Pride | Ambition | Care | Excellence

Design and Technology | Curriculum Map

Co-op Academy
Florence MacWilliams

Curriculum | Intent

The Design and Technology curriculum at Co-op Academy Florence MacWilliams empowers students to move from passive consumers of products to confident creators of engineered solutions. In alignment with our STEM specialism — and inspired by Florence MacWilliams' legacy of logical, systems-based thinking — students combine analytical problem-solving with creative, practical design. In a world increasingly shaped by automation, advanced manufacturing and digital innovation, it is essential that students understand how modern products, mechanisms and technologies are designed, made and improved.

Our curriculum balances declarative knowledge (the scientific and technical principles behind electronics, automation, materials and mechanisms) with procedural knowledge (the hands-on mastery of tools, CAD software, workshop processes and prototyping techniques). This ensures students understand both *how* engineered systems work and *how* to create high-quality solutions themselves.

Our KS3 curriculum is intentionally sequenced to build the academic and practical foundations required for the OCR GCSE in Design and Technology. Students are introduced early to rigorous design methodologies, systems thinking and technological principles that they will deepen at Key Stage 4, ensuring a smooth transition into advanced engineering and design practice.

We also place strong emphasis on creativity, iteration and real-world problem-solving. Students learn to analyse user needs, evaluate materials and manufacturing methods, and justify design decisions using evidence and technical understanding. This approach develops confident, reflective designers who can adapt their ideas and respond to authentic design challenges.

	Autumn Term	Spring Term	Summer Term
7	Smart Systems & Product Design Students move from theoretical physics to practical electronics, learning electrical theory, circuit schematics, and material properties. They design and manufacture a functional smart product using soldering, CAD modelling, and CAM prototyping. Students master resistance, voltage and current, solder components onto a PCB and design a bespoke casing using CAD/CAM.		Mechanical Systems & Materials Engineering Students explore mechanical engineering through precision metalwork. They interpret orthographic drawings, understand metal properties, and learn fastening theory while producing accurate components using drilling, tapping, and threading. Students read orthographic projections, cut internal and external threads and construct a custom 3D-printed fixture.
8	Digital Prototyping & CAD Assembly Students transition from 2D geometry to full 3D parametric modelling, learning how to sketch, dimension, extrude, and assemble multi-part digital components. Students construct and assemble complex virtual components, apply 3D features and create multi-part assemblies.	Physical Computing & Systems Control (BBC Micro:bit) Students combine sensors, coding, and actuators to create responsive systems. They build circuits, write algorithms, and iterate hardware/software solutions. Students connect sensors, write control algorithms, diagnose hardware and software bugs.	Materials Technology - Working with Woods and Manufactured Boards Students understand properties and characteristics of woods and manufactured boards. They use a variety of tools and equipment to mark out, cut and manipulate material to create a 3 Dimensional outcome using traditional and modern joining methods.
9	Industrial Systems & Robotics Students learn how modern factories operate using robotics, coordinate systems, and automation logic. They program robotic arms and run a mini assembly line. Students program multi-axis robotic arms, write loops and conditional timing, solve physical and programmatic errors.	User-Centred Product Design (USB Torch) Students analyse user needs, study ergonomics, and integrate electronics into a custom CAD-designed casing. They prototype using 3D printing and evaluate against a user brief. Students conduct demographic research, wire internal circuitry and iterate prototypes using additive manufacturing.	The Innovation Challenge (Timed Engineering Sprint) Students work under industry-style pressure to analyse contexts, generate rapid concepts, build speed-models, and evaluate prototypes against specifications. Students generate rapid concepts, apply speed-modeling and critically evaluate prototypes under a hard deadline.

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Careers Link	Electronic Engineer - Electronics Manufacturer Electronics Designer CAD/CAM Operative Product Designer Project Planner		Assembly Technician / Engineer Engineering Manufacture Operative R&D Model Maker

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Careers Link	CAD Technician Digital Design Engineer Mechanical Design Drafter Product Visualisation Specialist	Embedded Systems Technician Junior Electronics Programmer IoT Technician Hardware Debugging Technician	Joiner Product Designer Sustainability Architect Carpenter Kitchen Fitter

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Careers Link	Robotics Technician Automation Engineer Manufacturing Systems Operator Industrial Programmer	Product Designer Electronics Designer Human Factors / Ergonomics Specialist R&D / Experimental Prototype Technician	Product Innovation Engineer Rapid Prototyping Technician Design Sprint Facilitator Industrial Design Evaluator Product Designer / Manager



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At Co-op Academy Florence MacWilliams, colleagues and pupils work at 'PACE' ensuring pride, ambition, care, and excellence for self, school and city