Key Stage 4 Curriculum Documentation

GCSE Design and Technology – Textiles

Curriculum Intent

Design and Technology is a well-established subject at GCSE. Textiles aims to develop student's creative abilities and to ensure they have a deep and broad knowledge of the many different aspects of the subject of Fashion and Textiles. Textiles allows pupils to; develop the ability to study independently, set goals, manage your own workload and meet deadlines; develop project management skills; cultivate creative ability; advance IT and technical skills; including computer-aided design (CAD); increase an ability to solve problems and work within a team; increase research and information/data handling skills; enhance the ability to critically evaluate and interpret materials; improve written and oral communication skills; develop decision-making skills and gain a greater commercial awareness and practise business skills.

Many students who take GCSE Textiles go on to study Textiles for A Level, and of those who take it, many continue that into specialist areas at university level.

The GCSE in Design and Technology Textiles enables students to:

- Understand and apply iterative design processes through which they explore, create and evaluate a range of outcomes.
- The qualification enables students to use creativity and imagination to design and make prototypes that solve real and relevant problems, considering their own and others' needs, wants and values.
- It gives students opportunities to apply knowledge from other disciplines, including mathematics, science, art and design, computing and the humanities.
- Students will acquire subject knowledge in design and technology that builds on Key Stage 3, incorporating knowledge and understanding of different materials and manufacturing processes in order to design and make, with confidence, prototypes in response to issues, needs, problems and opportunities.
- Students learn how to take design risks, helping them to become resourceful, innovative and enterprising citizens.
- They should develop an awareness of practices from the creative, fashion and textiles, engineering and manufacturing industries.
- Through the critique of the outcomes of design and technology activity, both historic and present day, students should develop an understanding of its impact on daily life and the wider world and understand that high-quality design and technology is important to the creativity, culture, sustainability, wealth and wellbeing of the nation and the global community.

The study of design and technology seeks to prepare students to participate confidently and successfully in an increasingly technological world. It helps students to be aware of, and learn from, wider influences on design and technology, including historical, social/cultural, environmental and economic factors.

The aims and objectives of this qualification are to enable students to:

● Demonstrate their understanding that all design and technological activity takes place in contexts that influence the outcomes of design practice.

● Develop realistic design proposals as a result of the exploration of design opportunities and users' needs, wants and values.

● Use imagination, experimentation and combine ideas when designing.

● Develop the skills to critique and refine their own ideas while designing and making.

● Communicate their design ideas and decisions using different media and techniques, as appropriate for different audiences at key points in their designing.

● Develop decision-making skills, including the planning and organisation of time and resources when managing their own project work.

● Develop a broad knowledge of materials, components and technologies and practical skills to develop high-quality, imaginative and functional prototypes.

● Be ambitious and open to explore and take design risks in order to stretch the development of design proposals, avoiding clichéd or stereotypical responses.

● Consider the costs, commercial viability and marketing of products.

Content and Assessment overview

The course consists of two elements:

Component 1: Written paper worth 50% of the exam, consisting of a core section A, worth 40 marks, which covers all materials in D&T as a general paper, followed by a specialist section B, worth 60 marks, which specialises in Textiles.

Component 2: Non Examined Assessment, worth 50% of the exam, consisting of a portfolio and a prototype (a Textiles design and make task), which tests students' ability to work within a real-life context, and to investigate, design, make and evaluate a fashion or textile solution. This section is worth 100 marks.

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Year	Section of the syllabus	Term		Content
10	1.1 The impact of new and emerging technologies	Autumn	1	1.1.1 Industry: a) unemployment b) workforce skill set c) demographic movement d) science and technology parks.
				1.1.2 Enterprise: a) privately-owned business b) crowd funding c) government funding for new business start-ups d) not-for-profit organisations.
				1.1.3 Sustainability: a) transportation costs b) pollution c) demand on natural resources d) waste generated.
				1.1.4 People: a) workforce b) consumers c) children d) people with disabilities e) wage levels f) highly-skilled workforce g) apprenticeships.
				1.1.5 Culture: a) population movement within the EU b) social segregation/clustering within ethnic minorities.
				1.1.6 Society: a) changes in working hours and shift patterns b) Internet of Things (IoT) c) remote working d) use of video conference meetings.
				1.1.7 Environment: a) pollution b) waste disposal c) materials separation d) transportation of goods around the world e) packaging of goods.
				1.1.8 Production techniques and systems: a) standardised design and components b) just-in-time (JIT) c) lean manufacturing d) batch e) continuous f) one off g) mass.
				To apply a breadth of technical knowledge and understanding of the characteristics, advantages and disadvantages in relation to new and emerging technologies.
10	1.2 How the critical evaluation of new and emerging technologies informs design decisions; considering contemporary and potential future scenarios from different perspectives, such as ethics and the environment.	Autumn	1	1.2.1 How to critically evaluate new and emerging technologies that inform design decisions: a) budget constraints b) timescale c) who the product is for d) the materials used e) manufacturing capabilities.

				1.2.2 How critical evaluations can be used to inform design decisions, including the consideration of contemporary and potential future scenarios: a) natural disasters b) medical advances c) travel d) global warming e) communication.
				1.2.3 Ethical perspectives when evaluating new and emerging technologies: a) where it was made b) who was it made by c) who will it benefit d) fair trade products
				1.2.4 Environmental perspectives when evaluating new and emerging technologies: a) use of materials b) carbon footprint c) energy usage and consumption during manufacture and transportation d) life cycle analysis (LCA).
				To recognise the importance of the evaluative process and respective criteria when considering the impact of new and emerging technologies to a range of scenarios.
10	1.3 How energy is generated and stored in order to choose and use appropriate sources to make products and power systems	Autumn	1	1.3.1 Sources, generation and storage of energy: a) fossil fuels – oil, gas, coal b) biofuels – biodiesel and biomass c) tidal d) wind e) solar f) hydroelectric
				1.3.2 Powering systems: a) batteries and cells b) solar cells c) mains electricity d) wind power.
				1.3.3 Factors to consider when choosing appropriate energy sources to make products and power systems: a) portability of the power source b) environmental impact c) power output d) circuit/system connections e) cost
				The processes, applications, characteristics, advantages and disadvantages, in order to be able to discriminate between them and to select appropriately.
10	1.4 Developments in modern and smart materials, composite materials and technical textiles	Autumn	1	1.4.1 Modern and smart materials: a) shape-memory alloys (SMAs) b) nanomaterials c) reactive glass d) piezoelectric materials e) temperature-responsive polymers f) conductive inks.
				1.4.2 Composites: a) concrete b) plywood c) fibre/carbon/glass d) reinforced polymers e) robotic materials.
				1.4.3 Technical textiles: a) agro-textiles b) construction textiles c) geo-textiles d) domestic textiles e) environmentally friendly textiles f) protective textiles g) sports textiles.
				To apply technical knowledge and understanding of the characteristics, applications, advantages and disadvantages.
10	1.5 The functions of mechanical devices used to produce different sorts of movements, including the changing of magnitude and the direction of forces	Autumn	1	1.5.1 Types of movement: a) linear b) reciprocation c) rotary d) oscillation.

				1.5.2 Classification of levers: a) class 1, 2 and 3 b) calculations related to mechanical advantage (MA), velocity ratio (VR), load, effort and efficiency.
				1.5.3 Linkages: a) bell crank b) reverse motion linkages.
				1.5.4 Cams: a) pear shaped b) eccentric (circular) c) drop (snail).
				1.5.5 Followers: a) roller b) knife c) flat followers
				1.5.6 Pulleys and belts: a) V-belt b) velocity ratio (VR) c) input and output speeds
				1.5.7 Cranks and sliders.
				1.5.8 Gear types: a) simple and compound gear train b) idler gear c) revolutions per minute (RPM) calculations d) bevel gears e) rack and pinion
				The performance, principles, applications and the influence on the design of products.
10	1.6 How electronic systems provide functionality to products and processes, including sensors and control devices to respond to a variety of inputs, and devices to produce a range of outputs.	Autumn	1	1.6.1 Sensors, including: a) the role of sensors in electronic systems b) light-dependent resistors (LDRs) c) thermistor.
				1.6.2 Control devices and components, including: a) the role of switches in electronic systems b) transistors c) resistors.
				1.6.3 Outputs, including: a) the role of outputs in electronic systems b) buzzers c) light-emitting diodes (LEDs).
				Recognise and apply knowledge and understanding of the working characteristics, applications, advantages and disadvantages.
10	Practise NEA	Autumn	1	
10	1.7 The use of programmable components to embed functionality into products in order to enhance and customise their operation	Autumn	2	1.7.1 How to make use of flowcharts.
				1.7.2 How to switch outputs on/off in relation to inputs and decisions.
				1.7.3 How to process and respond to analogue inputs.
				1.7.4 How to use simple routines to control outputs with delays, loops and counts.
				The performance and functionality of using programmable components.
10	1.8 The categorisation of the types, properties and structure of ferrous	Autumn	2	1.8.1 Ferrous metals, including: a) mild steel b) stainless steel c) cast iron.

	and non-ferrous metals			
				1.8.2 Non-ferrous metals, including: a) aluminium b) copper c) brass.
				1.8.3 Properties, including: a) ductility b) malleability c) hardness.
				To apply knowledge and understanding of working properties, characteristics, applications, advantages and disadvantages of the types of materials, in order to be able to discriminate between them and select appropriately. These materials do appear in fashion products on zips, buttons, trims.
10	1.9 The categorisation of the types, properties and structure of papers and boards.	Autumn	2	1.9.1 Paper, including: a) copier paper b) cartridge paper c) tracing paper.
				1.9.2 Board, including: a) folding boxboard b) corrugated board c) solid white board.
				1.9.3 Properties, including: a) flexibility b) printability c) biodegradability.
				To apply knowledge and understanding of working properties, characteristics, applications, advantages and disadvantages of the types of materials, in order to be able to discriminate between them and select appropriately. These materials may be used in disposable clothing.
10	1.10 The categorisation of the types, properties and structure of thermoforming and thermosetting polymers.	Autumn	2	1.10.1 Thermoforming polymers, including: a) acrylic b) high impact polystyrene (HIPS) c) biodegradable polymers – Biopol®.
				1.10.2 Thermosetting polymers, including: a) polyester resin b) urea formaldehyde.
				1.10.3 Properties, including: a) insulator of heat b) insulator of electricity c) toughness.
				To apply knowledge and understanding of working properties, characteristics, applications, advantages and disadvantages of the types of materials, in order to be able to discriminate between them and select appropriately.
10	1.11 The categorisation of the types, properties and structure of natural, synthetic, blended and mixed fibres, and woven, non-woven and knitted textiles.	Autumn	2	1.11.1 Natural, including: a) animal – wool b) vegetable – cotton.
				1.11.2 Synthetic, including: a) polyester b) acrylic
				1.11.3 Woven, including: a) plain – calico b) twill – denim.

				1.11.4 Non-woven, including: a) felted wool fabric b) bonded fibres/webs.
				1.11.5 Knitted, including: a) weft-knitted fabrics b) warp-knitted fabrics.
				1.11.6 Properties, including: a) elasticity b) resilience c) durability
				To apply knowledge and understanding of working properties, characteristics, applications, advantages and disadvantages of the types of materials, in order to be able to discriminate between them and select appropriately.
10	Practise NEA	Autumn	2	
10	1.12 The categorisation of the types, properties and structure of natural and manufactured timbers	Spring	3	1.12.1 Natural timbers – hardwoods, including: a) oak b) mahogany c) beech d) balsa.
				1.12.2 Natural timbers – softwoods, including: a) pine b) cedar.
				1.12.3 Manufactured timbers, including: a) plywood b) medium density fibreboard (MDF).
				1.12.4 Properties, including: a) hardness b) toughness c) durability.
				To apply knowledge and understanding of working properties, characteristics, applications, advantages and disadvantages of the types of materials, in order to be able to discriminate between them and select appropriately.
10	1.13 All design and technological practice takes place within contexts which inform outcomes.	Spring	3	1.13.1 A wide range of materials, components and manufacturing processes for a range of contexts, to inform outcomes, including: a) the properties of materials and or components b) the advantages and disadvantages of materials and components and manufacturing processes c) justification of the choice of materials and components and manufacturing processes.
				Performance characteristics of a wide range of materials, components and manufacturing processes, in order to be able to discriminate between them and select appropriately.
10	1.14 Investigate environmental, social and economic challenges when identifying opportunities and constraints that influence the processes of designing and making.	Spring	3	1.14.1 Respect for different social, ethnic and economic groups who have different needs and values when identifying new design opportunities.
				1.14.2 An appreciation of the environmental, social and economic issues relating to the design and manufacture of products, including, fair trade, carbon offsetting, product disassembly and disposal.
				1.14.3 The main factors relating to ‘Green Designs’

				1.14.4 The main factors relating to recycling and reusing materials or products.
				1.14.5 Human capability.
				1.14.6 Cost of materials.
				1.14.7 Manufacturing capability.
				1.14.8 Environmental impact – life cycle analysis (LCA).
				Implications for designers and manufacturers when developing designs and manufacturing products.
10	1.15 Investigate and analyse the work of past and present professionals and companies in order to inform design.	Spring	3	1.15.1 Analysing a product to the following specification criteria: a) form b) function c) client and user requirements d) performance requirements e) materials and components/systems f) scale of production and cost g) sustainability h) aesthetics i) marketability j) consideration of innovation.
				1.15.2 The work of past and present designers and companies: a) Alessi b) Apple c) Heatherwick Studio d) Joe Casely-Hayford e) Pixar f) Raymond Loewy g) Tesla h) Zaha Hadid.
				Strategies, techniques and approaches employed when investigating and analysing the work of others.
10	1.16 Use different design strategies to generate initial ideas and avoid design fixation.	Spring	3	1.17.1 Develop and use a range of communication techniques and media to present the design ideas, including: a) freehand sketching (2D and/or 3D) b) annotated sketches c) cut and paste techniques d) digital photography/media e) 3D models f) isometric and oblique projection g) perspective drawing h) orthographic and exploded views i) assembly drawings j) system and schematic diagrams k) computer-aided design (CAD) and other specialist computer drawing programs.
				1.17.2 Record and justify design ideas clearly and effectively using written techniques.
				Techniques employed when communicating and recording design ideas.
10	Practise NEA	Spring	3	
10	6.1 Design contexts.	Spring	4	6.1.1 When designing or modifying a product, students should be able to apply their knowledge and understanding of textiles, components and manufacturing processes.
	6.2 The sources, origins, physical and working properties of natural, synthetic, woven and non-woven, knitted, blended and mixed-fibre textiles and their social and ecological footprint.	Spring	4	6.2.1 Natural: a) animal i). wool (in topic 1) ii). silk b) vegetable i). cotton (in topic 1) ii). Linen
				6.2.2 Synthetic: a) polyester (in topic 1) b) acrylic (in topic 1) c) regenerated cellulosic – viscose, acetate, Tencel® d) polyamide e) elastane f) nylon.
				6.2.3 Woven: a) plain – calico (in topic 1) b) twill – denim (in topic 1) c) satin – jacquard d) pile – velvet.

				6.2.4 Non-woven: a) felted wool fabric (in topic 1) b) bonded fibres/webs (in topic 1).
				6.2.5 Knitted: a) weft-knitted fabrics (in topic 1) b) warp-knitted fabrics (in topic 1).
				6.2.5 Sources and origins – where natural, synthetic, woven and non-woven, knitted, blended and mixed-fibre textiles are resourced/manufactured and their geographical origin: a) China, India, USA, Pakistan – cotton b) China, India, Uzbekistan – silk c) Russia, Canada, Ukraine, Europe (France and Belgium) – (flax) linen d) Australia, New Zealand, China, USA, United Kingdom – wool e) Alpine Forests – cellulose and wood pulp – cotton linters, pine, spruce, or hemlock trees – soft wood – acetate f) European Forest – oak and birch – hard wood – Lyocell™ g) Russia, UAE, Saudi Arabia – crude oil – polyester, nylon, acrylic.
				6.2.6 The physical characteristics of each natural, synthetic, woven and non-woven, knitted, blended and mixed-fibre textile: a) allergenic b) texture c) density.
				6.2.7 Working properties – the way in which each material behaves or responds to external sources: a) elasticity (in topic 1) b) resilience (in topic 1) c) durability (in topic 1) d) tensile strength e) breathability and absorbency f) electrical conductivity g) heat conductivity.
				6.2.8 Social footprint: a) trend forecasting b) impact of material production on communities and wildlife c) impact of farming and material production on communities and wildlife d) recycling/disposal – ethical responsibility e) reduction of chemical finishes – surface and aftercare treatments f) reduction of packaging materials – reduction in litter/waste/energy use g) brand identity – consumerism, changing the packaging of products over time.
				6.2.9 Ecological footprint: a) sustainability b) processing c) transportation d) wastage e) pollution f) deforestation g) oil exploration and extraction h) wildlife loss.
				To apply knowledge and understanding of the advantages, disadvantages and applications of the materials, in order to be able to discriminate between them and select appropriately.
10	6.3 The way in which the selection of natural, synthetic, blended and mixed-fibre textiles is influenced by.	Spring	4	6.3.1 Aesthetic factors: a) form b) colour c) texture d) lustre, sheen, shine.
				6.3.2 Environmental factors: a) sustainability b) pollution c) upcycling.
				6.3.3 Availability factors: a) use of stock materials b) use of specialist materials.
				6.3.4 Cost factors: a) quality of material b) manufacturing processes necessary c) treatments: fire proofing, stain resist, water proofing d) transportation – costs of moving materials around the world from country of origin.

				6.3.5 Social factors: a) use for different social groups b) trends/fashion c) popularity.
				6.3.6 Cultural and ethical factors: a) avoiding offence b) suitability for intended market c) use of colour and language d) the consumer society e) the effects of mass production f) built-in product obsolescence.
				The influence of the factors when selecting materials for a specific application.
10	6.4 The impact of forces and stresses on natural, synthetic, woven and non-woven, knitted, blended and mixed-fibre textiles and how they can be reinforced and stiffened.	Spring	4	6.4.1 Forces and stresses: a) compression b) tension c) shear d) natural forces within the fibre as it grows – shape e) flexibility.
				6.4.2 Reinforcement/stiffening techniques: a) ribs and boning b) suitable fabrication/assembly/construction processes c) lamination d) embedding composite materials e) stay stitching
				An awareness of the influence of forces and stresses that act on materials and the methods that can be employed to resist them.
10	6.5 Typical stock forms, types and sizes used in order to calculate and determine the required quantity of natural, synthetic, woven and non-woven, knitted, blended and mixed-fibre textiles.	Spring	4	6.5.1 Stock forms/types: a) rolls b) blocks c) denier d) weights – single, double e) laminates.
				6.5.2 Sizes: a) standard width – 90 cm, 137 cm, 154 cm b) yarn weight c) area d) diameter.
				To apply knowledge and understanding of the advantages, disadvantages and applications of the following forms/sizes of materials, in order to be able to discriminate between them and select appropriately.
10	Practise NEA	Spring	4	
10	6.6 Alternative processes that can be used to manufacture typical products of natural, synthetic, woven and non-woven, knitted, blended and mixed-fibre textiles to different scales of production.	Summer	5	6.6.1 Processes that can be used to cut and shape materials: a) shears b) stamp c) laser cut d) heating element – soldering iron e) extrusion.

				6.6.2 Scales of production: a) one off b) batch c) mass production d) continuous.
				6.6.3 Techniques for quantity production – methods that are employed when making products in quantity: a) marking-out methods (use of reference points, lines and surfaces) b) templates c) patterns d) sub-assembly e) computer-aided manufacturing (CAM) f) quality control g) working within tolerance h) efficient cutting to minimise waste.
				Application, advantages and disadvantages, of the processes, scales of production and techniques when manufacturing products, in order to be able to discriminate between them and select appropriately for use.
10	6.7 Specialist techniques, tools, equipment and processes that can be used on natural, synthetic, woven and non-woven, knitted, blended and mixed-fibre textiles to shape, fabricate, construct and assemble a high-quality prototype.	Summer	5	6.7.1 Tools and equipment: a) hand tools b) machinery c) digital design and manufacture.
				6.7.2 Shaping: a) adding and reducing fullness – pleat, gather, dart, tucks, shirring, ease, godet, under stitching b) moulding – steam, heat, adhesive c) adding structure – interfacing, boning.
				6.7.3 Fabricating/constructing/assembling: a) draping b) seams – plain, felled, French, double stitching, topstitching c) finishing raw edges – zig zagged, bound, rolled, turned under and sewn, blind hemming, invisible stitching d) fusing – sealed seams, taping, bonding e) component linkage f) overlocking – 2, 3 or 4 thread – raw edges and joining g) pressing, moulding h) wastage i) addition.
				Application, advantages and disadvantages, of the following specialist techniques when manufacturing products, in order to be able to discriminate between them and select appropriately for use.
10	6.8 Appropriate surface treatments and finishes that can be applied to natural, synthetic, woven and non-woven, knitted, blended and mixed fibre textiles for functional and aesthetic purposes.	Summer	5	6.8.1 Surface finishes and treatments: a) fabric painting (including silk) b) batik c) laminating d) couching e) embroidery f) appliqué g) printing h) resist dyeing i) patchwork j) quilting k) chemical – bleaching, easy-care, mercerising, carbonising, laminating, coating, fire proofing, stain resist, shrink resist water proofing, antistatic l) physical – calendering, raising, heat-setting, desizing, singeing, emerising, milling, fulling, walking m) biological – biostoning, biopolishing n) smart – thermochromic, photochromic, solvation chromism, electrochromic, anti-bacterial, micro encapsulation.
				Application, advantages and disadvantages of the finishing techniques and methods of preservation, in order to be able to discriminate between them and select appropriately for use.

10	Practise Mocks	Summer	6	
10	Begin NEA	Summer	6	June 1st
11	NEA & theory revision	Autumn	1	
11	NEA & theory revision	Autumn	2	
11	NEA & theory revision	Spring	1	
11	NEA & theory revision	Spring	2	
11	NEA & theory revision	Summer	1	

Final external assessments:

Assessment Objectives

Students must:		% in GCSE
AO1	Identify, investigate and outline design possibilities to address needs and wants	10
AO2	Design and make prototypes that are fit for purpose	30
AO3	Analyse and evaluate: • design decisions and outcomes, including for prototypes made by themselves and others • wider issues in design and technology	20
AO4	Demonstrate and apply knowledge and understanding of: • technical principles • designing and making principles	40
	Total	**100**

Breakdown of Assessment Objectives

Component	Assessment Objectives				Total % for all Assessment Objectives
	AO1 %	AO2 %	AO3 %	AO4 %	
Component 1	0	0	10	40	50
Component 2	10	30	10	0	50
Total for GCSE	**10**	**30**	**20**	**40**	**100**

Further curriculum support:

Text book
Selvedge & Vogue magazine subscriptions
Library books bought in for the course.

Enrichment activities:

Annual visit to the London - V&A/Harrods.
Extra lessons at lunchtime and after school as required by arrangement.