

Study Skills
Course Milestones for Students

Course Title: Design & Manufacture

Level: Higher

Work to be covered/Topics/Activities/Assignments

Month	Unit 1 Design	Work to be covered/Topics/Activities/Assignments		
	Unit Assessment	Topics	Unit 2 Materials & Manufacturing	
			Unit Assessment	
			Topics	
June	<p>Unit Assessment Task 1 – Furniture Design</p> <p>O/C 1 Analyse a design brief and produce a detailed specification by:</p> <p>1.1 carrying out relevant research into appropriate design factors</p> <p>1.2 incorporating valid findings of research into a detailed specification</p>	<p>Design Factors/Issues:</p> <ul style="list-style-type: none"> • Primary & Secondary Function • Performance • Durability • Value for Money • Ease of Maintenance • Running Costs • Fitness for Purpose • Ergonomics – Anthropometrics, Psychology, Physiology • Aesthetics • Safety & Legislation • Environmental Considerations <p>Strategies for Evaluation:</p> <ul style="list-style-type: none"> • Surveys • Questionnaires • User Trials/Trips • Observation • Testing • Test Rigs • Comparison to other products & to Specification • Evaluation Techniques • Presentation of Results <p>The Designer:</p> <ul style="list-style-type: none"> • The Design Process & Team • Problem Analysis • The Design Brief & Analysis of Brief • The Design Team <p>The Customer:</p> <ul style="list-style-type: none"> • Needs & Wants • Social Behaviour • Consumer Expectations • Defining the Market • Market Opportunity • Niche Market <p>Market Research:</p> <ul style="list-style-type: none"> • Field, Desk, Primary, Secondary 	<p>Group Task 1 – Present Material Processes</p> <p>Plastics, wood and metals</p> <p>Group Task 2 – Product Evaluation</p> <p>Evaluate a simple commercial product using chosen design issues and relevant strategies for evaluation.</p> <p>Present the findings in the form of a short consumer advice scene on a TV programme, VLOG, or as an illustrated article in a consumer product magazine.</p>	<p>Plastics including Composites:</p> <ul style="list-style-type: none"> • Polythene (high & low density), Polyvinyl Chloride, Polystyrene, Nylon, Cellulose Acetate, Acrylic, Epoxy Resin, Melamine Formaldehyde, Urea formaldehyde, Polyester Resin, Glass-reinforced Plastic, Carbon-fibre plastics, Elastomers, Labelling and Symbols <p>Metals</p> <ul style="list-style-type: none"> • Mild Steel, Carbon Steel, Stainless Steel, High-speed Steel, Cast Iron, Brass, Bronze, Aluminium & Aluminium Alloys, Copper, Tin, Lead, Zinc <p>Woods:</p> <ul style="list-style-type: none"> • Beech, Oak, Ash, Mahogany, Teak, Walnut, Balsa, Scots Pine, Red Cedar, Parana Pine, Spruce <p>Timber Derivatives:</p> <ul style="list-style-type: none"> • Manufactured Boards – fibreboard, plywood, block-board, chip-board, hard-board & Veneers. <p>Properties of Materials:</p> <ul style="list-style-type: none"> • Selection • Justification <p>Plastic Processes:</p> <ul style="list-style-type: none"> • Cutting, Injection Moulding, Extrusion, Rotational Moulding, Vacuum-forming, Blow-moulding, Calendaring, Laminating, Rapid Prototyping, Joining, Compression, Moulding, Casting, Bending, Fabrication, Coating, Forming, Adhesive Bonding, Finishing <p>Metal Processes:</p> <ul style="list-style-type: none"> • Cutting, Turning, Milling, Die Casting, Sand Casting, Lost Wax Casting, Pressing, Stamping, Punching, Extrusion, Spot Welding, Adhesive Bonding, Riveting, Arc Welding, Fitted Joints, Bolts, Screws, Piercing and Blanking, Drop Forging, Finishing

Month	Unit 1 Design		Unit 2 Materials & Manufacturing	
	Unit Assessment	Topics	Unit Assessment	Topics
August/ September	<p>Unit Assessment Task 2 – Furniture Design</p> <p>O/C 2 Develop and communicate a proposal to meet a design specification</p> <p>2.1 Using knowledge of commercial manufacturing</p> <p>2.2 Producing creative and diverse ideas</p> <p>2.3 Carrying out on-going evaluation of design decisions</p> <p>2.4 Using knowledge of design factors to explore and refine ideas effectively</p> <p>2.5 Using appropriate graphic techniques to explore and refine idea effectively</p> <p>2.6 Using appropriate modelling techniques to explore and refine ideas effectively</p>	<p>Specifications</p> <ul style="list-style-type: none"> Product Design, Marketing, Technical, Performance <p>Idea Generation:</p> <ul style="list-style-type: none"> Morphological Analysis Thought Showers Technology Transfer Analogy Lateral thinking Mood & Lifestyle Boards <p>Design Development & Refinement:</p> <ul style="list-style-type: none"> Synthesis Justification & Recording Presentation Techniques Modelling Techniques <p>Modelling Techniques:</p> <ul style="list-style-type: none"> Scale Mock-ups Fully Crafted Prototypes Test Computer Generated Part Product Simulations Rapid Prototyping Modelling Materials Appropriate Application (Develop, Communicate, Evaluate & Resolve Ideas) 		<p>Wood Processes :</p> <ul style="list-style-type: none"> Cutting Drilling Turning Routering Laminating Spindle Moulding Adhesive Bonding Knock-Down Fittings Finishing <p>Identification of Commercial Processes:</p> <ul style="list-style-type: none"> Form Material Split Lines Injection Points Ejector Points Shrinkage Draft Angle Intricate form Clean and Precise Flash Thinning of Sheet Material Shear Marks Cross-section over Length Surface Finish (texture/detail) <p>Planning for Manufacture (Production & Planning Systems):</p> <ul style="list-style-type: none"> One-off Batch Mass Line Flow Gantt Charts Flow Charts Project Planning JIT Jigs Patterns Standard Components CAD/CAM CNC Machining (automation) Rapid Prototyping

Month	Unit 1 Design		Unit 2 Materials & Manufacturing	
	Unit Assessment	Topics	Unit Assessment	Topics
October/ November		<p>Economics:</p> <ul style="list-style-type: none"> • Fixed & Variable Costs • Research & Development • Intellectual Property <p>Evaluation:</p> <ul style="list-style-type: none"> • Designers point of View • Strategies for Evaluation <p>Products:</p> <ul style="list-style-type: none"> • Technology Push/Consumer Pull • Fashion Style & Fads • Planned Obsolescence • Redundancy • Miniaturisation • Technological Opportunity • Product Planning • Product Life Cycle • Product Life Analysis 	<p>Unit Assessment Task 2 – Furniture Design</p> <p>O/C 1 Analyse the production of a commercial product by:</p> <p>1.1 Exploring the suitability of the materials used</p> <p>1.2 Exploring the suitability of the manufacturing and assembly processes used</p> <p>1.3 Exploring the products sustainability and its impact on the environment.</p> <p>O/C 2 Plan the production of a commercial product by:</p> <p>2.1 Manufacturing an accurate and detailed prototype/scale model</p> <p>2.2 Using information gathered from the prototype/scale model</p> <p>2.3 Selecting and justifying suitable materials</p> <p>2.4 Selecting and justifying suitable manufacturing and assembly processes</p>	<p>Impact of Design and Manufacturing Technologies on Society & the Environment and the World of Work:</p> <ul style="list-style-type: none"> • Energy Efficiency • Sustainability (Circular Economy) • Pollution • Materials innovation • Design for Recyclability • Design for Re-use • Employment Patterns • Consumer Choices • New or Different Skills Required

December	Revision for Prelim Exam				
February	Prelim Exam				
	Component 1 COURSE ASSESSMENT	Candidates ability to:	Activity	Marks	Marks allocated for
January/ February/ March/ April	<p>Course Assignment TASK (50% of overall grade)</p> <p>Deadline 31 March 2016</p> <p>For applying design skills and knowledge and understanding, 70 marks will be available and will be allocated in six areas, according to the candidate's ability to:</p> <ul style="list-style-type: none"> • generate ideas • explore and refine ideas • apply graphic techniques • apply modelling techniques • apply knowledge and understanding of materials and processes • apply knowledge and understanding of design issues 	generate ideas	Generating a range of alternative ideas throughout the design process that demonstrate creativity and address the needs of the problem or situation.	10	<ul style="list-style-type: none"> • Alternative ideas are generated which are diverse • Alternative ideas are generated and they are very creative. • The detail provided to enable informed decision making is full and appropriate.
		explore and refine ideas	Exploring and refining ideas in order to produce a design proposal that addresses the needs of the problem or situation.	12	<ul style="list-style-type: none"> • Exploration of ideas is thorough. • Refinement of ideas is thorough. • The design proposal provides all of the detail required to fully address the needs of the problem or situation.
		apply graphic techniques	Applying different graphic techniques appropriate to a design stage to communicate information with consistency, quality, clarity and purpose.	12	<ul style="list-style-type: none"> • A minimum of five different graphic types are used, at least one of which is rendered, and they are suited to the purpose. • The quality of the graphics is very good and consistently appropriate to the design stage and/or the information that requires to be communicated. • Graphic techniques consistently communicate the required information with clarity and purpose.
		apply modelling techniques	Applying modelling techniques to inform and communicate design decisions.	12	<ul style="list-style-type: none"> • Modelling techniques are applied and they are consistently used effectively to inform design decisions. • Modelling techniques are applied and they are consistently used effectively to communicate design decisions. • All of the modelling techniques used are appropriate to their purpose.
		apply knowledge and understanding of materials and processes	Applying knowledge and understanding of materials and processes during the development of the proposal.	12	<ul style="list-style-type: none"> • There is strong knowledge and understanding of materials • There is strong knowledge and understanding of processes • There is strong justification of the materials, processes and construction methods selected.
		apply knowledge and understanding of design issues	Applying knowledge and understanding of design issues during the development of the proposal.	12	<ul style="list-style-type: none"> • The design issues considered are fully relevant. • Strong knowledge and understanding of design issues has been used in the development of the design proposal. • There is strong justification for design decisions based on knowledge and understanding of design factors.
May	<p>Component 2 QUESTION PAPER (50% of overall grade, 70 marks, 2 hour duration)</p> <p>The purpose of the question paper is to assess the learner's ability to retain and integrate knowledge and understanding from across the Course.</p> <p>The question paper Component of Course assessment will require learners to draw upon and apply knowledge and understanding of a sample from the topic areas above.</p>				

Resource Type	Resources	Topic/Activity/Assignment
BOOKS	<p>Leckie and Leckie Higher Product Design</p> <p>Leckie and Leckie Higher Design and Manufacture Course Notes. Pupils would need to purchase themselves.</p> <p>Various design and materials books available to borrow in the department.</p>	<p>Whole course Theory (some areas of new course are missing from this book surrounding circular economy and environmental impact).</p>
DVD	<p>'The Genius of Design' series. Available to borrow from the department.</p>	
DIGITAL RESOURCES	<p>GLOW group/Shared Docs</p>	<p>Various notes for all areas of the course. Higher Product Design Past Papers. Higher Design and Manufacture Past Papers. Course Unit Support Notes. Course Assessment Specifications. Unit Assignment Tasks. List of helpful websites.</p>