



**GEMDTM - COURSE OUTLINE**  
**MATERIALS DESIGN AND TECHNOLOGIES – GENERAL YEAR 11: 2022**  
**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	1-2	<b>Safety</b>	<p><b>Safety</b></p> <ul style="list-style-type: none"> <li>• correct use of personal protective equipment (PPE) where applicable</li> <li>• occupational safety and health (OSH) practices appropriate to tasks being undertaken in workshops</li> </ul> <p>• <b>Production management</b></p> <ul style="list-style-type: none"> <li>▪ maintain time management while using tools, equipment and machinery to complete production</li> </ul> <p>follow instructions from plans maintain safety requirement</p>	<p>OSH Induction Booklet (not assessed)</p> <p><b>Task 3: Folding Tray</b></p> <p><b>Task 7: Semester 1 Response Booklet;</b></p> <p><b>Types of metals and Uses Worksheet</b></p>
1	3-4	<b>Design</b>	<p><b>Design</b></p> <p><b>Design fundamentals and skills</b></p> <ul style="list-style-type: none"> <li>• investigate <ul style="list-style-type: none"> <li>▪ needs, values and beliefs of the client or other end user</li> <li>▪ sources of design inspiration</li> <li>▪ existing ideas and products</li> <li>▪ design fundamentals <ul style="list-style-type: none"> <li>○ aesthetics</li> <li>○ function</li> <li>○ safety</li> <li>○ cost</li> </ul> </li> </ul> </li> <li>• devise <ul style="list-style-type: none"> <li>▪ using communication and documentation techniques <ul style="list-style-type: none"> <li>○ sketching</li> <li>○ annotation</li> </ul> </li> <li>▪ elements of design</li> </ul> </li> </ul>	<p><b>Task 1: Folding Shovel Design Folio</b></p> <p><b>Task 3: Folding Tray</b></p> <p><b>Task 6: Welding Exercises: Oxy Welding</b></p>



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		<ul style="list-style-type: none"><li>○ line</li><li>○ shape</li><li>○ form</li><li>○ texture</li><li>○ colour</li><li>○ tone</li><li>▪ rapid concept development techniques</li><li>▪ reviewing design ideas against design brief</li><li>▪ annotated graphics and sketches with appropriate measurements or dimensions applicable to context</li><li>▪ production planning<ul style="list-style-type: none"><li>○ full materials list</li><li>○ full materials costing</li><li>○ production plan, including time line</li></ul></li><li>● evaluate<ul style="list-style-type: none"><li>▪ design ideas when investigating and devising</li><li>▪ finished product against the initial design and student generated criteria</li></ul></li></ul> <p><b>Use of technology</b></p> <p><b>Skills and techniques</b></p> <ul style="list-style-type: none"><li>● ICT, portfolio development and communication skills<ul style="list-style-type: none"><li>▪ photography – ongoing record of progress and processes used and final product</li><li>▪ documenting presentations and evaluations</li></ul></li><li>● context appropriate drawings and relevant technical information to produce the final product to demonstrate<ul style="list-style-type: none"><li>▪ sketching rapid concept developments</li><li>▪ 3D presentation drawings</li><li>▪ rendering techniques</li><li>▪ 2D working drawings or using templates</li><li>▪ inspiration/concept or storyboard development and presentation</li><li>▪ design and making specification sheets</li></ul></li><li>● workroom/studio terminology appropriate to context</li></ul>	
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		<ul style="list-style-type: none"> <li>• select appropriate materials and calculate the quantities of materials required to complete the project</li> <li>• with supervision, operate machinery and tools appropriate to context</li> </ul> <p><b>Production management</b></p> <ul style="list-style-type: none"> <li>• production plan             <ul style="list-style-type: none"> <li>▪ maintain a production plan</li> <li>▪ maintain time management while using tools, equipment and machinery to complete production                 <ul style="list-style-type: none"> <li>○ follow instructions from plans</li> <li>○ maintain safety requirements</li> </ul> </li> <li>▪ record changes to materials lists or costing</li> </ul> </li> </ul> <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> <p><b>Safety</b></p> <ul style="list-style-type: none"> <li>• correct use of personal protective equipment (PPE) where applicable</li> <li>• occupational safety and health (OSH) practices appropriate to tasks being undertaken in workshops</li> </ul> <p><b>Nature and properties of Materials</b>          Permanent and non-permanent fixings</p>	
1	5-10	<p><b>Safety</b></p> <ul style="list-style-type: none"> <li>• correct use of personal protective equipment (PPE) where applicable</li> <li>• occupational safety and health (OSH) practices appropriate to tasks being undertaken in workshops</li> </ul> <p><b>Use of technology</b></p> <p><b>Skills and techniques</b></p> <ul style="list-style-type: none"> <li>• read and correctly interpret plans/patterns/templates</li> <li>• use appropriate conventions and workroom terminology</li> <li>• select and apply appropriate and accurate marking out tools and techniques</li> <li>• apply skills in using a range of tools for sheet metal fabrication</li> <li>• apply skills in using a range of tools and machinery, including safe machine operation</li> <li>• correct use of machine speeds and cutting fluids</li> <li>• cutting patterns or shapes using gas or electric cutting equipment</li> </ul>	<b>Task 4: Folding Shovel</b>



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			<ul style="list-style-type: none"> <li>perform cold and hot forming of metal shapes</li> <li>use permanent joining and non-permanent fixing of metals</li> <li>use fixed or hand held grinding tools</li> <li>apply different metal finishes</li> </ul> <p>demonstrate workshop clean up procedures</p>													
2	1-2	<b>Materials</b>	<p><b>Materials</b></p> <ul style="list-style-type: none"> <li><b>Nature and properties of materials</b></li> <li>identification of origins of common ferrous and non-ferrous metals</li> <li>classification of the properties of common ferrous and non-ferrous metals by weld properties and workability</li> <li>identification of common metal sections</li> </ul> <table border="1"> <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> <ul style="list-style-type: none"> <li>identification of common associated materials used with metal <ul style="list-style-type: none"> <li>abrasives</li> <li>permanent and non-permanent fixings</li> <li>adhesives</li> </ul> </li> <li>identification of different metal finishes from the following range of finishes <ul style="list-style-type: none"> <li>painted</li> <li>galvanised</li> <li>plastic or powder coatings</li> </ul> </li> </ul>	▪ wire	▪ hexagonal	▪ round tube	▪ rod	▪ octagonal bar	▪ square tube	▪ flat	▪ sheet	▪ rectangular hollow section	▪ square	▪ plate	▪ angle	<p><b>Task 4: Folding Shovel</b>  <b>Task 7: Semester 1 Response Booklet; Recycling of metals Worksheet</b></p>
▪ wire	▪ hexagonal	▪ round tube														
▪ rod	▪ octagonal bar	▪ square tube														
▪ flat	▪ sheet	▪ rectangular hollow section														
▪ square	▪ plate	▪ angle														
2	3-5	<b>Safety</b>	<p><b>Safety</b></p> <ul style="list-style-type: none"> <li>correct use of personal protective equipment (PPE) where applicable</li> <li>occupational safety and health (OSH) practices appropriate to tasks being undertaken in workshops</li> </ul> <p><b>Production management</b></p>	<p><b>Task 4: Folding Shovel</b>  <b>Task 6: Welding Exercises: MIG Welding</b></p>												



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			<ul style="list-style-type: none"> <li>• production plan           <ul style="list-style-type: none"> <li>▪ maintain a production plan</li> <li>▪ maintain time management while using tools, equipment and machinery to complete production               <ul style="list-style-type: none"> <li>○ follow instructions from plans</li> <li>○ maintain safety requirements</li> </ul> </li> <li>▪ record changes to materials lists or costing</li> <li>▪ record regular journal/diary entries</li> </ul> </li> <li>▪ ongoing evaluation techniques: diary, journal or portfolio notes and use of photography to record ongoing progress/decision changes made to the project</li> </ul> <p><b>Nature and properties of Materials</b>          Permanent and non-permanent fixings</p>	
2	6-7	<b>Design</b>	<p><b>Design</b>  <b>Design fundamentals and skills</b></p> <ul style="list-style-type: none"> <li>• investigate           <ul style="list-style-type: none"> <li>▪ needs, values and beliefs of the designer/developer</li> <li>▪ design fundamentals               <ul style="list-style-type: none"> <li>○ aesthetics – appearance, form</li> <li>○ function – purpose, use</li> <li>○ safety – safe design concepts</li> <li>○ cost – comparison with commercial products</li> </ul> </li> <li>▪ similar and alternate existing ideas and products using a variety of sources:               <ul style="list-style-type: none"> <li>○ sources of design inspiration – aesthetic and functional features</li> <li>○ performance criteria related to aesthetics and function</li> </ul> </li> </ul> </li> <li>• devise           <ul style="list-style-type: none"> <li>▪ communication and documentation techniques               <ul style="list-style-type: none"> <li>○ sketching</li> <li>○ annotating</li> </ul> </li> <li>▪ ICT or manual presentation skills to create solutions incorporating:               <ul style="list-style-type: none"> <li>○ elements of design – line, shape, form, texture, colour, tone</li> <li>○ rapid concept development techniques</li> </ul> </li> <li>▪ review of design ideas against design brief and performance criteria</li> </ul> </li> </ul>	<b>Task 2: BBQ Design Folio</b>



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		<ul style="list-style-type: none"><li>▪ design solution, using annotated hand drawings or computer generated drawings with measurements or dimensions applicable to context</li><li>▪ production planning:<ul style="list-style-type: none"><li>○ full materials list</li><li>○ full materials costing</li><li>○ production plan, including time line</li></ul></li><li>• evaluate<ul style="list-style-type: none"><li>▪ production plan, journal or diary with supporting images</li><li>▪ finished product against the design brief, initial design and student-generated performance criteria</li></ul></li></ul> <p><b>Use of technology</b></p> <p><b>Skills and techniques</b></p> <ul style="list-style-type: none"><li>• ICT, portfolio development and communication skills<ul style="list-style-type: none"><li>▪ photography – ongoing record of progress and processes used and final product</li><li>▪ documenting presentations and evaluations</li></ul></li><li>• develop context appropriate drawings and relevant technical information to produce the final product:<ul style="list-style-type: none"><li>▪ sketching rapid concept developments</li><li>▪ 2D working drawings or using templates</li><li>▪ inspiration/concept or storyboard development and presentation</li></ul></li><li>• use workroom/studio terminology appropriate to context</li><li>• select appropriate materials and calculate the correct amount required to order and purchase materials to complete the project</li><li>• operate machinery and tools appropriate to context</li></ul> <p><b>Safety</b></p> <ul style="list-style-type: none"><li>• correct use of personal protective equipment (PPE) where applicable</li><li>• conduct risk assessment for using specific tools/machinery</li><li>• demonstrate occupational safety and health practices appropriate to tasks being undertaken in workshops</li><li>• apply risk management strategies in the workshop/studio</li><li>• recognise need and purpose of MSD (materials safety data) with regard to storage and handling of hazardous substances and hazardous operations appropriate to situation</li></ul>	
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		<p><b>Production management</b></p> <ul style="list-style-type: none"><li>• production plan<ul style="list-style-type: none"><li>▪ maintain a production plan</li><li>▪ maintain time management while using tools, equipment and machinery to complete production<ul style="list-style-type: none"><li>○ adhere to sequential instructions</li><li>○ apply safety and risk management</li></ul></li><li>▪ record changes to materials lists or costing</li><li>▪ record regular journal/diary entries</li></ul></li><li>• use ongoing evaluation techniques: diary, journal or portfolio notes and use of photography to record ongoing progress/decision changes made to the project</li></ul> <p><b>Materials in context</b></p> <ul style="list-style-type: none"><li>• impact of materials production processes on the workshop and the local environment; metal waste management, fumes, noise</li></ul> <p><b>Use of technology</b></p> <p><b>Skills and techniques</b></p> <ul style="list-style-type: none"><li>• correctly interpret and/or modify plans/patterns/templates</li><li>• use appropriate conventions and workshop terminology</li><li>• calculate orders and costing for solid materials and/or sheet materials</li><li>• apply appropriate and accurate marking out techniques</li><li>• apply skills in using a range of tools and machinery</li><li>• apply techniques for cutting external and internal threads</li><li>• apply correct processes to apply metal finishes from the following range of finishes:<ul style="list-style-type: none"><li>▪ painted</li><li>▪ oiling</li><li>▪ plastic or powder coatings</li><li>▪ lacquer</li><li>▪ electroplating</li><li>▪ anodising</li><li>▪ enamelling</li></ul></li></ul>	
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2	8-10	<p><b>Safety</b></p>	<p><b>Safety</b></p> <ul style="list-style-type: none"> <li>• correct use of personal protective equipment (PPE) where applicable</li> <li>• occupational safety and health (OSH) practices appropriate to tasks being undertaken in workshops</li> </ul> <p><b>Use of technology</b></p> <p><b>Skills and techniques</b></p> <ul style="list-style-type: none"> <li>• read and correctly interpret plans/patterns/templates</li> <li>• use appropriate conventions and workroom terminology</li> <li>• select and apply appropriate and accurate marking out tools and techniques</li> <li>• apply skills in using a range of tools for sheet metal fabrication</li> <li>• apply skills in using a range of tools and machinery, including safe machine operation</li> <li>• correct use of machine speeds and cutting fluids</li> <li>• cutting patterns or shapes using gas or electric cutting equipment</li> <li>• perform cold and hot forming of metal shapes</li> <li>• use permanent joining and non-permanent fixing of metals</li> <li>• use fixed or hand held grinding tools</li> <li>• apply different metal finishes</li> <li>• demonstrate workshop clean up procedures</li> </ul>	<p><b>Task 2: BBQ Design Folio</b>  <b>Task 5 BBQ</b>  <b>Task7: Semester 1 Response Booklet; Finishes for metals Worksheet</b></p>
3	1-5	<p><b>Safety</b></p>	<p><b>Safety</b></p> <ul style="list-style-type: none"> <li>• correct use of personal protective equipment (PPE) where applicable</li> <li>• conduct risk assessment for using specific tools/machinery</li> <li>• demonstrate occupational safety and health practices appropriate to tasks being undertaken in workshops</li> <li>• apply risk management strategies in the workshop/studio</li> <li>• recognise need and purpose of MSD (materials safety data) with regard to storage and handling of hazardous substances and hazardous operations appropriate to situation</li> </ul> <p><b>Production management</b></p> <ul style="list-style-type: none"> <li>• production plan <ul style="list-style-type: none"> <li>▪ maintain a production plan</li> <li>▪ maintain time management while using tools, equipment and machinery to complete production <ul style="list-style-type: none"> <li>○ adhere to sequential instructions</li> </ul> </li> </ul> </li> </ul>	<p><b>Task 2: BBQ Design Folio</b>  <b>Task 5 BBQ</b>  <b>Task 6: Welding Exercises: Arc Welding</b></p>





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



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4	1-5	<p><b>Materials</b></p>	<p><b>Materials</b></p> <ul style="list-style-type: none"><li>• <b>Nature and properties of materials</b></li><li>• origins of metal alloys</li><li>• production processes for making alloys</li><li>• uses of common alloys</li><li>• identification of common metal sizes, thicknesses and sections<ul style="list-style-type: none"><li>▪ bar</li><li>▪ tube</li><li>▪ sheet</li></ul></li><li>• identification of common associated materials used with metal<ul style="list-style-type: none"><li>▪ abrasives</li><li>▪ permanent and non-permanent fixings</li><li>▪ adhesives</li><li>▪ finishes</li></ul></li></ul>	<p><b>Task 2: BBQ Design Folio</b></p> <p><b>Task 5 BBQ</b></p> <p><b>Task 8: Semester 2</b></p> <p><b>Response Booklet;</b></p> <p><b>Metalwork Careers</b></p> <p><b>Worksheet</b></p>
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