Curriculum rationale **Faculty : Design** **Lead : M Jones**

What is your curriculum statement for each key stage?

There are also some characteristics distinct to our subject. Design Technology is taught at KS2 to widely varying levels, students join us with a range of designing and making skills most commonly in compliant materials. Manipulative skills are poorly developed and many have little or no knowledge of manipulating rigid materials. Graphical communication skills are usually poor. Information from the feeder schools varies greatly in quality.

KS3 Pupils develop a secure knowledge of healthy, safe and hygienic practice across all specialist areas of Design when completing a range of Design, Make and evaluative tasks including:

- **The ability to build and apply Computer Aided Design skills using 2D and 3D mathematic modelling skills.**
- **Develop knowledge and understanding of physical and mechanical materials properties, including papers and boards, woods, metals, plastics, fabrics and composites.**
- **Generate a range on imaginative and purposeful design ideas using an iterative design approach to a range of design challenges.**
- **Develop and apply STEAM knowledge through the prototyping their own designs in the 'Race for the line' project.**
- **Translate design ideas into workable solutions employing more complex practical skills, which develop in complexity and challenge throughout the keystage.**
- **Develop technical knowledge related to micro controllers and VEX robotics through the design and manufacture of complex circuits and robotics.**
- **To use a variety of approaches through the study of inspirational Designers (Alessi) and Architects (Zaha Hadid) in the 'Pavilion' project.**
- **Design Ventura scheme implemented after successful pilot project – real life context through the design and manufacture of high quality products.**
- **CEIAG is embedded into the curriculum, links to industry and real life contexts. These include RIBA - Pavilion design, Unilever – Bright futures programme, Make it Challenge and numeracy links with the Dragons Den competition.**

KS4 Design and Technology develops knowledge, understanding and skills required to undertake the iterative design process of exploring, creating and evaluating. This is delivered primarily through the practical application of this knowledge and understanding. Student develop unique projects developed from the set NEA contexts. These principles include:

Core technical principles.

• *new and emerging technologies* - The impact of new and emerging technologies on: the design and organisation of the workplace including automation and the use of robotics.
• *energy generation and storage* - How power is generated from coal, gas and oil. Arguments for and against the selection of fossil fuels.
• *developments in new materials* - Developments made through the invention of new or improved processes e.g. Graphene, Metal foams and Titanium.

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• *systems approach to designing* – Input, process and output.
• *mechanical devices* - Visualise and represent 2D and 3D objects including 2D diagrams of mechanisms/ mechanical movement.
• *materials and their working properties* - Classification of the types and properties of a range of materials. Physical properties of materials related to use and knowledge applied when designing and making.

Specialist technical principles.

• *selection and working with materials or components* - Functionality: application of use, ease of working, aesthetics: surface finish, texture and colour, environmental factors: recyclable or reused materials. Availability: ease of sourcing and purchase. Cost: bulk buying. Social factors: social responsibility. Cultural factors: sensitive to cultural influences. Ethical factors: purchased from ethical sources such as FSC.

Designing and making principles.

Pupils will demonstrate and apply knowledge and understanding of designing and making principles in relation to the following areas:

- *Developing manufacturing skills* – Integrating manufacturing skills including CAD – laser cutting and 3D printing, Machinery, hand tools, and materials properties.
- *selection and manipulation of materials and components* – jewellery project, pewter casting with links to creative design ideas and inspirational designers.
- *investigation, primary and secondary data* – research and interviews with clients and local industry to establish real word context for NEA.
- *environmental, social and economic challenge* – Ecology and ethics in design through study of the green imperative.
- *the work of others* - Students should investigate, analyse and evaluate the work of past and present designers including Phillippe Starke and Alessi to inform their own designing.
- *design strategies and communication of design ideas* - Develop, communicate, record and justify design ideas using a range of appropriate techniques such as: freehand sketching, isometric and perspective 2D and 3D drawings, system and schematic diagrams, annotated drawings that explain detailed development or the conceptual stages of designing, exploded diagrams to show constructional detail or assembly working drawings: 3rd angle orthographic, using conventions, dimensions and drawn to scale.
- *prototype development* – use of mathematical modelling techniques including CAD/CAM through the use of Solidworks and Tinker CAD.
- *tolerances* – Quality control and quality assurance.
- *material management* - The importance of planning the cutting and shaping of material to minimise waste eg nesting of shapes and parts to be cut from material stock forms. How additional material may be removed by a cutting method or required for seam allowance, joint overlap etc. Expression in decimal and standard form eg calculation of required materials. Calculate surface area and volume eg material requirements.
- *Managing a large scale design and make project* – analysis, research, project planning and iteration.

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KS5 Pupils build on the core knowledge developed at KS3 and 4. Pupils investigate historical, social, cultural, environmental and economic influences on design and technology, whilst enjoying opportunities to put their learning in to practice by producing prototypes of their choice. Students will gain a real understanding of what it means to be a designer, alongside the knowledge and skills sought by higher education and employers.

- *Detailed Product analysis* - through a product study, students analyse the functional elements of products. They identify the strengths and weaknesses of the physical and mechanical properties of materials and develop innovative solutions to real problems.
- *Design development and product disassembly* – Dyson engineering box used to explore manufacturing methods used in industry.
- *STEAM* - Dendrite race for the line engineering focus with CEIAG links through the learning partnership.
- *Understanding plastics* – quality control CAD/CAM skills development and prototyping skills.
- *NEA example project* – Biomimicry inspired lamp, building on design creativity and links to inspirational designers, emphasis on prototyping. Having chosen their context and potential user(s) they then need to plan and carry out an extensive investigation into all aspects of the context in order that they might operate from a position of knowledge when making subsequent decisions.
- The study of Dieter Rams 10 principles of design, educates students about the impact of good design on society and how this has influenced the design of industrial products and practicing designers such as apple designer, Jony Ive.

How does learning develop through each key stage?

Introduction to Design through Computer Aided Design, crazy creature textiles based project, Dendrite race for the line STEM project, developing prototyping skills and detailed testing and evaluating, Design a pavilion project year 8 builds on creativity and a range of mathematical modelling skills. Students develop an understanding of how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs] through the Stereo amplifier project in year 8. Year 9 builds on CEIAG links through the Design Ventura project linked to the London Design museum.

What principles guide your decision making? What is distinctive about your curriculum?

The unique aspect of Design and Technology is the real life context. CEIAG is embedded into the curriculum due to the nature of the subject and the clear links with industry and the impact on society. Students produce their own design ideas, using creativity to create unique concepts that can be developed into commercially viable solutions. Literature such as the Universal Principles of Design is used to prepare students for industry and design based degree courses.

Core technical principles – application of knowledge from across the curriculum (with a focus on maths and science).

Specialist technical principles - In addition to the core technical principles, all students develop an in-depth knowledge and understanding of the following specialist technical principles related to material production.

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Designing and making principles – through the completion of increasingly complex practical activities.

How do you expect to see your curriculum delivered? How do you vary this delivery to meet the needs of all learners?

- **Develop independent learning through well planned briefs that engage and inspire students.**
- **Inspirational teaching with outstanding subject knowledge evident from specialist teaching staff.**
- **Magenta principle integrated into the Design lessons to engage and inspire learners.**
- **Practical focus with evidence of knowledge and understanding gained through design and theory folder.**

How do your vary the learning experiences when delivering the curriculum? In the classroom / outside the classroom / through different learning opportunities?

- **Collaborative planning for students with SEN, extension activities for HAPs and increased level of challenge with level of Design and practical tasks more challenging .**
- **Differentiated activities solving any problems related to mobility issues and students access to the curriculum. TA support is planned into lessons with technical support used to prepare support materials and plan and deliver engaging activities across the keystages.**
- **Extension activities and mare challenging projects are developed for the HAPs in the department to engage and inspire learners.**

What impact does your curriculum have on the learners at Archbishop Blanch?

Students develop a love of learning in Design and Technology and Food lessons. Students are intrinsically motivated in lessons to product high quality outcomes for a range of design challenges. Students are taught to apply the skills and knowledge that they are developing across the curriculum. The mathematical skills they develop include a focus on arithmetic and numerical computation, handling data, graphs, geometry and trigonometry. The scientific knowledge student learn to apply are quantities, units and symbols. STEAM links across the curriculum allow students to develop their understanding of scientific terms when developing a design brief and specifications. Calculation of quantities, measurement of materials and selection of components. Metals and non-metals and the differences between them, on the basis of their characteristic physical and chemical properties and how the properties of materials are selected related to their uses Students engage in extra-curricular activities and have been successful in national competitions. Students take opportunities to complete work experience at high profile industrial placements at Jaguar/Landrover and KKA Architecture. The department has good links to industry. The focus on CEIAG in design lessons educates students about the possible careers that are linked to their studies in Design at Archbishop Blanch. Students are positive about their learning experience in Design and Technology in pupil voice questionnaires. A level students achieve good Value Added grades and progress to degree courses in Product Design, Architecture and Engineering courses at a number of universities across the country, including Warwick, Leeds, Liverpool, Nottingham and Liverpool John Moores University.

What are your assessments for this academic year?

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The feedback given to students uses a progression framework designed to tailor the feedback to the requirements of the national curriculum at Keystage 3 and the new AQA specifcations at keystages 4 and 5.

Term 1	**Design**	**Identify and investigate design possibilities**
Term 2	**Design**	**Producing a design brief & specification.**
Term 3	**Design**	**Generating design ideas**
Term 4	**Make**	**Developing design ideas**
Term 5	**Make**	**Realising design ideas**
Term 6	**Evaluate**	**Analysing & evaluating**