



GEMDTM - COURSE OUTLINE
MATERIALS DESIGN AND TECHNOLOGIES – GENERAL YEAR 11: 2021
UNIT 1 RED AND UNIT 2 BLUE



This course will run the two units, 1 and 2, concurrently. The student Semester 1 grade will therefore be an estimate.

Term	Week	Topic and key teaching points	Syllabus content	Assessment
1	1-4	Safety	<p>Safety</p> <ul style="list-style-type: none"> • correct use of personal protective equipment (PPE) where applicable • occupational safety and health (OSH) practices appropriate to tasks being undertaken in workshops <p>• Production management</p> <ul style="list-style-type: none"> ▪ maintain time management while using tools, equipment and machinery to complete production <p>follow instructions from plans maintain safety requirement</p>	<p>OSH Induction Booklet (not assessed)</p> <p>Task 3: Folding Tray</p> <p>Task 12: Metal Careers Worksheet</p>
		Design	<p>Design</p> <p>Design fundamentals and skills</p> <ul style="list-style-type: none"> • investigate <ul style="list-style-type: none"> ▪ needs, values and beliefs of the client or other end user ▪ sources of design inspiration ▪ existing ideas and products ▪ design fundamentals <ul style="list-style-type: none"> ○ aesthetics ○ function ○ safety ○ cost • devise <ul style="list-style-type: none"> ▪ using communication and documentation techniques <ul style="list-style-type: none"> ○ sketching ○ annotation ▪ elements of design 	<p>Task 1: Folding Shovel Design Folio</p> <p>Task 6: Oxy Welding Exercises</p>



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		<ul style="list-style-type: none">○ line○ shape○ form○ texture○ colour○ tone▪ rapid concept development techniques▪ reviewing design ideas against design brief▪ annotated graphics and sketches with appropriate measurements or dimensions applicable to context▪ production planning<ul style="list-style-type: none">○ full materials list○ full materials costing○ production plan, including time line● evaluate<ul style="list-style-type: none">▪ design ideas when investigating and devising▪ finished product against the initial design and student generated criteria <p>Use of technology</p> <p>Skills and techniques</p> <ul style="list-style-type: none">● ICT, portfolio development and communication skills<ul style="list-style-type: none">▪ photography – ongoing record of progress and processes used and final product▪ documenting presentations and evaluations● context appropriate drawings and relevant technical information to produce the final product to demonstrate<ul style="list-style-type: none">▪ sketching rapid concept developments▪ 3D presentation drawings▪ rendering techniques▪ 2D working drawings or using templates▪ inspiration/concept or storyboard development and presentation▪ design and making specification sheets● workroom/studio terminology appropriate to context	
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			<ul style="list-style-type: none"> • select appropriate materials and calculate the quantities of materials required to complete the project • with supervision, operate machinery and tools appropriate to context <p>Production management</p> <ul style="list-style-type: none"> • production plan <ul style="list-style-type: none"> ▪ maintain a production plan ▪ maintain time management while using tools, equipment and machinery to complete production <ul style="list-style-type: none"> ○ follow instructions from plans ○ maintain safety requirements ▪ record changes to materials lists or costing <p>record regular journal/diary entries ongoing evaluation techniques: diary, journal or portfolio notes and use of photography to record ongoing progress/decision changes made to the project</p>	
1	5-9	Safety	<p>Safety</p> <ul style="list-style-type: none"> • correct use of personal protective equipment (PPE) where applicable • occupational safety and health (OSH) practices appropriate to tasks being undertaken in workshops <p>Use of technology</p> <p>Skills and techniques</p> <ul style="list-style-type: none"> • read and correctly interpret plans/patterns/templates • use appropriate conventions and workroom terminology • select and apply appropriate and accurate marking out tools and techniques • apply skills in using a range of tools for sheet metal fabrication • apply skills in using a range of tools and machinery, including safe machine operation • correct use of machine speeds and cutting fluids • cutting patterns or shapes using gas or electric cutting equipment • perform cold and hot forming of metal shapes • use permanent joining and non-permanent fixing of metals • use fixed or hand held grinding tools • apply different metal finishes <p>demonstrate workshop clean up procedures</p>	<p>Task 1: Folding Shovel Design Folio</p> <p>Task 4: Folding Shovel</p>



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2	1-2	Materials	<p>Materials</p> <ul style="list-style-type: none"> • Nature and properties of materials • identification of origins of common ferrous and non-ferrous metals • classification of the properties of common ferrous and non-ferrous metals by weld properties and workability • identification of common metal sections <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>▪ wire</td> <td>▪ hexagonal</td> <td>▪ round tube</td> </tr> <tr> <td>▪ rod</td> <td>▪ octagonal bar</td> <td>▪ square tube</td> </tr> <tr> <td>▪ flat</td> <td>▪ sheet</td> <td>▪ rectangular hollow section</td> </tr> <tr> <td>▪ square</td> <td>▪ plate</td> <td>▪ angle</td> </tr> </table> • identification of common associated materials used with metal <ul style="list-style-type: none"> ▪ abrasives ▪ permanent and non-permanent fixings ▪ adhesives • identification of different metal finishes from the following range of finishes <ul style="list-style-type: none"> ▪ painted ▪ galvanised <p>plastic or powder coatings</p>	▪ wire	▪ hexagonal	▪ round tube	▪ rod	▪ octagonal bar	▪ square tube	▪ flat	▪ sheet	▪ rectangular hollow section	▪ square	▪ plate	▪ angle	<p>Task 4: Folding Shovel Task 9: Types of Metals and Uses work sheet</p>
▪ wire	▪ hexagonal	▪ round tube														
▪ rod	▪ octagonal bar	▪ square tube														
▪ flat	▪ sheet	▪ rectangular hollow section														
▪ square	▪ plate	▪ angle														
2	3-5	Safety	<p>Safety</p> <ul style="list-style-type: none"> • correct use of personal protective equipment (PPE) where applicable • occupational safety and health (OSH) practices appropriate to tasks being undertaken in workshops <p>Production management</p> <ul style="list-style-type: none"> • production plan <ul style="list-style-type: none"> ▪ maintain a production plan ▪ maintain time management while using tools, equipment and machinery to complete production <ul style="list-style-type: none"> ○ follow instructions from plans ○ maintain safety requirements ▪ record changes to materials lists or costing ▪ record regular journal/diary entries 	<p>Task 4: Folding Shovel Task 7: MIG Welding Exercises</p>												



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			ongoing evaluation techniques: diary, journal or portfolio notes and use of photography to record ongoing progress/decision changes made to the project	
2	6-8	Design	<p>Design Design fundamentals and skills</p> <ul style="list-style-type: none"> • investigate <ul style="list-style-type: none"> ▪ needs, values and beliefs of the designer/developer ▪ design fundamentals <ul style="list-style-type: none"> ○ aesthetics – appearance, form ○ function – purpose, use ○ safety – safe design concepts ○ cost – comparison with commercial products ▪ similar and alternate existing ideas and products using a variety of sources: <ul style="list-style-type: none"> ○ sources of design inspiration – aesthetic and functional features ○ performance criteria related to aesthetics and function • devise <ul style="list-style-type: none"> ▪ communication and documentation techniques <ul style="list-style-type: none"> ○ sketching ○ annotating ▪ ICT or manual presentation skills to create solutions incorporating: <ul style="list-style-type: none"> ○ elements of design – line, shape, form, texture, colour, tone ○ rapid concept development techniques ▪ review of design ideas against design brief and performance criteria ▪ design solution, using annotated hand drawings or computer generated drawings with measurements or dimensions applicable to context ▪ production planning: <ul style="list-style-type: none"> ○ full materials list 	Task 2: BBQ Design Folio



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		<ul style="list-style-type: none">○ full materials costing○ production plan, including time line● evaluate<ul style="list-style-type: none">▪ production plan, journal or diary with supporting images▪ finished product against the design brief, initial design and student-generated performance criteria <p>Use of technology</p> <p>Skills and techniques</p> <ul style="list-style-type: none">● ICT, portfolio development and communication skills<ul style="list-style-type: none">▪ photography – ongoing record of progress and processes used and final product▪ documenting presentations and evaluations● develop context appropriate drawings and relevant technical information to produce the final product:<ul style="list-style-type: none">▪ sketching rapid concept developments▪ 2D working drawings or using templates▪ inspiration/concept or storyboard development and presentation● use workroom/studio terminology appropriate to context● select appropriate materials and calculate the correct amount required to order and purchase materials to complete the project● operate machinery and tools appropriate to context <p>Safety</p> <ul style="list-style-type: none">● correct use of personal protective equipment (PPE) where applicable● conduct risk assessment for using specific tools/machinery● demonstrate occupational safety and health practices appropriate to tasks being undertaken in workshops● apply risk management strategies in the workshop/studio● recognise need and purpose of MSD (materials safety data) with regard to storage and handling of hazardous substances and hazardous operations appropriate to situation <p>Production management</p> <ul style="list-style-type: none">● production plan<ul style="list-style-type: none">▪ maintain a production plan	
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		<ul style="list-style-type: none">▪ maintain time management while using tools, equipment and machinery to complete production<ul style="list-style-type: none">○ adhere to sequential instructions○ apply safety and risk management▪ record changes to materials lists or costing▪ record regular journal/diary entries• use ongoing evaluation techniques: diary, journal or portfolio notes and use of photography to record ongoing progress/decision changes made to the project <p>Materials in context</p> <ul style="list-style-type: none">• impact of materials production processes on the workshop and the local environment; metal waste management, fumes, noise <p>Use of technology</p> <p>Skills and techniques</p> <ul style="list-style-type: none">• correctly interpret and/or modify plans/patterns/templates• use appropriate conventions and workshop terminology• calculate orders and costing for solid materials and/or sheet materials• apply appropriate and accurate marking out techniques• apply skills in using a range of tools and machinery• apply techniques for cutting external and internal threads• apply correct processes to apply metal finishes from the following range of finishes:<ul style="list-style-type: none">▪ painted▪ oiling▪ plastic or powder coatings▪ lacquer▪ electroplating▪ anodising <p>enamelling</p>	
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2	8-11	<p>Safety</p>	<p>Safety</p> <ul style="list-style-type: none"> • correct use of personal protective equipment (PPE) where applicable • occupational safety and health (OSH) practices appropriate to tasks being undertaken in workshops <p>Use of technology</p> <p>Skills and techniques</p> <ul style="list-style-type: none"> • read and correctly interpret plans/patterns/templates • use appropriate conventions and workroom terminology • select and apply appropriate and accurate marking out tools and techniques • apply skills in using a range of tools for sheet metal fabrication • apply skills in using a range of tools and machinery, including safe machine operation • correct use of machine speeds and cutting fluids • cutting patterns or shapes using gas or electric cutting equipment • perform cold and hot forming of metal shapes • use permanent joining and non-permanent fixing of metals • use fixed or hand held grinding tools • apply different metal finishes <p>demonstrate workshop clean up procedures</p>	<p>Task 2: BBQ Design Folio Task 5 BBQ</p>
3	1-5	<p>Safety</p>	<p>Safety</p> <ul style="list-style-type: none"> • correct use of personal protective equipment (PPE) where applicable • conduct risk assessment for using specific tools/machinery • demonstrate occupational safety and health practices appropriate to tasks being undertaken in workshops • apply risk management strategies in the workshop/studio • recognise need and purpose of MSD (materials safety data) with regard to storage and handling of hazardous substances and hazardous operations appropriate to situation <p>Production management</p> <ul style="list-style-type: none"> • production plan <ul style="list-style-type: none"> ▪ maintain a production plan ▪ maintain time management while using tools, equipment and machinery to complete production <ul style="list-style-type: none"> ○ adhere to sequential instructions 	<p>Task 2: BBQ Design Folio Task 5 BBQ Task 8: Arc Welding Exercises</p>



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			<ul style="list-style-type: none"> ○ apply safety and risk management <ul style="list-style-type: none"> ▪ record changes to materials lists or costing ▪ record regular journal/diary entries • use ongoing evaluation techniques: diary, journal or portfolio notes and use of photography to record ongoing progress/decision changes made to the project 	
3	6-7	Materials in context	<p>Materials in context</p> <ul style="list-style-type: none"> • impacts of the disposal of finishes, lubricants and other waste products • identification of environmental considerations <ul style="list-style-type: none"> ▪ 3 Rs – reduce, re-use, recycle ▪ ways to reduce waste <p>ways to re-use and recycle</p>	<p>Task 2: BBQ Design Folio Task 5 BBQ Task 10: Recycling of Metals work sheet</p>
3	8-10		<ul style="list-style-type: none"> • Materials • Nature and properties of materials • origins of metal alloys • production processes for making alloys • uses of common alloys • identification of common metal sizes, thicknesses and sections <ul style="list-style-type: none"> ▪ bar ▪ tube ▪ sheet • identification of common associated materials used with metal <ul style="list-style-type: none"> ▪ abrasives ▪ permanent and non-permanent fixings ▪ adhesives <p>finishes</p>	<p>Task 2: BBQ Design Folio Task 5 BBQ Task 11: Nature and Properties of Metals work sheet</p>



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4	1-4	Materials	Materials <ul style="list-style-type: none">• Nature and properties of materials• origins of metal alloys• production processes for making alloys• uses of common alloys• identification of common metal sizes, thicknesses and sections<ul style="list-style-type: none">▪ bar▪ tube▪ sheet• identification of common associated materials used with metal<ul style="list-style-type: none">▪ abrasives▪ permanent and non-permanent fixings▪ adhesives finishes	Task 2: BBQ Design Folio Task 5 BBQ Task 13: Metal Characteristics work sheet
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