

# Y12 – Term 1

September

October

November

December

Theory

**UNIT 1 : IDENYFYING REQUIREMENTS**

- 1.1 What can be learnt by exploring contexts that design solutions are intended for?
- 1.2 What can be learnt by undertaking stakeholder analysis?
- 1.3 How can usability be considered when designing prototypes?

**ASSESSMENT OPPORTUNITY**

- 1.1 and 1.2 quick quiz
- End of unit test

UNIT 2 : LEARNING FROM EXISTING PRODUCTS

- 2.1 Why is it important to analyse and evaluate products as part of the design and manufacturing process?
- 2.2 Why is it important to understand technological developments in product design?
- 2.3 Why is it important to understand both past and present developments in product design?

ASSESSMENT OPPORTUNITY

- End Of Unit test
- Quick quiz

Hmk

Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
Identifying Requirements	Learning From Existing products and practices	Implications of Wider issues	Design thinking and communication	Material component considerations	Technical understanding	Manufacturing process and techniques	Viability of design solutions	Health and safety	Identifying Requirements	Technical understanding	Viability of design solutions	Learning from existing products and practice	Implications of wider issues	Material component considerations	Exam Practice questions

In Depth

**MODELLING & PROTOTYPING**

The ability to develop a model using typical modelling materials such as styrofoam and cardboard is essential when developing iterative design ideas. In this project students will be expected to research inspirational products, develop their drawing skills whilst creating a variety of conceptual ideas and learn about how to manipulate modelling materials to achieve a 3 dimensional final prototype. Students will need to present:

- A final PowerPoint that communicates all elements of the project journey
- A final three dimensional outcome

**Balance Toy**

Using knowledge, skills and technical understanding you need to design, plan and make a Balance Toy of your own design and development. **You will need to present:**

- A high quality made product
- A detailed sequenced plan for making
- Technical and constructional drawings

Big/Small

• 7.1 How can materials and processes be used to make iterative models?

- 1.1 What can be learnt by exploring contexts that design solutions are intended for?
- 1.2 What can be learnt by undertaking stakeholder analysis?
- 1.3 How can usability be considered when designing prototypes?

7.2 Understand methods of joining similar and dissimilar materials within products to fulfil the following functions.

7.2 Demonstrate an understanding of a variety of processes, tools and machinery used to accurately manufacture final prototypes in the workshop made from wood, metal and polymers.

7.4 Understand how and why different production methods are used when manufacturing products dependent on market demand.

7.4 Understand how ICT and digital technologies are changing modern manufacturing:

7.5 Understand the processes that need to be undertaken to ensure products meet legal requirements and are of high quality.

# Y12 – Term 2

January

February

March

April

Theory

**UNIT 3 : IMPLICATION OF WIDER ISSUES**

- 3.1 What factors need to be considered whilst investigating design possibilities?
- 3.2 What factors need to be considered when developing design solutions for manufacture?

**ASSESSMENT OPPORTUNITY**

- End of unit test

4. Design Thinking & Communication

**4.1 Demonstrate an understanding of how to use annotated sketching and digital tools to graphically communicate ideas and sketch modelling to explore possible improvements, in terms of physical requirements, such as:**

**4.1 Demonstrate an understanding of methods used to communicate the construction of design solutions to inform third parties, such as producing:**

**Assessment Opportunity**

End of unit Test

Hmk

Week 1

Week 2

Week 3

Week 4

Week 1

Week 2

Week 3

Week 4

Week 1

Week 2

Week 3

Week 4

Week 1

Week 2

Week 3

Week 4

- Alternative Renewable Energy Sources

- Obsolescence

- Life Cycle Assessment - definitions

- Benefits of Lifecycle assessment

- Incentives and Directives

- Designing for Manufacture (DFM)

- Fairtrade

- **Direct Distribution**
- **And manufacturer**

- User Centred design

- Orthographic Drawing

- Two Point perspective

- Isometric Drawing

- Exploded Views

- Oblique Drawing

- Crating Up Methods

- Shading Technique

Big/Small

- 3.1 What factors need to be considered whilst investigating design possibilities?
- 3.3 What factors need to be considered when manufacturing products?
- 3.4 What factors need to be considered when distributing products to markets?
- 3.5 How can skills and knowledge from other subject areas, including mathematics and science, inform decisions in product design?

- What is Function?
- What is Usability?
- What is Construction?
- What is Movement?
- What is Stability?
- What is Composition?
- What is strength?
- What is aesthetic qualities?
- What is manufacturing processes?
- What is suitability of materials and components?

- 4.1 How do product designers use annotated 2D and 3D sketching and digital tools to graphically communicate ideas?
- 4.2 How do industry professionals use digital design tools to support and communicate the exploration, innovation and development of design ideas?
- 4.3 How do product designers use different approaches to design thinking to support the development of design ideas?

# Y12 – Term 3

	September				October				November				December			
Theory	<p><b>5. Material Considerations</b></p> <p><i>5.1 Understand that the selection of materials and components is influenced by a range of factors.</i></p> <p><i>5.2 Understand that most products consist of multiple materials and that product designers are required to discriminate between them appropriately for their use, including:</i></p> <p><i>5.3 Understand why the characteristics and properties of the materials in 5.2a make them suitable for use in a variety of products dependent on the contextual application, including:</i></p>				<ul style="list-style-type: none"> <li><b>6. Technical Understanding</b></li> <li><i>6.1 Learners should understand how and why some materials and/or system components need to be reinforced or stiffened to withstand forces and stresses to fulfil the structural integrity of products.</i></li> <li><i>6.1 Learners should understand processes that can be used to ensure the structural integrity of a product.</i></li> <li><i>6.2 Understand how surface finishes and coatings can be used to enhance the appearance of products and the methods of preparing different surfaces to accept finishes in order to deliver a decorative, colourful and quality outcome.</i></li> <li><i>6.2 Understand how materials and products can be finished in different ways to prevent corrosion or decay in the environment they are intended for.</i></li> <li><i>6.3 Demonstrate an understanding of how smart materials change the functionality of products.</i></li> </ul>				<p><b>7. Manufacturing Processes &amp; Techniques</b></p> <p><i>7.1 Understand that 3D iterative models can be made from a range of materials and components to create block models and working prototypes to communication and test ideas, moving parts and structural integrity.</i></p> <p><i>7.1 Demonstrate an understanding of simple processes that can be used to model ideas using hand tools and digital tools such as rapid prototyping, or digital simulation packages to support the creation of iterative developments.</i></p> <p><i>7.2 Understand methods of joining similar and dissimilar materials within products to fulfil the following functions.</i></p> <p><i>7.2 Understand how digital technology, including the use of computer-aided design (CAD) and computer-aided manufacture (CAM) can be used in the making of final prototypes.</i></p>				<ul style="list-style-type: none"> <li><b>8. Viability of Design Solutions</b></li> <li><b>9. Health &amp; Safety</b></li> <li><i>8.1 Critically evaluating how a design solution has met its intended requirements.</i></li> <li><i>8.2 Demonstrate an understanding of the methods and importance of undertaken physical testing on a product to ensure it meets the criteria it is meant to fulfil.</i></li> <li><i>8.3 Demonstrate an understanding of the value of feasibility studies to determine the likely factors that influence the commercial viability of a product to market</i></li> <li><i>9.1 Demonstrate an understanding of how to work safely with specialist tools, techniques, processes, equipment and machinery during the design and manufacture of products.</i></li> <li><i>9.2 The responsibility of manufacturers to appropriately label products and offer guarantees to their consumers to deliver the correct levels of product assurance related to safety.</i></li> </ul>			
	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
Hmk	• Functional performance	• Aesthetics	• Cost and Availability	• Properties and Characteristics	• Structural integrity	• Triangulation	• Modern technologies	• Material Finishes	• Modelling	• Additive Manufacture	• Modelling materials	• Rapid Prototyping	• Testing Design Solutions	• Testing Standards	• Risk Assessments	• Health and Safety Legislation
	<ul style="list-style-type: none"> <li><i>5.1 What factors influence the selection of materials that are used in products?</i></li> <li><i>5.2 What materials should be selected when designing and manufacturing products and prototypes in product design?</i></li> <li><i>5.3 Why is it important to consider the properties/characteristics of materials when designing and manufacturing products?</i></li> </ul>				<ul style="list-style-type: none"> <li><i>6.1 What considerations need to be made about the structural integrity of a design solution?</i></li> <li><i>6.2 How can products be designed to function effectively within their surroundings?</i></li> <li><i>6.3 What opportunities are there through using smart and modern technologies within products?</i></li> </ul>				<ul style="list-style-type: none"> <li><i>7.1 How can materials and processes be used to make iterative models?</i></li> <li><i>7.2 How can materials and processes be used to make final prototypes?</i></li> </ul>				<ul style="list-style-type: none"> <li><i>8.1 How can designers assess whether a design solution meets its stakeholder requirements?</i></li> <li><i>8.2 How can product designers and manufacturers assess whether a design solution meets the criteria of technical specifications?</i></li> <li><i>8.3 How do designers and manufacturers determine whether design solutions are commercially viable?</i></li> <li><i>9.1 How can safety be ensured when working with materials in a workshop environment?</i></li> <li><i>9.2 What are the implications of health and safety legislation on product manufacture?</i></li> </ul>			
Big/Small																

# Y13 – Term 1

Y13 – Term 1																
September				October				November				December				
<b>NEA</b>	<ul style="list-style-type: none"> <li>• <i>Strand 1.1-Explore</i></li> <li>• <i>Strand 1.2 Design Brief</i></li> <li>• <i>Strand 1.3 Stake holders and Primary Users</i></li> <li>• <i>Strand 1.4 Investigating Existing products</i></li> <li>• <i>Strand 1.5 Exploration of Materials</i></li> <li>• <i>Strand 1.6 Technical Specification</i></li> </ul>				<ul style="list-style-type: none"> <li>• <i>Strand 2.1 Initial ideas</i></li> <li>• <i>Strand 2.2 Design Developments</i></li> <li>• <i>Strand 2.3 Development of final ideas</i></li> <li>• <i>Strand 2.4 Critical Thinking</i></li> </ul>				<p><i>Strand 3.1 Design Communication</i></p> <p><i>Strand 3.2 Quality of ideas</i></p> <p><i>Strand 3.3 Quality of design Developments</i></p> <p><i>Strand 3.4 Quality of Final Design Solutions</i></p>				<p><i>Strand 4.1 Quality of planning for making the final Prototype</i></p> <p><i>Strand 4.2 Quality of final prototype</i></p> <p><i>Strand 4.3 Uses of specialist techniques and processes</i></p> <p><i>Strand 4.4 Uses of Specialist tools and equipment</i></p> <p><i>Making Prototypes</i></p>			
	<b>Theory</b>															
<b>Homework</b>																
• <i>Learning from existing products</i>		• <i>Implications of wider issues</i>		• <i>Material component considerations</i>		• <i>Manufacturing Processes and Techniques</i>		• <i>Technical understanding</i>		• <i>Viability of design solutions</i>		• <i>Design Thinking and communication</i>		• <i>Learning from existing products</i>		
• <i>Health and Safety</i>		• <i>Manufacturing processes and techniques</i>		• <i>Implications of wider issues</i>		• <i>Technical understanding</i>		1. <i>Material component considerations</i>		1. <i>Implications of wider issues</i>		1. <i>Viability of design solutions</i>				

# Y13 – Term 2

Y13 – Term 2																			
				January				February				March				April			
NEA				<p><i>Strand 4.1 Quality of planning for making the final Prototype</i></p> <p><i>Strand 4.2 Quality of final prototype</i></p> <p><i>Strand 4.3 Uses of specialist techniques and processes</i></p> <p><i>Strand 4.4 Uses of Specialist tools and equipment</i></p> <p><i>Making Prototype</i></p>				<ul style="list-style-type: none"> <li>• <i>Strand 5.1 Analysis and evaluation of primary and or secondary sources</i></li> <li>• <i>Strand 5.2 Ongoing Evaluation to manage design progression</i></li> </ul> <p><i>Strand 5.3 Risk Assessments</i></p>				<p><i>Strand 5.4 Feasibility of Design Solution</i></p> <p><i>Strand 5.5 Evaluation of Final Prototypes</i></p>							
				Theory															
Homework				<ul style="list-style-type: none"> <li>• <i>Identifying Requirements</i></li> <li>• <i>Learning from existing Products</i></li> <li>• <i>Implications of wider issues</i></li> <li>• <i>Design Thinking and communication</i></li> </ul>				<ul style="list-style-type: none"> <li>• <i>Material Component Consideration</i></li> <li>• <i>Technical understanding</i></li> <li>• <i>Manufacturing processes and techniques</i></li> <li>• <i>Viability of design solutions</i></li> </ul>				<ul style="list-style-type: none"> <li>• <i>Health and Safety</i></li> <li>• <i>Identifying requirements</i></li> <li>• <i>Technical understanding</i></li> <li>• <i>Viability of design solutions</i></li> </ul>				<ul style="list-style-type: none"> <li>1. <i>Viability of design solutions</i></li> <li>1. <i>Material Component Consideration</i></li> <li>1. <i>Design Thinking and communication</i></li> <li>1. <i>Technical understanding</i></li> </ul>			

**Y13 – Term 3**

May

June

Summer Term

In Depth

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