


# Westfield Academy - Curriculum Information

What your child will learn in ...

## Design and Technology

<b>Head of Department</b>	Miss Hall	
<b>Head of Department email</b>	RHA@westfield.academy	
<b>Lessons per 2 week cycle</b>	5	
<b>Specification/Board details/Key stage</b>	Eduqas	

## Term by term

Project 1	Project 2	Project 3	NEA
Year 10 Textiles			
<b>Tote-ally fabulous</b> Over the shoulder bag Students are going to be using a combination of materials and techniques to create a sustainable over the shoulder bag. This will build upon prior practical skills they have learned but also incorporate new techniques with metals, plastics, CAD CAM and surface techniques on fabric.	<b>Packaging and graphics</b> This half term will focus on packaging the bag they have created and incorporating papers and boards theory along with graphic design.	<b>Art light and Textile</b> Technique mosaic A combination of electronics, timbers and textile techniques within this project to create a showcase product. This will build upon electronic and timber theory whilst still having the textile element.	<b>Non-Examined Assessment (coursework) - Research</b> To research into their chosen design brief and to create a specification before generating ideas to solve their brief.
Year 10 Timbers			
<b>Recycled Lamp</b> A combination of sustainable materials that allow for a circular design/life cycle. Using recycled plastic, timber and metals along with building an electronic circuit to power the light.	<b>CAD CAM Maze</b> This project is focused solely on the advances of new technology and using a mixture of CAD CAM to manufacture products	<b>Bug Hotel</b> Timber based product that has sustainable aspects that gives back to the community. A variety of timber skills will be used to build the bug hotel preparing the student for their coursework.	<b>Non-Examined Assessment (coursework) - Research</b> To research into their chosen design brief and to create a specification before generating ideas to solve their brief.
NEA		Theory	

Year 11	
<p><b>Research</b> To research into their chosen design brief and to create a specification before generating ideas to solve their brief.</p> <p><b>Ideas</b> Generate a variety of different solutions to their chosen brief.</p> <p><b>Development and prototyping</b> Develop their chosen solution further by explaining in detail how it will be created.</p> <p><b>Manufacturing and evaluation</b> Create their solution in a workshop and by using modern CAM machines and evaluate the whole process to discover improvements</p> <p><b>NEA refinement and theory revision.</b> Refine their NEA and ensure they are prepared for their exam.</p>	<p>Theory based on the core elements of Dt and in-depth theory based on timbers</p> <p>The following topics will be covered</p> <ul style="list-style-type: none"> <li>- New and emerging technologies</li> <li>- Energy generation</li> <li>- Developments in new materials - smart, composite, technical textiles etc</li> <li>- Electronic systems</li> <li>- Mechanical devices, movements, forces etc</li> <li>- Timbers</li> <li>- Plastics</li> <li>- Metals</li> <li>- Textiles</li> <li>- Papers and boards</li> <li>- Designers</li> <li>- The design process</li> <li>- Drawing techniques</li> <li>- CAD/CAM software and machinery</li> <li>- Manufacturing processes</li> </ul>
<b>Key Skills developed</b>	<p>Practical skills - tools, machines, techniques, CAD, CAM, health and safety</p> <p>Theory - grow an in depth knowledge of materials and their properties and new technologies,</p> <p>Creativity, Research, giving and receiving feedback, analysis, Designing, drawing, accuracy, attention to detail</p>
<b>Useful Websites</b>	<p>Bitesize <a href="https://www.bbc.co.uk/bitesize/examspecs/z4nfwty">https://www.bbc.co.uk/bitesize/examspecs/z4nfwty</a></p> <p>Eduqas website <a href="https://www.eduqas.co.uk/qualifications/design-and-technology-gcse/#tab_keydocuments">https://www.eduqas.co.uk/qualifications/design-and-technology-gcse/#tab_keydocuments</a></p> <p>Technology Student <a href="https://www.technologystudent.com/">https://www.technologystudent.com/</a></p> <p>Seneca - Online revision &amp; quizzes <a href="https://senecalearning.com/en-GB/revision-notes/gcse/design-and-technology/aqa">https://senecalearning.com/en-GB/revision-notes/gcse/design-and-technology/aqa</a></p>
<b>Reading/Literacy requirements /Key Words</b>	<p><b>Textiles</b> Natural fibres, synthetic fibres, cotton, wool, linen, polyester, nylon, elastane, yarn, thread, weave, knit, weave patterns (such as twill, satin, and plain weave), non-woven fabrics, textiles treatments (like dyeing, waterproofing, and flame-retardant finishes), textile bonding, fabric printing, stitching, embroidery, fabric weight, texture, stretch, elasticity, strength, softness, permeability, moisture-wicking, breathability, sustainable textiles, biodegradable fabrics, smart textiles, conductive fabrics, nanofibres, and recycled textiles.</p> <p><b>Timbers</b> Hardwoods, softwoods, manufactured boards, grain, moisture content, density, elasticity, strength, durability, kiln drying, seasoning, veneer, laminated timber, plywood, MDF (Medium Density Fibreboard), chipboard, blockboard, sustainability, woodworking joints (such as dovetail, butt joint, and mortise and tenon), finishing techniques (such as varnishing, staining, and oiling), bending, sanding, screwing, nailing, carving, sustainable forestry, woodworking tools</p>

(like saws, planes, and chisels), tensile strength, compressive strength, and expansion and contraction.

#### **Plastics**

thermoplastics, thermosetting plastics, polymers, monomers, polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), polystyrene (PS), acrylic, polyethylene terephthalate (PET), polycarbonate, nylon, bioplastics, biodegradable plastics, plasticisers, injection moulding, extrusion, blow moulding, vacuum forming, compression moulding, rotational moulding, 3D printing (FDM), recycling, plastic waste, upcycling, downcycling, sustainable plastics, material properties (such as flexibility, strength, transparency, and durability), UV degradation, and plastic additives (such as stabilisers and colourants).

#### **Metals**

Ferrous metals, non-ferrous metals, alloys, steel, cast iron, aluminium, copper, brass, bronze, zinc, lead, stainless steel, carbon steel, mild steel, high-carbon steel, wrought iron, galvanisation, anodising, malleability, ductility, conductivity, corrosion, rusting, heat treatment, tempering, quenching, forging, casting, welding, brazing, soldering, machining, CNC (Computer Numerical Control), bending, welding types (such as MIG, TIG, and arc welding), cold working, hot working, metal fatigue, tensile strength, hardness, and metal polishing.

#### **Papers and boards**

paper, board, corrugated board, solid white board, duplex board, triplex board, folding boxboard, coated paper, kraft paper, recycled paper, grammage, weight, finish, texture, stiffness, smoothness, folding, printing, cutting, scoring, embossing, perforating, die cutting, sustainability, biodegradability, recyclability, lamination, bleached, unbleached, pulp, pulp mill, wood-free paper, acid-free paper, conservation, packaging, labelling, and the use of papers and boards in packaging, printing, and promotional materials.

#### **Electronics**

Circuit, electrical circuit, closed circuit, open circuit, series circuit, parallel circuit, components, resistors, capacitors, diodes, transistors, LEDs (Light Emitting Diodes), microcontrollers, semiconductors, conductors, insulators, switch, battery, power supply, voltage, current, resistance, Ohm's law, amperes, volts, ohms, power, soldering, breadboard, PCB (Printed Circuit Board), component placement, circuit diagram, flow of electricity, solder, wire, integrated circuit (IC), printed wiring board, surface-mount technology (SMT), through-hole technology, rectifier, fuse, signal, analogue, digital, microprocessor, sensor, actuator, transformer, electrolysis, and the environmental impact of electronic waste (e-waste) and recycling.

#### **Manufacturing**

Casting, moulding, injection moulding, extrusion, machining (such as milling, turning, and drilling), laser cutting, water jet cutting, welding, brazing, soldering, CNC (Computer Numerical Control), 3D printing, vacuum forming, die cutting, stamping, shearing, pressing, forming, assembly, finishing (such as painting and polishing), quality control, batch production, mass production, just-in-time (JIT) manufacturing, automation, lean manufacturing, and prototyping.

#### **CAD CAM and Drawing**

CAD (Computer-Aided Design), CAM (Computer-Aided Manufacturing), 2D drawing, 3D modelling, isometric drawing, orthographic projection, planometric drawing, exploded diagrams, sketching, rendering, dimensioning, annotation, scale, line types, hidden detail, technical drawing, perspective drawing, CAD software, CNC (Computer Numerical Control), 3D printer, rapid prototyping, laser cutting, milling, routing, lathe, drilling, toolpath, vector graphics, bitmap graphics, parametric design, simulation, wireframe, surface modelling, solid modelling, tessellation, layer, STL (stereolithography) file format, G-code, and ergonomic design considerations for digital design and manufacturing

#### **Energy**

	<p>Energy sources, renewable energy, non-renewable energy, fossil fuels, solar energy, wind energy, hydroelectric energy, geothermal energy, tidal energy, nuclear energy, biomass, carbon footprint, energy efficiency, energy conservation, power, energy transfer, electrical energy, mechanical energy, thermal energy, kinetic energy, potential energy, work, joules, watts, voltage, current, resistance, power rating, efficiency, sustainability, energy generation, energy storage, energy consumption, battery, fuel cell, solar panels, photovoltaic cells, thermodynamics, energy density, insulation, and the impact of energy use on the environment.</p> <p><b>New emerging technology</b>  Smart materials, responsive materials, thermochromic materials, photochromic materials, shape memory alloys, piezoelectric materials, photoelectric materials, self-healing materials, electrochromic materials, conductive fabrics, light-emitting fabrics, phase change materials, polymers, nanomaterials, biomimicry, composites, composite materials, reinforcement, matrix, glass fiber, carbon fiber, aramid fiber (e.g., Kevlar), fiberglass, epoxy resin, laminates, lay-up process, resin infusion, pre-preg, composite molding, technical textiles, protective textiles, flame-resistant fabrics, waterproof fabrics, UV-resistant fabrics, conductive textiles, wearable technology, high-performance textiles, medical textiles, geotextiles, aerogel, smart textiles, nano-textiles, and bio-fabrics.</p> <p><b>NEA</b>  Design brief, client, target market, user-centered design, specification, research, primary research, secondary research, product analysis, existing products, market research, survey, questionnaire, interview, focus group, analysis of needs, design ideas, concept sketches, development, iterative design, prototyping, CAD, CAM, testing, evaluation, functionality, form, aesthetics, ergonomics, materials, sustainability, environmental impact, lifecycle analysis, cost analysis, feasibility, prototypes, mock-ups, product testing, user feedback, refinement, modifications, design development, final design, technical drawings, bill of materials (BOM), manufacturing process, assembly, tolerances, quality control, health and safety, legal considerations, intellectual property, patents, copyright, ethical considerations, commercialization, and project management.</p>
Homework requirements	<p>Once every week which is posted on google classroom. This should be between 45 minutes to 1 hour with.</p> <p>Revision is expected alongside the course and should be done independently.</p>
Personal Development Links	
Trips/Visits (If applicable)	N/A