Government of **Western Australia**
School Curriculum and Standards Authority

SAMPLE COURSE OUTLINE

MATERIALS DESIGN AND TECHNOLOGY

GENERAL YEAR 11

Acknowledgement of Country

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

Disclaimer

Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course. Teachers must exercise their professional judgement as to the appropriateness of any they may wish to use.

Sample course outline

Materials Design and Technology – General Year 11

A sample course outline has been provided for each of the three defined contexts: Metal, Textiles and Wood with common content replicated in each.

Context: Metal

Unit 1 and Unit 2

Semester 1

Week	Syllabus content

1–3	**Design fundamentals and skills**
	• investigate
	  ▪ needs, values and beliefs of the client or other end user
	  ▪ sources of design inspiration
	  ▪ existing ideas and products
	  ▪ design fundamentals
	  ○ aesthetics
	  ○ function
	  ○ safety
	  ○ cost
	
	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
	  ▪ wire ▪ hexagonal ▪ round tube
	  ▪ rod ▪ octagonal bar ▪ square tube
	  ▪ flat ▪ sheet ▪ rectangular hollow section
	  ▪ square ▪ plate ▪ angle
	• identification of common associated materials used with metal
	  ▪ abrasives
	  ▪ permanent and non-permanent fixings
	  ▪ adhesives
	• identification of different metal finishes from the following range of finishes
	  ▪ painted
	  ▪ galvanised
	  ▪ plastic or powder coatings
	  ▪ lacquer
	
	Materials in context
	• examples of the broad areas of use for tubular metals
	• impacts of the disposal of finishes, lubricants and other waste products
	• identification of environmental considerations
	  ▪ 3 Rs – reduce, re-use, recycle
	  ▪ ways to reduce waste
	  ▪ ways to re-use and recycle
	
	Task 1: Short answer test

Week	Syllabus content

4–6	**Design fundamentals and skills**
	• devise
	  ▪ using communication and documentation techniques
	  ○ sketching
	  ○ annotation
	  ▪ elements of design
	  ○ line
	  ○ shape
	  ○ form
	  ○ texture
	  ○ colour
	  ▪ rapid concept development techniques
	  ▪ reviewing design ideas against design brief
	  ▪ annotated graphics and sketches with appropriate measurements or dimensions applicable to context
	  ▪ production planning
	  ○ full materials list
	  ○ full materials costing
	  ○ production plan
	• evaluate
	  ▪ design ideas when investigating and devising.
	
	Skills and techniques
	• ICT, portfolio development and communication skills
	  ▪ photography – of the features of the final product
	  ▪ documenting presentations and evaluations
	• context appropriate drawings and relevant technical information to produce the final product to demonstrate
	  ▪ 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.

7–8	**Skills and techniques** • 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 • demonstrate workshop clean-up procedures **Safety** • correct use of personal protective equipment (PPE) where applicable • work health and safety practices appropriate to tasks being undertaken in workshops **Task 2: Production skills and techniques**

Week	Syllabus content

9–15	**Production management**
	• production plan
	  ▪ using tools, equipment and machinery to complete production
	  ○ follow instructions from plans
	  ○ maintain safety requirements
	  ▪ record changes to materials lists or costing
	• ongoing evaluation techniques: record changes made to the project
	Skills and techniques
	• workroom/studio terminology appropriate to context
	• select appropriate materials and calculate the quantities of materials required to complete the project
	• with supervision, operate machinery and tools appropriate to context
	Task 3: Devise a design solution
	Task 4: Production management and manufactured product

16–17	**Design fundamentals and skills** • evaluate ▪ finished product against the initial design and student generated criteria

Semester 2

Week	Syllabus content

1–4	**Design fundamentals and skills**
	• investigate
	  ▪ needs, values and beliefs of the designer/developer
	  ▪ design fundamentals
	  o aesthetics – appearance, form
	  o function – purpose, use
	  o safety – safe design concepts
	  o cost – comparison with commercial products
	  ▪ similar and alternate existing ideas and products using a variety of sources
	  o sources of design inspiration – aesthetic and functional features
	  o performance criteria related to aesthetics and function.
	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
	  ▪ bar
	  ▪ tube
	  ▪ sheet
	• identification of common associated materials used with metal
	  ▪ abrasives
	  ▪ permanent and non-permanent fixings
	  ▪ adhesives
	  ▪ finishes
	Materials in context
	• impact of materials production processes on the workshop and the local environment; metal waste management, fumes, noise

5–7	**Design fundamentals and skills**
	• devise
	  ▪ communication and documentation techniques
	  o sketching
	  o annotating
	  ▪ ICT or manual presentation skills to create solutions incorporating:
	  o elements of design: line, shape, form, texture, colour
	  o 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:
	  o full materials list
	  o full materials costing
	  o production plan
	Skills and techniques
	• ICT, portfolio development and communication skills
	  ▪ 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:
	  ▪ sketching rapid concept developments
	  ▪ 2D working drawings or using templates

Week	Syllabus content
	▪ 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 **Skills and techniques** • 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: ▪ painted ▪ oiling ▪ plastic or powder coatings ▪ lacquer ▪ electroplating ▪ anodising ▪ enamelling **Task 5: Devise a design solution**
8–15	**Safety** • correct use of personal protective equipment (PPE) where applicable • conduct risk assessment for using specific tools/machinery • demonstrate work health and safety 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 **Production management** • production plan ▪ using tools, equipment and machinery to complete production ○ adhere to sequential instructions ○ apply safety and risk management ○ record changes to materials lists or costing • use ongoing evaluation techniques: record ongoing progress/decision changes made to the project **Task 6: Production management and manufactured product**
16–17	**Design fundamentals and skills** • evaluate ▪ finished product against the design brief, initial design and student-generated performance criteria **Task 7: Product report**

Context: Textiles
Unit 1 and Unit 2

Semester 1

Week	Syllabus content

1–3	**Design fundamentals and skills**
	• investigate
	  ▪ needs, values and beliefs of the client or other end user
	  ▪ sources of design inspiration
	  ▪ existing ideas and products
	  ▪ design fundamentals
	  ○ aesthetics
	  ○ function
	  ○ safety
	  ○ cost
	
	Nature and properties of materials
	• fibre types and classification
	  ▪ natural fibres
	  ○ cellulosic – cotton, linen
	  ○ protein – wool, silk
	  ▪ manufactured fibres
	  ○ regenerated – rayon
	  ○ synthetic – polyester
	• fabric structures
	  ▪ woven – warp, weft, selvedge
	  ▪ knitted – course, wale
	  ▪ non-woven
	• processes required to convert fibre to yarn to fabric
	• aesthetic and functional properties of textiles used
	• select fabrics for particular end-uses considering aesthetic and functional properties
	
	Materials in context
	• textiles and their uses
	  ▪ apparel
	  ▪ furnishings
	  ▪ costumes
	  ▪ textiles arts
	  ▪ non-apparel items
	• identification of environmental considerations
	  ▪ 3 Rs – reduce, re-use, recycle
	  ▪ ways to reduce waste
	  ▪ ways to re-use and recycle
	
	Task 1: Short answer test

Week	Syllabus content

4–6	**Design fundamentals and skills**
	• devise
	  ▪ using communication and documentation techniques
	  ○ sketching
	  ○ annotation
	  ▪ elements of design
	  ○ line
	  ○ shape
	  ○ form
	  ○ texture
	  ○ colour
	  ▪ rapid concept development techniques
	  ▪ reviewing design ideas against design brief
	  ▪ annotated graphics and sketches with appropriate measurements or dimensions applicable to context
	  ▪ production planning
	  ○ full materials list
	  ○ full materials costing
	  ○ production plan
	• evaluate
	  ▪ design ideas when investigating and devising
	
	Skills and techniques
	• ICT, portfolio development and communication skills
	  ▪ photography – of the features of the final product
	  ▪ documenting presentations and evaluations
	• context appropriate drawings and relevant technical information to produce the final product to demonstrate
	  ▪ 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

7-8	**Skills and techniques**
	• use drawing skills
	  ▪ sketching
	  ▪ fashion drawing using templates
	• demonstrate pattern skills
	  ▪ use a commercial pattern
	  ▪ take basic body measurements
	  ▪ design and wearing ease
	  ▪ select pattern using body measurements
	  ▪ identify pattern parts
	  ▪ pattern layout
	  ▪ cutting out
	  ▪ transfer of pattern markings
	  ▪ adapt pattern, lengthen, shorten
	• demonstrate sewing machine skills
	  ▪ threading
	  ▪ straight stitch
	  ▪ zig zag
	  ▪ changing machine feet
	  ▪ changing machine needle

Week	Syllabus content

	• demonstrate overlocker skills, use overlocker for neatening
	• demonstrate construction techniques
	  ▪ joining – french seam, flat seam, knit seam
	  ▪ shaping – double dart, pleating
	  ▪ closures – lapped zipper, invisible zipper, button and buttonhole
	  ▪ finishing – rolled hem, hand stitched blind hem
	  ▪ pressing
	  ▪ embellishment and decorative techniques as appropriate
	  ▪ demonstrate workshop/studio clean up procedures
	Safety
	• correct use of personal protective equipment (PPE) where applicable
	• work health and safety practices appropriate to tasks being undertaken in workshops
	Task 2: Production skills and techniques

9–15	**Production management**
	• production plan
	  ▪ using tools, equipment and machinery to complete production
	  ○ follow instructions from plans
	  ○ maintain safety requirements
	  ▪ record changes to materials lists or costing
	• ongoing evaluation techniques: record changes made to the project
	Skills and techniques
	• workroom/studio terminology appropriate to context
	• select appropriate materials and calculate the quantities of materials required to complete the project
	• with supervision, operate machinery and tools appropriate to context
	Task 3: Devise a design solution
	Task 4: Production management and manufactured product

16–17	**Design fundamentals and skills** • evaluate ▪ finished product against the initial design and student generated criteria

Semester 2

Week	Syllabus content

1–4	**Design fundamentals and skills**
	• investigate
	  ▪ needs, values and beliefs of the designer/developer
	  ▪ design fundamentals
	  ○ 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:
	  ○ sources of design inspiration – aesthetic and functional features
	  ○ performance criteria related to aesthetics and function
	Nature and properties of materials
	• fibre types and classification
	  ▪ natural fibres
	  ○ cellulosic – cotton, linen
	  ○ protein – wool, silk
	  ▪ manufactured fibres
	  ○ regenerated – rayon, acetate
	  ○ synthetic – polyester, nylon
	• identify the following for one synthetic fibre – polyester, nylon
	  ▪ classification
	  ▪ origin
	  ▪ fabric names
	  ▪ environmental impacts of manufacture
	  ▪ care
	• fabric structures
	  ▪ woven – plain, satin, twill
	  ▪ knit – warp, weft
	  ▪ non-woven – felt, interfacings
	• fabric manufacturing from fibre to yarn to fabric
	  ▪ manufacturing techniques
	  ▪ costs
	• identification of aesthetic properties of the textiles used
	  ▪ colour
	  ▪ handle
	  ▪ drape
	• identification of functional properties of the textiles used
	  ▪ comfort
	  ▪ laundering
	Materials in context
	• product life cycle and the impact of disposal of textile products, and waste management on the local environment

Week	Syllabus content

5–7	**Design fundamentals and skills**
	• devise
	  ▪ communication and documentation techniques
	  ○ sketching
	  ○ annotating
	  ▪ ICT or manual presentation skills to create solutions incorporating:
	  ○ elements of design: line, shape, form, texture, colour
	  ○ 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:
	  ○ full materials list
	  ○ full materials costing
	  ○ production plan
	
	Skills and techniques
	• ICT, portfolio development and communication skills
	  ▪ 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:
	  ▪ 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
	
	Skills and techniques
	• demonstrate drawing skills
	  ▪ sketching – rapid concept development
	  ▪ 2D and 3D fashion drawing using templates
	• demonstrate pattern skills
	  ▪ use a commercial pattern
	  ▪ take basic body measurements
	  ▪ design and wearing ease
	  ▪ select pattern using body measurements
	  ▪ identify pattern parts
	  ▪ pattern layout
	  ▪ cutting out
	  ▪ transfer pattern markings
	  ▪ adapt pattern, lengthen, shorten
	• demonstrate sewing machine skills
	  ▪ threading
	  ▪ straight stitch
	  ▪ zig zag
	  ▪ changing machine feet
	  ▪ changing machine needle
	• demonstrate overlocker skills, use overlocker for neatening
	• demonstrate construction techniques
	  ▪ joining – french seam, flat seam, knit seams
	  ▪ shaping – double dart, pleating
	  ▪ closures – lapped zipper, invisible zipper, button and buttonhole

Week	Syllabus content
	▪ finishing – rolled hem, hand stitch blind hem ▪ pressing ▪ embellishment and decorative techniques as appropriate **Task 5: Devise a design solution**
8–15	**Safety** • correct use of personal protective equipment (PPE) where applicable • conduct risk assessment for using specific tools/machinery • demonstrate work health and safety 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 **Production management** • production plan ▪ using tools, equipment and machinery to complete production ▪ adhere to sequential instructions ▪ apply safety and risk management ▪ record changes to materials lists or costing • use ongoing evaluation techniques: record ongoing progress/decision changes made to the project **Task 6: Production management and manufactured product**
16–17	**Design fundamentals and skills** • evaluate ▪ finished product against the design brief, initial design and student-generated performance criteria **Task 7: Product report**

Context: Wood
Unit 1 and Unit 2

Semester 1

Week	Syllabus content

1–3	**Design fundamentals and skills**
	• investigate
	  ▪ needs, values and beliefs of the client or other end user
	  ▪ sources of design inspiration
	  ▪ existing ideas and products
	  ▪ design fundamentals
	  ○ aesthetics
	  ○ function
	  ○ safety
	  ○ cost
	Nature and properties of materials
	• origins of common softwoods and hardwoods
	• classification of hardwoods, softwoods and manufactured boards using the characteristics of hardness, colour and workability
	• difference between rough sawn and DAR timbers
	• identification of common timber sizes, lengths, widths and thicknesses, sheet sizes
	• identification of the structure and basic parts of a tree
	  ▪ cambium layer
	  ▪ sapwood
	  ▪ heartwood
	  ▪ growth rings
	  ▪ medullary rays
	  ▪ pith
	  ▪ bark
	• identification of common timber finishes
	Materials in context
	• broad areas of use for hard and soft woods
	• identification of environmental considerations
	  ▪ 3 Rs – reduce, re-use, recycle
	  ▪ ways to reduce waste
	  ▪ ways to re-use and recycle
	Task 1: Short answer test

4–6	**Design fundamentals and skills**
	• devise
	  ▪ using communication and documentation techniques
	  ○ sketching
	  ○ annotation
	  ▪ elements of design
	  ○ line
	  ○ shape
	  ○ form
	  ○ texture
	  ○ colour
	  ▪ rapid concept development techniques
	  ▪ reviewing design ideas against design brief
	  ▪ annotated graphics and sketches with appropriate measurements or dimensions applicable to context

Week	Syllabus content
	▪ production planning ○ full materials list ○ full materials costing ○ production plan • evaluate ▪ design ideas when investigating and devising **Skills and techniques** • ICT, portfolio development and communication skills ▪ photography – of the features of the final product ▪ documenting presentations and evaluations • context appropriate drawings and relevant technical information to produce the final product to demonstrate ▪ 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
7–8	**Skills and techniques** • read and correctly interpret and/or modify plans/patterns/templates • use appropriate workroom terminology • select and safely apply technical skills using a range of tools and machinery that could include, but not limited to: ▪ radial arm saw or drop saw or compound mitre saw ▪ sanding machines ▪ portable or fixed routers ▪ various grinders ▪ carving tools ▪ wood lathe ▪ biscuit cutter ▪ portable saws ▪ drill press • identify and differentiate between PVA, two pack epoxy, contact cement adhesives • use hand tools and/or machines to fabricate at least one of the following joints: ▪ widening joint ▪ finger joint ▪ cross-halving joint ▪ dovetail joint ▪ housing joint ▪ mortise and tenon ▪ bridle joint ▪ biscuit joint • differentiate between water-based, turpentine (oil) based, solvent-based and two pack epoxy finishes, including stains and waxes • apply multiple coats of a finish by brush, cloth and/or spray gun followed by correct clean up procedures • demonstrate workshop clean up procedures **Safety** • correct use of personal protective equipment (PPE) where applicable • work health and safety practices appropriate to tasks being undertaken in workshops **Task 2: Production skills and techniques**

Week	Syllabus content

9–15	**Production management**
	• production plan
	  ▪ using tools, equipment and machinery to complete production
	  ○ follow instructions from plans
	  ○ maintain safety requirements
	  ▪ record changes to materials lists or costing
	• ongoing evaluation techniques: record changes made to the project
	Skills and techniques
	• workroom/studio terminology appropriate to context
	• select appropriate materials and calculate the quantities of materials required to complete the project
	• with supervision, operate machinery and tools appropriate to context
	Task 3: Devise a design solution
	Task 4: Production management and manufactured product

16–17	**Design fundamentals and skills** • evaluate ▪ finished product against the initial design and student generated criteria

Semester 2

Week	Syllabus content

1–4	**Design fundamentals and skills**
	• investigate
	  ▪ needs, values and beliefs of the designer/developer
	  ▪ design fundamentals
	  o aesthetics – appearance, form
	  o function – purpose, use
	  o safety – safe design concepts
	  o cost – comparison with commercial products
	  ▪ similar and alternate existing ideas and products using a variety of sources:
	  o sources of design inspiration – aesthetic and functional features
	  o performance criteria related to aesthetics and function
	Nature and properties of materials
	• origins of manufactured boards
	• production process for manufactured boards
	• uses of plywood and different fibreboards
	• identification of characteristics of plywood and fibreboards
	• the association between hardness, workability and structure
	• identification of common associated materials used with wood
	  ▪ adhesives
	  ▪ permanent and non-permanent fixings
	  ▪ abrasives
	  ▪ fillers and finishes
	Materials in context
	• condition of materials recovered through different methods of recycling
	• impact of materials production processes on the workshop and the local environment, waste management, dust, fumes, noise

5–7	**Design fundamentals and skills**
	• devise
	  ▪ communication and documentation techniques
	  o sketching
	  o annotating
	  ▪ ICT or manual presentation skills to create solutions incorporating:
	  o elements of design: line, shape, form, texture, colour
	  o 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:
	  o full materials list
	  o full materials costing
	  o production plan
	Skills and techniques
	• ICT, portfolio development and communication skills
	  ▪ 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:
	  ▪ sketching rapid concept developments
	  ▪ 2D working drawings or using templates
	  ▪ inspiration/concept or storyboard development and presentation
	• use workroom/studio terminology appropriate to context

Week	Syllabus content
	• 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 **Skills and techniques** • correctly interpret and/or modify plans/patterns/templates • use appropriate conventions and workshop terminology • select appropriate materials and calculate the correct amount required for completion of project • calculate orders and costing for solid timbers and/or sheet materials • apply appropriate and accurate marking out techniques • demonstrate correct and safe procedures for setting up and/or operating selected power tools and machinery that could include: ▪ radial arm saw or drop saw or compound mitre saw ▪ sanding machines ▪ portable or fixed routers and table ▪ various grinders ▪ carving tools ▪ wood lathe ▪ biscuit cutter ▪ bandsaw ▪ pneumatic tools ▪ portable saws ▪ drill press ▪ mortise machine • identification of the main reasons for blades becoming blunt or breaking • select and use appropriate adhesives • select and use appropriate finishes • apply multiple coats of a finish by spray gun, including appropriate clean-up of equipment **Task 5: Devise a design solution**
8–15	**Safety** • correct use of personal protective equipment (PPE) where applicable • conduct risk assessment for using specific tools/machinery • demonstrate work health and safety 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 **Production management** • production plan ▪ using tools, equipment and machinery to complete production ○ adhere to sequential instructions ○ apply safety and risk management ▪ record changes to materials lists or costing • use ongoing evaluation techniques: record ongoing progress/decision changes made to the project **Task 6: Production management and manufactured product**
16–17	**Design fundamentals and skills** • evaluate ▪ finished product against the design brief, initial design and student-generated performance criteria **Task 7: Product report**