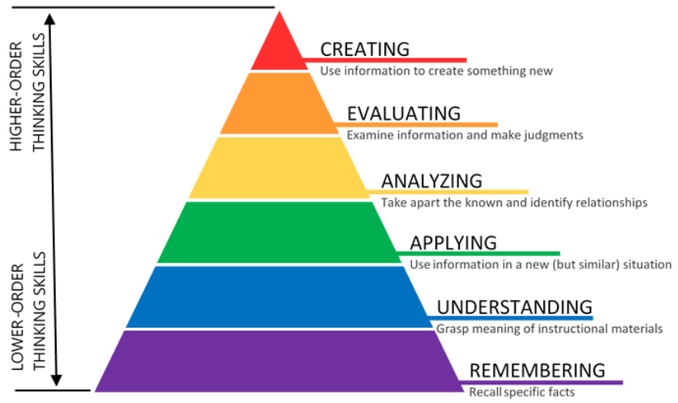
SAPIENTIA ET DOCTRINA – KNOWLEDGE AND WISDOM

Design & Technology Curriculum Map - 2024/25

"Creativity is allowing yourself to make mistakes. The art is knowing which ones to keep."

Scott Adams

Bloom's Taxonomy



Curriculum Intent

Design and technology at the academy dares students to develop their wisdom, practical skills and knowledge. Their subject awareness will give them the confidence to engage with the designed and made world. Students will learn how products and systems are designed and manufactured, how to be innovative and to make creative use of a variety of resources, including digital technologies, to improve the world around them.

As well as developing the next generation of creative designers and manufacturers, our young people will solve, design and provide essential solutions for future national and global problems. Our young people will also grow the wider skill sets they will require to be lifelong learners and assets to the wider world of work, primed for the 4th industrial revolution.

Curriculum Planning

This curriculum has been constructed using Bloom's Taxonomy to support higher order thinking and to define/develop different levels of cognition in our students. The overall scheme in Key Stage 3 is split into **knowledge** of technology/materials, **presentation**/ communication skills, **manufacturing** quality and product **evaluation**/reasoning based on GCSE/A-Level assessment objectives.

Year	Intent	Learning Challenges	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
	Sir Robert Pattinson Academy students in Key Stage 3 will be able to:	***Knowledge:*** How can I apply my knowledge of the **origins, properties and lifecycle** of materials?	**TIMBER**		**METAL**		**POLYMER**	
7	Understand where raw materials are gathered and transformed into useful materials and the impact on sustainability and environment. Apply safe methods in the workshops using a range a of tools and process to produce artifacts. Apply how CAD/CAM works and use it to produce their own artifacts. Analyse the work of others to understand the history and motivations behind the designed world and use this to influence their own work. Solve design briefs and communicate their design ideas.	***Presentation:*** How can I apply my knowledge of **visual communication** to represent an idea? ***Manufacture:*** How can I apply my knowledge of **visual communication** to represent an idea? ***Evaluation:*** How can I use my knowledge of **testing & evaluation** to select materials and suggest improvements?	**Knowledge:** Origins of Timber Stock Forms Timber Categories Deforestation 6 R's **Presentation:** Scale Drawing Isometric Drawing Rendering - *Timber*	**Manufacture:** Saw Skills - *Tenon* Workshop Health & Safety Finishing - *Sanding & Varnishing* Marking Out Techniques Tolerance Joining Methods – *Comb Joint & PVA* **Evaluation:** Material Properties – *Hardness* Vicker's Testing Life Cycle Assessment	**Knowledge:** Origins of Metal Stock Forms Metal Categories Mining Impacts Oxidisation Blast Furnace **Presentation:** Isometric Crating Rendering – *Metal* Fine Lining	**Manufacture:** Saw Skills – *Hacksaw* Workshop Health & Safety Finishing – *Plastic Dip Coating & Filing* Marking Out Techniques Tolerance Joining Methods – *Tap & Die* **Evaluation:** Material Properties – *Hardness* ACCESS FM	**Knowledge:** Origins of Polymer Stock Forms Polymer Categories Mining Impacts Fractional Distillation **Presentation:** Rendering – P*olymer* Freehand Crating Idea generation Mind Mapping	**Manufacture:** Saw Skills – Coping Saw Finishing – *Sandpaper Grades & Filing* Joining Methods – *Liquid Solvent Cement* **Evaluation:** Material selection Material Properties – *Fusibility*
8		***Knowledge:***	**TIMBER**		**METAL**		**POLYMER**	

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<table>
<tr><td></td><td rowspan="2">Evaluate their artifacts and the processes used to consider improvements.

Evaluate how motion, force and energy is created, transferred, and manipulated in systems.

Create their own working ideas using their understanding of the work of others, materials, and practical skills.</td><td>How can I analyse the <u>design, processing and manufacture</u> of materials into products in depth?

Presentation:
How can I use my knowledge of <u>communication skills</u> to create ideas showing variation?

Manufacture:
How can I apply my knowledge of <u>CAD/CAM machinery</u> to manufacture a high-quality outcome?

Evaluation:
How can I apply my knowledge of <u>evaluation</u> to develop design ideas?</td><td><u>Knowledge:</u>
Design Movement – Arts & Crafts
CAD/CAM – Pro/Con's
Influential Designers – William Morris
Industry Production – Mass/Batch

<u>Presentation:</u>
One-Point Perspective
Research – Mood Boarding</td><td><u>Manufacture:</u>
CAD - 2D Design Basics
Finishing – Wood Stain

<u>Evaluation:</u>
Using research to design
Design movement analysis
Work Of Other Analysis</td><td><u>Knowledge:</u>
Design Movement – Art Deco
CAD/CAM – Pro/Con's
Influential Designers – Eileen Gray
Industry Production – Sand Casting
Cultural Impacts on design

<u>Presentation:</u>
Collaborative Design
Computer Numerical Control</td><td><u>Manufacture:</u>
Gravity Casting
Finishing – Drilling/Filing
CAD – Alignment

<u>Evaluation:</u>
Design movement analysis
Work Of Other Analysis</td><td><u>Knowledge:</u>
Design Movement – Memphis
CAD/CAM – Pro/Con's
Influential Designers – Ettorre Stottsass
Industry Production – Injection Moulding

<u>Presentation:</u>
Card Modelling</td><td><u>Manufacture:</u>
Line Bending
CAD – Accuracy & Measurement

<u>Evaluation:</u>
Design movement analysis
Iteration Evaluation
Work Of Other Analysis</td></tr>
<tr><td>9</td><td>Knowledge:
How can I apply my knowledge of <u>motion, force and energy</u> to understand how it is transferred and manipulated in systems & structures?

Presentation:
How can I apply my knowledge of <u>presentation</u> to communicate how I have solved design problems?

Manufacture:
How can I apply my knowledge of <u>tool and material selection</u> to create a high-quality functional prototype or sample?

Evaluation:
How can I apply my knowledge of <u>suitability testing</u> to suggest improvements for my prototype?</td><td colspan="2">TIMBER

<u>Knowledge:</u>
Motion
Mechanical Systems
Mechanical Advantage
Hydraulics/Pneumatics
Gears/Pulleys

<u>Presentation:</u>
Foam Modelling
Orthographic Projection</td><td><u>Manufacture:</u>
Cam & Followers
Levers/Linkages
Temporary Fixings
Templates

<u>Evaluation:</u>
Ergonomics
Forces & Stresses</td><td colspan="2">METAL / POLYMER

<u>Knowledge:</u>
Fossil Fuels
Energy Generation
Nuclear Power
Renewable Power
Electrical Components

<u>Presentation:</u>
3D CAD
Plasticine Modelling
Rendering – Light/Shadow</td><td><u>Manufacture:</u>
Soldering
3D Printing

<u>Evaluation:</u>
Energy Impacts
Anthropometrics</td><td colspan="2">COMPOSITE

<u>Knowledge:</u>
Structures
Biomimicry
Smart Materials
Composite Materials
Bridges

<u>Presentation:</u>
Triangulation
Artstraws
Two-Point Perspective
Mixed Material Models
Thick & Thin Lines
Rendering – Glass & Fabric</td><td><u>Manufacture:</u>
Casting Concrete

<u>Evaluation:</u>
Forces & Stresses
Material Properties – Elasticity
Destruction Testing</td></tr>
</table>

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<table>
<tr><td rowspan="2">10</td><td rowspan="2">Sir Robert Pattinson Academy GCSE Design & Technology students in Key Stage 4 will:

Examine where raw materials are gathered and transformed into useful materials and the impact on sustainability and environment.

Examine how motion, force and energy is created, transferred, and manipulated in systems.

Analyse the work of others to understand the history and motivations behind the designed world and use this it to influence their own work.

Create design briefs, design specifications and design ideas.

Create their own working ideas using their understanding of the work of others, materials, and practical skills.

Select safe methods in the workshops using a range a of tools and processes to produce designed solutions.

Select best CAD/CAM works and use them it to produce their own artifacts.

Evaluate their design solutions and the processes used to consider improvements.</td><td rowspan="2">

How can I generate imaginative, creative and innovative design ideas using extensive research and design strategies?

How can I evidence detailed development work using a wide range of modelling techniques and justify material/component selection?

How can I use appropriate correct tools, materials and equipment to make an exceptionally high-quality prototype?

How can I use comprehensive on-going testing, analysis and evaluation to make modifications/iterations of a prototype?</td><td colspan="5">Exam Content</td><td>Non-Examined Assessment</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td><u>Identifying & investigating design possibilities</u>
Primary / Secondary Research
Client Identification
Interviewing
Evaluation

<u>Producing a design brief & specification</u>
Client needs/wants</td></tr>
<tr><td>11</td><td colspan="6">Non-Examined Assessment</td><td>Exam Content</td></tr>
<tr><td></td><td></td><td></td><td>Generating design ideas
Ongoing Testing/Research
Design Strategies
Evaluation
Drawing Techniques</td><td>Developing design ideas
Ongoing Testing/Research
2D/3D Techniques
CAD Work
Modelling
Working/Material Properties
Manufacturing Spec</td><td>Realising design ideas
Quality Control
Prototype
Health/Safety</td><td>Analysing & evaluating
Third Party Feedback
First Party Feedback
Further Modifications
Evaluation Against Spec
Environmental Evaluation</td><td>Revision</td><td>Exam Leave</td></tr>
</table>

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10	***Sir Robert Pattinson Academy Level 1/2 Design Engineering students in Key Stage 4 will:*** Solve design briefs, design specifications and design ideas. Select safe methods in the workshops using a range a of tools and processes to produce designed solutions. Evaluate design solutions and the processes used to consider improvements. Select CAD/CAM and use it to produce their own artifacts. Evaluate products and the processes used to consider improvements. Create working ideas using understanding of materials, and practical skills.	**R039 Communicating designs Skills** How can I generate design ideas using a range of communication techniques? How can I generate design ideas using a range of CAD? **R040: Design, evaluation and modelling NEA Skills** How can I analysis existing products to understand strengths and weaknesses considering the users requirements? How can I design a production plan to manufacture a product from an engineering drawing? How can I design a production plan to manufacture a product from an engineering drawing? How can I select materials and tools a physical model using a given engineering drawing? How can I generate a 3D CAD model using a given engineering drawing?	**R039 Communicating designs Skills** 1.1 Sketches for a design idea 2.1 Drawings for a design idea 3.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes	**R039 Communicating designs NEA Practice** 1.1 Sketches for a design idea 2.1 Drawings for a design idea 3.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes	**R039 Communicating designs NEA** 1.1 Sketches for a design idea 2.1 Drawings for a design idea 3.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes	**R039 Communicating designs NEA** 1.1 Sketches for a design idea 2.1 Drawings for a design idea 3.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes	**R040: Design, evaluation and modelling NEA Skills** 1.1 Product analysis 1.2 Carry out product disassembly 2.1 Methods of modelling 3.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes	**R040: Design, evaluation and modelling NEA Practice** 1.1 Product analysis 1.2 Carry out product disassembly 2.1 Methods of modelling 3.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes
11		**R040: Design, evaluation and modelling NEA Skills** How can I analysis existing products to understand strengths and weaknesses considering the users requirements? How can I design a production plan to manufacture a product from a engineering drawing?	**R040: Design, evaluation and modelling NEA** 1.1 Product analysis 1.2 Carry out product disassembly 2.1 Methods of modelling 3.1 Produce a 3D CAD model of a design proposal to include compound 3D shapes	**R040: Design, evaluation and modelling NEA** 1.1 Product analysis 1.2 Carry out product disassembly 2.1 Methods of modelling 3.1 Produce a 3D CAD model of a design	**R040: Design, evaluation and modelling NEA** 1.1 Product analysis 1.2 Carry out product disassembly 2.1 Methods of modelling 3.1 Produce a 3D CAD model of a design	**R038: Principles of Engineering Design** 1.Designing processes 2.Design requirements 3. Communicating design outcomes 4. Evaluating design ideas	**R038: Principles of Engineering Design** 1.Designing processes 2.Design requirements 3. Communicating design outcomes 4. Evaluating design ideas	Exam Leave

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		How can I design a production plan to manufacture a product from a engineering drawing? How can I generate a physical model using a given engineering drawing? How can I generate a 3D CAD model using a given engineering drawing?		proposal to include compound 3D shapes	proposal to include compound 3D shapes			
12	***Sir Robert Pattinson Academy A-Level Product Design students in Key Stage 5 will:*** Appraise where raw materials are gathered and transformed into useful materials and the impact on sustainability and environment. Appraise how motion, force and energy is created, transferred, and manipulated in systems. Appraise best CAD/CAM works and use it to produce their own artifacts. Select safe methods in the workshops using a range a of tools and processes to produce designed solutions. Evaluate their products and the processes used to consider improvements. Investigate their design solutions and the processes used to consider improvements. Investigate the work of others to understand the history of the designed world and what has driven it and use it to influence their own work. Construct design briefs, design specifications and design ideas Create their own working ideas using their understanding of the work of others, materials, and practical skills.		**3.1 Technical principles** **Materials** 3.1.1 Materials and their applications. 3.1.2 Performance characteristics of materials 3.1.3 Enhancement of materials. **Mathematics in technology**	**3.1 Technical principles** **Materials** 3.1.4 Forming, redistribution and addition processes. 3.1.5 The use of finishes 3.1.6 Modern industrial and commercial practice **Mathematics in technology**	**3.1 Technical principles** **Materials** 3.1.7 Digital design and manufacture 3.1.8 The requirements for product design and development 3.1.11 Design for manufacturing, maintenance, repair and disposal **Mathematics in technology**	**3.1 Technical principles** **Materials** 3.1.9 Health and safety 3.1.10 Protecting designs and intellectual property 3.1.12 Feasibility studies **Mathematics in technology**	**3.1 Technical principles** **Materials** 3.1.13 Enterprise and marketing in the development of products 3.1.14 Design communication **Mathematics in technology**	**NEA**
13								Exam Leave

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