -Kinetic pumped storage systems -Alkaline and rechargeable batteries Sustainability and the environment Critical evaluation of new and emerging technologies – planned obsolescence Design for maintenance Ethics The environment Primary and secondary data Design brief and manufacturing specification The work of others	Note taking used to record information. Analysing. Discussion. Practical skills Annotation of designs including specific materials and processes where known. Learning of key terms and meanings: students will learn about what primary and secondary data are and how they can be used to inform design research. students will learn how to write a Design Brief and a Manufacturing Specification. students will learn about the work of others and investigate how this can influence their own work. key terminology including renewable and non-renewable fuels, fossil fuels, wind, solar, tidal, hydro-electrical, biomass, coal, gas, oil when polymers replace other materials and why? This should link into the properties that these materials have. Analysing common products that we use every day and discussing the specific type of polymers, names, types and properties. Demonstration of heating and processing thermoforming polymers to understand plastic memory.		

Term 3,1 &2	**(Exam Theory/ NEA Project 1st June)** understand what primary data is, understand what secondary data is. understand what a design brief is and be able to write their own. know what a manufacturing specification is and be able write one for their own product. understand about mining, drilling and farming and their environmental impacts. understand about deforestation and the environmental impact it has on the world understand about which processes contribute to global warming and atmospheric pollution understand the social issues in the design and manufacture of products and the need for fair trade in the world. Build theory knowledge through note taking activities research packs on hardwoods, softwoods, manufactured boards used to collect and record information. knowledge of tools and techniques Discussion of different ways designers develop ideas. Examples shown of methods of modelling and sketching to communicate ideas. Demonstration of a specific technique used to communicate in 2D or 3D a chosen design idea. (isometric, perspective)	Primary and secondary data. Design brief and manufacturing specification. Environmental, social and economic challenge Generating design ideas Initial design ideas Cardboard modelling (1) Cardboard modelling (2) Design development 3D CAD final model (1) 3D CAD final model (2) Selecting materials and stock sizes Sources of materials Forces and stresses Testing. Measuring and marking out Manufacture of protypes and manufacture diary. Commercial processes and surface finishes. Analysis and evaluation of prototypes.	use both types of data to understand client and user needs Undertake research using there understanding od Social, Economical and environmental Factors. Be able to create a detailed explanation of work of others using these to inform their design. All materials annotated and justified. Choice explained and any reinforcement clearly shown. Working drawing Sketching techniques Annotation used to justify all design decisions – theory of materials and mechanical devices used to assist Demonstration of a specific technique used to communicate in 2D or 3D a chosen design idea. (isometric, perspective) Draw out a technical drawing/ plan drawing. Students produce design solutions prototype more guided approach taken with this outcome as it is the first model. Techniques explored and practiced to encourage students to work on making sketches and models. Make further modifications to design ideas and begin to produce 3D models of these on Google sketch up. Models could be scaled for higher ability students. Students begin to measure and mark out parts of their toys in their chosen material. assessment used as QC. Developing ideas through prototyping and modelling. Model part or the entire toy to scale (maths links – working to and working out the scale). Students work independently to begin shaping parts of their prototypes Manufacture diaries could be used to plan out each activity and use of tools and equipment. Demonstration of treatments and finishes used on a range of materials. Samples carried out to test a range of treatments. Students recall and apply knowledge as appropriate		

Term 3	**Exam Theory** Categorisation of textiles, examples shown and discussion of findings. Specialist techniques and processes (the use of production aids, tolerance, commercial processes and QC) demonstrate innovation are functional consider aesthetics assess if prototypes are fit for purpose. Scales of production Using data to understand needs Fossil fuels, Nuclear power, Renewable energy, Energy storage. Students to record information for revision purposes. Prototype development Specialist tools and equipment Specialist techniques and processes	Textiles. Freehand sketching Isometric 2D/3D scaled drawing. tessellation/nesting. stock size, cost and wastage. Commercial processes Tolerance Quality Control Batch Mass Continuous Environment – pollution, global warming Sustainability – finite/non-finite. The six Rs (reduce, refuse, re-use, repair, recycle and rethink) Shape, fabricate and construct a high-quality prototype. Surface treatments and finishes	Identify areas of success for drawing in their exam. Use of Computer Aided Design (CAD) to introduce the idea of reducing waste when cutting /manufacturing parts of their seating (scaled) (maths link – working out the surface area needed for parts and the amount of wastage). Exploration of shape, tessellation/nesting. Calculating area and angles. Identify ways of introducing QC and working to tolerance and question the importance of these. Maths Skills calculation, addition subtraction. Decimal and percentages. Look at a range of products from a variety of material areas how will they impact on the environment (re-visit obsolescence, life cycle). Discussion around finite/non-finite resources – carry out a life cycle assessment for their design idea so far. Re-visit knowledge and experience from previous NEA projects. Demonstrations used to ensure understanding of appropriate methods.		