CoDA Curriculum

Design + Innovation

Key Stage 3

CITY OF DERBY ACADEMY

Improving the life chances of all students

Design + Innovation

The Key Stage 3 Design + Innovation curriculum combines the KS3 National curriculum for Design and technology with the KS3 National curriculum for Computing.

For the first 13 weeks of Year 7 learners complete an Introduction to D+I unit, where they experience different subject areas within the faculty. After this they commence a regular carousel rotation program until the end of Year 8, where they do units of work in:

- Food and Cookery (lunchtime and world foods) – learners will acquire a range of food and nutrition-related knowledge through a range of exercise. Alongside this, learners will develop their practical skills by hygienically creating a range of food products following the principles of food safety.
- Fashion and Textiles (cultural influences: Mexico and Japan) – learners will design and make two fabric pieces: a pencil-case pouch, taking inspiration from the Day of the Dead festival; and a wall-hanging fabric art piece, taking inspiration from Japanese life.
- Design and Technology: Material Properties (polymers and metals) – learners will: develop knowledge of polymers and metals, and of polymer and metal manufacturing methods; complete design processes to manufacture a series of products, including a pewter-cast key-ring and a moulded plastic wall clock.
- Design and Technology: Systems and Devices (mechanisms and electronics) – learners will: develop knowledge of types of motion, forces, levers, linkages and cams; develop knowledge of electronic components; assemble and test a working electronic circuit; use CAD/CAM to design and produce a product casing.
- Information and Computer Technology (e-Safety, computing basics, and Programming) – learners will develop knowledge of: emails, passwords, using Word and PowerPoint software, inputs – processes – outputs, data storage, computer systems, programming: micro:bit, python, html.

In Year 9, learners have the opportunity to study a curriculum designed to join the skills and knowledge developed in Years 7 and 8 to those needed for subjects which may be taken in Year 10. The Year 9 units of work are:

- Food and Cookery (food for life) – learners will build on the knowledge already acquired to explore how food is needed for a healthy lifestyle. Alongside this, learners will further develop their practical skills by hygienically creating a range of challenging food products following the principles of food safety.
- Fashion and Textiles (clothing and accessories) – learners will design a capsule fashion collection for a global brand. In addition, they will customise a plain white t-shirt using resist-dyeing, and will design and make a personalised/monogrammed calico tote bag, developing skills of surface decoration and machine sewing.
- Design and Technology: Materials (timbers) – learners will: develop knowledge of timber-based products and timber manufacturing methods; use iterative design principles to develop and manufacture functioning products.
- Creative iMedia (visual identity and digital graphics) – learners will create pre-production documents – mind-maps; mood-boards; and visualisation diagrams – incorporating principles of colour-theory, typography, and design conventions, to develop graphic products created using CAD software.
- Computer-Aided Design (Fusion360) – learners will use tutorials to complete increasingly complex 3D models using CAD and prepare a design for CAM (3D printing).

The Key Stage 4 Design + Innovation curriculum intends to give learners the skills and knowledge needed to make progress onto the next step following their secondary education, and currently includes qualifications in: Business; Construction; Creative iMedia; Design and Technology; Engineering Manufacture; Fashion and Textiles; and Food and Cookery.

At Key Stage 3 students will follow the national curriculum:

Design and technology programme of study: key stage 3.

When designing and making, pupils should be taught to:

Design

- use research and exploration, such as the study of different cultures, to identify and understand user needs
- identify and solve their own design problems and understand how to reformulate problems given to them
- develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations
- use a variety of approaches, to generate creative ideas and avoid stereotypical responses
- develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools

Make

- select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture
- select from and use a wider, more complex range of materials, components and ingredients, taking into account their properties

Evaluate

- analyse the work of past and present professionals and others to develop and broaden their understanding
- investigate new and emerging technologies
- test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups
- understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists

Technical knowledge

- understand and use the properties of materials and the performance of structural elements to achieve functioning solutions
- understand how more advanced mechanical systems used in their products enable changes in movement and force
- understand how more advanced electrical and electronic systems can be powered and used in their products
- apply computing and use electronics to embed intelligence in products that respond to inputs, and control outputs, using programmable components.

Cooking and nutrition – Pupils should be taught to:

- understand and apply the principles of nutrition and health
- cook a repertoire of predominantly savoury dishes so that they are able to feed themselves and others a healthy and varied diet
- become competent in a range of cooking techniques
- understand the source, seasonality and characteristics of a broad range of ingredients.

Computing programme of study: key stage 3.

Pupils should be taught to:

- design, use and evaluate computational abstractions that model the state and behaviour of real-world problems and physical systems
- understand several key algorithms that reflect computational thinking [for example, ones for sorting and searching]; use logical reasoning to compare the utility of alternative algorithms for the same problem
- use two or more programming languages, at least one of which is textual, to solve a variety of computational problems; make appropriate use of data structures; design and develop modular programs that use procedures or functions
- understand simple Boolean logic and some of its uses in circuits and programming; understand how numbers can be represented in binary, and be able to carry out simple operations on binary numbers
- understand the hardware and software components that make up computer systems, and how they communicate with one another and with other systems
- understand how instructions are stored and executed within a computer system; understand how data of various types (including text, sounds and pictures) can be represented and manipulated digitally, in the form of binary digits
- undertake creative projects that involve selecting, using, and combining multiple applications, preferably across a range of devices, to achieve challenging goals, including collecting and analysing data and meeting the needs of known users
- create, re-use, revise and re-purpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
- understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct and know how to report concerns.

Year 7-8

Topic	Introduction to Design + Innovation	Design + Technology: Material Properties	Design + Technology: Systems + Devices	Fashion + Textiles	Food + Cookery	Information + Communication Technology
End Points (Knowledge & Skills)	Personalised design. Baseline quiz. Embroidery sample. Designing clothes. Sending emails. Using the internet. Safe knife skills. Beginner baking skills. Health & safety. Tools & equipment. Render design work. Using grids to draw. Written assessment.	Health & safety. Properties of polymers. Properties of metals. Categories of polymers. Categories of metals. Manufacturing methods. Design brief. Design specification. Product analysis. Communicate ideas. Annotated drawings. Create & use a template. Manufacture products. Use different tools. Equipment & machinery. Evaluation of products.	Health & safety. Use of soldering irons. Types of different components. Resistor colour codes. Quality Assurance. Use CAD/CAM. Categories of motions. Categories of leavers. Types of CAMs. Types of linkages.	Use a sewing machine. Mexican culture. Tie-dye fabric. Fibres & fabrics. Design sugar skulls. Make fabric pouch. Japanese culture. Shibori dyeing. Fabric construction. Use CAD/CAM. Sublimation printing. Surface decoration. Hand-embroidery.	Health & safety rules. Food preparation skills. Evaluate products. Healthy diet principles. Nutrients – sources. Nutrients - functions. Bacteria & food safety. Taste testing. Social & moral issues. Functions of ingredients. Designing food products.	Send an email. Produce a presentation. Construct a document. Online safety. Make a computer game. Inputs & outputs. Data storage. Binary numbers. Denary number. Convert binary – denary. Use HTML. Construct a webpage. Use Micro:bit. Simple programming. Bitmap images. Graphical techniques. Produce an image.
What is assessed	Practical skills. Presentation skills. Knowledge retention.	Generate ideas. Communicate ideas. Manufacture ideas. Evaluate ideas.	Practical skills. Presentation skills. Knowledge retention.	Practical skills. Designing. Making skills.	Knowledge. Practical skills. Designing.	Digital literacy E-safety Coding
Key Vocabulary	Design + Technology: Describe, Pillar Drill, Sanding Machine, Tenon Saw; Fashion + Textiles: Colourway, Design, Embroidery, Surface Decoration; Food + Cookery: Bridge/Claw Hold, Evaluation, Fruit & Vegetables, Hob; Computing: e-mail, Home Folder, Teams, Word Processing; Graphics: Colour Theory, Dimension, Presentation, Rendering.	Thermoplastic, Thermoset, Ferrous, Non-Ferrous, Alloy, Vacuum Former, Pewter Casting, Coping Saw, HIPS, Vinyl, Pewter, MDF, Design Brief, Specification, Wasting, Forming, Ergonomics, Molecular Structure, Evaluate, Analysis, Compare, Sustainable, Aesthetics, Negative Space	Resistor, Ceramic Capacitor, Electrolytic Capacitor, Printed Circuit Board, Soldering Iron, Solder, Polarity, Computer Aided Design (CAD, Vector, Computer Aided Manufacture (CAM), Laser Cutter, Acrylic, Linear, Rotary, Reciprocating, Oscillating, Fulcrum, Crank & Slider, Bell Crank, CAMs	Fabric, Needle + Thread, Stitching + Sewing, Scissors + Pins, Tie-dye, Embroidery, Embellishment, Surface Decoration, Fibres, Natural, Sustainable, Cotton + Wool, Linen + Silk, Man-made, Synthetic + Regenerated, Polyester + Acrylic, Nylon + Elastane, Shibori, Resist-dyeing, Yarn, Woven / Weaving, Warp + Weft, Knitted /	Eatwell guide, Taste, Texture, Appearance, Aroma, Nutrients, Carbohydrate, Fat, Protein, Vitamins, Minerals, Bacteria, Free range, Fairtrade, Organic, Cross contamination, Sustainability	Hardware, Software, Process, Network, Internet, World wide web, Cyberbullying, Input, Variable Sensor, E-safety, Output, Binary, Data, Procedure, Bitmap, Memory, RAM, ROM, Storage, Processor, LEDS, Micro:bit, HTML

				Knitting, Non-woven, Bonded, Felted		
Literacy Skills Developed (Writing/Oracy/Tier 2)	Literacy skills developed through quality teaching & the embedding of high expectations regarding the presentation of books. Key words are provided during theory lesson. Opportunities taken for oracy when appropriate.					
Career Links (Employability Skills, Career Opportunities)	CAD operator Product designer Chef / Caterer Textile Artist Computer operator Communication. Creativity. Independence. Resilience.	Product designer. D&T Teacher. Carpenter. Jewellery maker. Materials engineer. Communication. Creativity. Independence. Resilience.	Graphic Designer Digital Artist Typesetter Copywriter Product Designer Communication. Creativity. Independence. Resilience.	Textile artist. Sewing machinist. Pattern cutter. Fashion designer. Craft-maker. Communication. Creativity. Independence. Resilience.	Chef. Caterer. Nutritionist. Food scientist. Food inspector. Communication. Creativity. Independence. Resilience.	Programmer Game designer App developer ICT technician Data analysist Communication. Creativity. Independence. Resilience.
SMSC Links	Use of imagination and creativity in designing their own products. Understanding of the consequences of their behaviours and actions in a workshop environment.	Willingness to participate in and respond positively to the work of other designers. Use of imagination and creativity in designing their own products. Understanding of the consequences of their behaviours and actions in a workshop environment.	Willingness to participate in and respond positively to the work of other designers. Use of imagination and creativity in designing their own products.	Sustainability and environmental impact of textiles fibres and fabrics. Creativity is encouraged to produce design work Learners are encouraged to explore cultural references and their own interests to inspire their design work. Their practical work is customised to suit their own tastes to create unique personalised products.	Learners study social and moral beliefs around foods (organic, free range etc). Learners are taught about the Health and safety specific to the food curriculum to keep themselves and others healthy and safe. Learners study other cultures' foods in the 'world foods' unit and are encouraged to share their own cultural food experiences.	

Year 9

Topic	Computer-Aided Design	Creative iMedia	D+T: Materials: Timber	Fashion + Textiles	Food + Cookery
End Points (Knowledge & Skills)	3D printing process & its uses. Navigate around Fusion 360 software. Work to a given brief. Application of Fusion 360. Creation of a working drawing. Creation of a rendered design. Preparing a design for CAM.	Pre-production documents. Mind-maps + mood-boards. Image manipulation. Present design ideas. Visualisation diagrams. Considered choices. Colour theory. Typography. Produce digital graphics.	Health & safety in a workshop environment. Properties of different timbers. Different types of wood joints. Design brief & specification. Client Profile. Analyse an existing product. Communicate ideas through drawings & annotations. Iterative design process Manufacture of a product using tools & machines. Evaluation of product.	Design a capsule-collection. Explore formal elements. Hand-sketching skills. Fashion illustration skills. Textiles fibres & fabrics. Resist-dyeing skills. Sewing machine skills. Constructed textiles. Surface decoration skills. Drawing & painting. Sublimation printing.	Advanced food preparation skills. Evaluate products Recap nutrients & the Eatwell guide The health benefits of a variety of vitamins Allergens & seasonal products Food provenance Designing food products to meet a dietary need
What is assessed	Fusion skills. Work to a brief. Evaluation of ideas.	Photoshop Skills. Work to a brief. Generate/communicate ideas.	Generate/communicate ideas. Manufacture ideas. Evaluate ideas.	Practical skills. Designing. Making skills.	Knowledge, practical skills & designing.
Key Vocabulary	CAD, CAM, Extrude, Assembly, 3D Printing, Dimension, Fillet, Chamfer, Components, Rendering, STL, GCODE, PLA, Slicing, Design Brief, Specification, Plane, Orthographic, Projection, Isometric, Additive, Revolve, Evaluate, Describe, Aesthetics, Appearance	Merchandise, Consumer, Mood Board, Select (tool), Lasso (tool), Hue, Saturation, Eraser (tool), Cut, Copy, Paste, Transform, Invert, Contrast, Visualising	Softwood, Hardwood, Manufactured Board, Lap Joint, Housing Joint, Tenon Saw, Chisel, Mitre Joint, Mortise & Tenon, Design Brief, Specification, Steel Rule, Bench-hook, Soldering, Deciduous, Coniferous, Ergonomics, Tolerance	Fashion; Textiles; Brand; Resist-dyeing; Formal elements; Capsule collection; Features + Details; Fabric painting; Colourways; Contemporary; Illustration; Surface decoration; Embellishment; Embroidery; Printing; Woven/weaving; Knitted/knitting; Presentation	Hygiene, Cross contamination, Macronutients, Carbohydrate, Fat, Protein, Eatwell guide, Vitamins, Vegetarian, Vegan, Organic, Gluten, Allergen, Reared, Seasonality, Metabolism, Julienne, Brunoise, Provenance
Literacy Skills Developed (Writing/Oracy/Tier 2)	Literacy skills developed through quality teaching & the embedding of high expectations regarding the presentation of books. Key words are provided during theory lesson. Opportunities taken for oracy when appropriate.				
Career Links (Employability Skills, Career Opportunities)	CAD Technician. 3D Artist. Mechanical engineer. Architect. Product designer.	Web Developer. Social Media Manager. Digital Marketing Specialist. Game Designer. Content Creator.	Product designer. D&T Teacher. Carpenter. Furniture Maker. Materials engineer.	Textile artist. Sewing machinist. Pattern cutter. Fashion designer. Craft-maker.	Chef. Caterer. Nutritionist. Food scientist. Food inspector.

	Communication. Creativity. Independence. Resilience.	Communication. Creativity. Independence. Resilience.	Communication. Creativity. Independence. Resilience.	Communication. Creativity. Independence. Resilience.	Communication. Creativity. Independence. Resilience.
SMSC Links	Sense of enjoyment and fascination in new technologies like 3D printing. Willingness to participate in and respond positively to the work of other designers. Use of imagination and creativity in designing their own products.	Students will understand the moral/ethical issues which are involved with copyright and why it is wrong to plagiarise work. Learners research music artists and explain how they have influenced their lives. Students review the work of different artists and musicians (Music Albums) and understand how these have significance on different cultures.	Willingness to participate in and respond positively to the work of other designers. Use of imagination and creativity in designing their own products. Understanding of the consequences of their behaviours and actions in a workshop environment.	Creativity is encouraged to produce design work Learners are encouraged to explore their own cultural identity and interests to inspire their fashion design work. Their practical work is customised to suit their own tastes to create unique personalised products. Sustainability and environmental impact of textiles fibres and fabrics.	Learners study spiritual beliefs around food (vegan and vegetarianism, religious foods etc). Learners cook a range of recipes from various influences across the globe. Leaners explore the spiritual, moral, social, and cultural reasons why people choose to eat different foods. Learners are taught about the FSA - Food Standards Agency and how they monitor food businesses, Natasha's law which helps to protect people with allergies.