

Design and Technology Department – Year 11

Year 11 students will work throughout the autumn and spring terms completing the NEA assessment. During this time they will study subject areas related to the stage in the project. In the summer term students will revise subject knowledge for GCSE exams and undertake practice questions and past papers.						
 Shirley High Curriculum Map	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:	Theme/Topic/Skill:
	GCSE Content review Design Development	Planning and Manufacture	Assembly and Finishing	Project Testing & Evaluation	GCSE Exam Preparation	GCSE Exam Preparation
Why now?	Pupils will be working on design ideas and learning how to use research to influence their designs for their NEA. Pupils will be investigating different drawing and presentation techniques. Working on revision skills for PPE1.	Pupils will be working on design ideas models and development of their designs for their NEA. Pupils will be investigating surface treatment and material management. Working on revision skills and developing design specification answering techniques.	Pupils will be working on development of their designs, final design and final model for their NEA. Pupils will be investigating specialist tools and equipment and prototyping. Working on revision skills for PPE2.	Pupils will be working on fine tuning and finishing of the NEA project and model, ready to hand in marking Working on revision skills for summer written paper exam.	Working on revision skills and past papers for summer written paper exam.	
Fundamental Concepts	Understanding the GCSE assessment, reviewing work completed and starting Design Development	Planning for manufacture and start cutting and shaping parts.	Continuing manufacture, joining and apply surface finishes.	Testing the completed project and comparing with the Specification and client requirements	Exam Preparation revision	Exam Techniques and revision
Students will...	<p>Review of Progress Students will review the GCSE assessment content and the progress achieved towards the Non Examined Assessment (NEA).</p> <p>The Context & Design Possibilities The work of others - Existing designs The client & client needs The Design Brief The Design Specification Initial Design Ideas</p> <p>Design Development Students develop design ideas and demonstrate skills in a wide range of techniques and annotating to explain detail, materials, construction and features. e.g. Isometric, Oblique, 1 point Perspective, 3 Point Perspective, Planometric, Orthographic.</p> <p>Evaluation of ideas Designs will be evaluated against the design specification and students will select the design which best meets requirements.</p> <p>Design Modelling Students will produce physical models in card and other materials to visualise and develop final details for their design.</p> <p>They will also produce 3D CAD models for their final design and generate Isometric and orthographic dimensioned drawings.</p> <p>Further design details can be developed by practical experimentation. E.g. by trying Joints, processes, fixings etc and by trying CAM 3D printing for small parts.</p> <p>Final Design Students will produce accurate Isometric and 3rd angle projection drawings following conventions showing dimensions and drawn to scale.</p> <p>Design Evaluation Evaluation of the final design will consider how well it meets the Context, the Design brief, the Design specification and the Client requirements. It will also take into account its ecological and social footprint for the materials and manufacturing details specified..</p> <p>The following topics will be explored alongside project work:</p> <p>Ergonomics ; Including the use of anthropometric data and percentiles.</p> <p>Material Selection and use: How to select and use materials and components</p>	<p>Planning Students will plan the manufacture of their design and create A parts list / cutting list – (for ordering) A plan for manufacture (The sequence of operations, tools & equipment and quality checks) A Gantt chart – to plan and monitor timescales for completion of stages.</p> <p>Students will write a Manufacturing Specification for the design to be manufactured. This should specify completion details required such as the quantity required, the completion date, size tolerance, quality required.</p> <p>Marking out Students will mark out data points and coordinates using of reference points, lines and surfaces where appropriate. They will plan cutting and shaping to minimise waste.</p> <p>Cutting & shaping Students will use appropriate tools and equipment safely to cut and shape parts to size. Students will make quality checks for the dimensional accuracy and tolerance.</p> <p>Evaluation As part of continuous evaluation for their projects students should review their projects in relation to future production and how the design / planning would change for Batch production, Mass production or Continuous production Including the use of templates, jigs and/or patterns.</p> <p>The following topics will be explored alongside project work</p> <p>Material management: Stock forms, types and sizes: Commercially available types and sizes of materials and components Nesting of shapes and parts to be cut from material to minimise waste.</p> <p>Production techniques and systems: Automation JIT, CAD/CAM (FMS) Lean manufacturing. Robotics</p>	<p>Manufacture Students will continue to manufacture their prototype and demonstrate how to select and use safety specialist tools and equipment as part of their project e.g Metal turning, wood turning, sawing, milling, drilling, cutting, shearing, brazing, welding, threading, riveting laminating, soldering, vacuum forming, creasing, bending, casting, and dip coating. CAM 3D printing & Vinyl cutting.</p> <p>Advanced Manufacture Students will complete manufacturing processes including the addition of any electronic systems (e.g. Sensors, outputs & control circuits etc.) or advanced manufacturing processes in CAM such as 3D printing and CAM Vinyl cutting.</p> <p>Assembly & finish Students will complete practical work assemble parts and apply finishes such as paint, lacquer, varnish</p> <p>The following topics will be explored alongside project work</p> <p>Manufacturing processes How to saw, drill, chisel, sand, plane, rout and turn wood. How to cut, shear, drill, turn, mill, bend, cast, braze, solder, rivet, thread and weld metal. How to cut, bend, Extrude, Injection mould, Blow mould, Compression mould, Vacuum form, join and 3D print plastics. How to change the properties of materials by heat treatment and the addition of other materials</p> <p>Surface treatments and finishes: Know and understand surface treatments and finishes applied for functional and aesthetic purposes: Painting, varnishing and tanalising wood. Dip coating, powder coating spray painting and galvanizing metal Understand how to prepare materials for surface treatment.</p>	<p>Testing & Evaluation Completed projects will be tested for operation. Projects will be evaluated against the design specification, the manufacturing specification and client requirements.</p> <p>The client should be asked to evaluate the prototype.</p> <p>The evaluation should clearly identify the strengths and weaknesses in the completed project. It should also identify any improvements that could be made to the design and changes that would be made if the design was to be made commercially by batch production or mass production.</p> <p>Portfolio Completion and Submission The NEA portfolio will be completed and compiled to show evidence for marking.</p> <p>Feedback will be given, following an initial submission and students will act on this and resubmit to maximise marks.</p> <p>The following revision topics will be explored including practice with past exam questions</p> <p>Core Technical Principles New and emerging technologies: Energy generation and storage: Developments in new materials: Systems approach to designing: Mechanical devices: Materials and their working properties:</p>	<p>Revision sessions will revisit each of the exam topics and include practice questions</p> <p>Specialist Technical Principals Selection of materials or 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: Timber based materials Metal based materials Polymers Electronic and Mechanical Systems Surface treatments and finishes</p>	<p>Exam techniques. Students will learn how to maximise their marks by using their time effectively; reading the question carefully and allocating appropriate time and detail depending on the value of the question.</p> <p>Revision sessions will continue to revisit exam topics</p> <p>Designing and Making Principals Investigation, primary and secondary data: Environmental, social and Economic challenge: The work of others: Design Strategies Communication of design ideas: Prototype development: Selection of materials and components: Tolerances: Material management: Specialist tools and equipment: Specialist techniques and processes</p>

	appropriate to the task considering: functional need, Aesthetics, Environmental factors, cost and availability : Timber based materials, Metals, Plastics, Composites Smart Materials					
Language for Life (Key terms/Vocabulary)	Ergonomics, Anthropometrics, Aesthetics, Smart materials, composite materials	GANTT chart, CAD, CAM, JIT, FMS	Wastage, die cutting, perforation, turning, sawing, milling, drilling, cutting and shearing, brazing, welding, lamination, soldering, 3D printing, bonding, deforming, reforming, vacuum forming, creasing, bending, blow moulding, casting, injection moulding and extrusion	Emerging Technology, Systems Approach, Mechanical Devices	Ecological footprint, Stock forms, Polymers	Primary data, Secondary data, Tolerances
Extended writing Opportunities	Annotation & Evaluation	Manufacturing Specification and plan for manufacture Evaluation of designs	Record of making and including justification of any changes or developments to design.	Evaluation against the specification and client needs	Practicing written exam questions to highlight the relevant points	Practicing written exam questions to highlight the relevant points
Maths Across the Curriculum	Scale, nets, modelling	Graphics, volumes, areas, patterns to minimise waste	Nesting and minimising waste. Working to dimensions and tolerances	Measuring final dimensions and outputs	Exam questions of forces, electricity, mechanical movement	Exam questions on data percentages, nets patterns and wastage, size tolerances.
Links to careers/aspirations	Engineers / Product designers/ Architects, Trades position in engineering, drafting & construction	Engineers / Product designers/ Architects, Trades position in engineering, drafting & construction	Engineers / Product designers/ Architects, Trades position in engineering, drafting & construction	Engineers / Product designers/ Architects, Trades position in engineering, drafting & construction	Engineers / Product designers/ Architects, Trades position in engineering, drafting & construction	Engineers / Product designers/ Architects, Trades position in engineering, drafting & construction
Cultural Capital	Review of client needs outside school for the NEA project	Students will select materials and processes locally and they will consider the social and environmental impact of their choices.	Students will select and apply processes and surface treatments considering the social and environmental impact of their choices	Students will evaluate their project against the original client needs and should get feedback from them.	Topics will consider where they are seen and how they are applied at home and around the world.	Topics will consider where they are seen and how they are applied at home and around the world.
Practical Application of Skills	3D modelling skills including CAD/CAM skills	Planning, using hand tools and specialist tools for marking out	Workshop / manufacturing skills using hand tools and machines for wood metal and plastic. Finishing skills, including the use of paints and other surface treatments.	Practical testing, evaluation and recording skills	Exam techniques and understanding of vocational skills and techniques.	Exam techniques and understanding of vocational skills and techniques.