9.3 Architecture

Focus Area

Information and Communication Technologies – Architecture

Timing

12 Weeks

Resources

Solid Edge ST10
Solid Edge Tutorials
Service Platter Folio Template
Workshop Machine and Hand Tools
Materials (Timber of various species)
Laser Cutter

Unit Description

Assessment will consist of a design folio and the production of a prototype of the design.

Outcomes

DT5-1 analyses and applies a range of design concepts and processes
DT5-4 analyses the work and responsibilities of designers and the factors affecting their work
DT5-5 evaluates designed solutions that consider preferred futures, the principles of appropriate technology and ethical and responsible design
DT5-6 develops and evaluates innovative, enterprising and creative design ideas and solutions
DT5-7 uses appropriate techniques when communicating design ideas and solutions to a range of audiences
DT5-9 applies risk management practices and works safely in developing quality design solutions

Assessment (30%)

Design solution
CAD Drawing
Design Folio

ICT

Students will develop effective internet research skills in the development of a design folio to record the progress of their project. They will also model their design before production.

Cross-curriculum priorities

☒ Aboriginal and Torres Strait Islander histories and cultures
☒ Asia and Australia's engagement with Asia
☐ Sustainability

General capabilities

☒ Critical and creative thinking
☒ Ethical understanding
☒ ICT capability
☒ Intercultural understanding
☒ Literacy
☒ Numeracy
☒ Personal and social capability

Other learning across the curriculum areas

☐ Civics and citizenship
☒ Difference and diversity
☒ Work and enterprise

Content	Teaching, Learning and Assessment	Resources
Stage 4/5 - Core: Activity of Designers **Ethical and responsible design** ▪ investigate how designers respond ethically and responsibly to design issues when they develop design ideas and solutions, for example: (ACTDEK040, ACTDEK041) – research an example of an ethical and responsible design in a focus area of design – analyse the life cycle of a product in terms of sustainability and environmental impact of resources being used ▪ understand ethical responsibilities surrounding intellectual property, trademarks and copyright, for example: – protection of Aboriginal and/or Torres Strait Islander cultural knowledge and heritage – protection of creative, intellectual, scientific and industrial activity, eg inventions, logos, brand names ▪ develop design ideas and solutions considering ethical and responsible design practices (ACTDEK040) ▪ evaluate and explain the impact of past, current and emerging technologies on the individual, society and environments, for example: (ACTDEK041) – Aboriginal and/or Torres Strait Islander Peoples – Indigenous Peoples – people with disability – unique environments **Stage 4/5 - Core: Design Processes** **Identification of needs and opportunities** ▪ identify opportunities for new and better solutions (ACTDEK045, ACTDEP048) ▪ consider the requirements of end users and stakeholders (ACTDEP048, ACTDEP051) ▪ establish and document the requirements and design considerations for a design project ▪ evaluate the quality of a designed solution against criteria for success (ACTDEP051)	**Project Proposal Phase** *Focus Question: What impact can designers have upon the individual and society?* ***Teacher*** • Introduces the design situation and leads a discussion about the requirements of the brief. Relates the design situation to the concept of design as a problem-solving exercise. • Exhibits a portfolio sample and explains the design process and portfolio documentation procedures required. • Outlines the Project Proposal section of the portfolio and requirements for completion, including the provision of scaffolds for each element. • ***Students*** • Create a portfolio document using PowerPoint and complete the Proposal stage of the design process. • Participate in discussions about the design brief needs, problems and opportunities. • Develop a written narrative using the layers thinking routine to predict future directions for service platter designs. •	•

Stage 4/5 - Core: A Holistic Approach **Influence of design on the individual, society and environments** ▪ explain how the needs of individuals and society influence the development of a design project, for example: – ergonomic requirements – accessibility requirements ▪ predict the outcome of a project and its effect on preferred futures (ACTDEK040) **Stage 4/5 - Core: Design Processes** **Management** ▪ implement and evaluate a process of design, for example: (ACTDEP051, ACTDEP052) – prepare and implement time and action plans for design projects	**Project Management Phase** *Focus Question: What impact does effective project management have on the success of projects?* ***Teacher*** • Outlines the Project Management section of the portfolio and requirements for completion, including the provision of scaffolds for each element. • Leads a discussion about the importance of time / action planning and explains the application of the time plan within the portfolio document. • Leads a discussion about the material and resource limitations that apply to the project and reasons for limitations on design. • Explains safety requirements relating to the workshop and project tools and machinery. Facilitates completion of appropriate Onguard Safety Tests. • Demonstrates the safe and appropriate use of tools and machinery in the development of a skills exercise. Depending upon student ability, this may include cutting shapes with the scroll saw, producing a tea pot stand using a cross halving joint or making a dowel plant holder. ***Students*** • Develop a time / action plan for the completion of their project and evaluate their progress on an ongoing basis. • Identify and explain the limitations placed upon their design by documenting them within the portfolio document. • Login and complete allocated Onguard Safety Tests. **Case Study** ***Teacher*** • Identifies and explains a range of exemplary toy designs from the Good Design Awards, highlighting elements of the toys that exhibit well engineered solutions. • Distributes and explains the Future Design Case Study Task. ***Students*** • Engage in discussion and questioning regarding exemplary toy designs and suggest their own examples. • Complete the Future Design case study by investigating an existing toy design and predicting, in the form of a poster design, how this toy may evolve over the next 20 years.	• Onguard Safety Test website

Stage 4/5 - Core: Activity of Designers

Preferred futures

- define preferred futures
- explore the possibilities for preferred futures given the constraints of our current thinking, available technologies and resources (ACTDEK040, ACTDEK041)
- identify visions and specific examples of preferred futures, for example: (ACTDEK040)
  - lifestyle choices
  - financial considerations
- justify design solutions with consideration of preferred futures (ACTDEK041)
- identify what changes would need to occur to achieve preferred futures (ACTDEK040)
- analyse some exemplary designed solutions and predict future directions for a designed solution (ACTDEP051)

Stage 4/5 - Core: Design Processes

Research and exploration

Students:

- access, identify and summarise information and data, for example:
  - websites, eg Australian Bureau of Statistics
- interpret and manipulate data to aid the development of design ideas (ACTDEK047)
- research appropriate materials, processes and production methods for design projects
- apply and communicate research findings to design projects
- analyse the social, financial and environmental impact of design projects (ACTDEK040)

Creative and innovative idea-generation

- generate ideas, research solutions and employ collaborative techniques when developing creative design ideas, for example: (ACTDEP049)
  - undertake primary and secondary research
  - work collaboratively and share ideas
  - develop models and prototypes of design solutions
- apply design thinking when developing and producing design projects for preferred futures
- develop criteria for success for design projects

Communication and presentation techniques

- develop a range of appropriate techniques to communicate and present design ideas to a targeted audience, for example: (ACTDEP049)
  - communicate research findings and design ideas in visual, graphical, written, oral or digital forms

Project Development Phase

Focus Question: How do designers develop creative design ideas?

Teacher

- Outlines the Project Development section of the portfolio and requirements for completion, including the provision of scaffolds for each element.
- Outlines to process of conducting a PMI analysis of existing solutions using a range of contemporary and historical examples, such as those developed by Indigenous peoples.
- Identifies and demonstrates an idea generation technique (such as brainstorming, concept sketching or modelling) and an idea screening technique (such as SWOT analysis or criteria based) for students to apply to the development of their design solution,
- Demonstrates a range of hand drawing skills which, depending upon student ability, may include pictorial, orthogonal, perspective or rendering exercises.
- Provides feedback and advice relating to student idea generation.
- Demonstrates the use of Solid Edge CAD Software which, depending upon student ability, may involve developing extruded shapes, creating cutouts, mirroring parts, 3D sketching or rendering.
- Models appropriate investigation of materials using the internet so that students may safely and effectively research the characteristics and properties of a range of appropriate materials for their project
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Students

- Conduct and document a PMI analysis of existing toy designs relevant to the chosen area of focus for their design brief.
- Practice and refine hand drawing skills by completing a range of drawing exercises.
- Develop and evaluate a range of initial idea sketches for their project using the idea generation and idea screening techniques demonstrated.
- Practice and refine CAD skills by completing a range of video tutorials.
- Produce a CAD development of their chosen idea and communicate pictorial and orthogonal versions within their portfolio document.
- Document their progress through the Project Development phase within the portfolio as demonstrated within the folio template.

- Isometric Grid
- Drawing Exercises
- Solid Edge Tutorials

Content	Teaching, Learning and Assessment	Resources
– develop models or prototypes to communicate design ideas and solutions – develop, present and justify a marketing strategy for the designed solution ▪ design and produce solutions using ICT as appropriate, for example: (ACTDEP052) – employ desktop publishing software and multimedia applications to document design processes use web-based tools to collaborate on design projects		

Content	Teaching, Learning and Assessment	Resources
Stage 4/5 - Core: Design Processes **Management** ▪ manage materials, tools and techniques when developing a design project (ACTDEP050) ▪ evaluate the role of project management when developing a design project ▪ maintain a safe work environment when producing a design project, for example: (ACTDEP050) – use personal protective equipment (PPE) – identify and respond to warning and safety signage – adhere to exclusion zones in workshops – implement risk management strategies and practices **Experimentation** Students: ▪ undertake tests and experiments to develop design ideas (ACTDEK046, ACTDEP050) ▪ assess the suitability of design ideas by testing and experimenting ▪ refine design ideas to address needs and opportunities ▪ experiment to optimise solutions for design projects, for example: – prototypes – develop models using software	**Project Realisation Phase** *Focus Question: Why are most products manufactured in industrial settings?* ***Teacher*** • Assists students in the development of a Manufacturing Plan – including consideration of tools required and safety precautions necessary. • Identifies and discusses advanced ICT based manufacturing techniques that would be used in an industrial or commercial setting. • Facilitates a Think – Pair – Share activity to prompt student discussion about advantages and disadvantages of technologically advanced manufacturing techniques. • Demonstrates the completion of an experiment to test the properties or characteristics of a relevant material, such as timber strength, fabric flame resistance, etc. and demonstrates within the portfolio template the documentation of results and conclusions. • Demonstrates safe use of tools, equipment and processes required to prepare and construct the phone holder project. • Monitors student progress during practical activities and provides feedback to develop student skills and maintain quality project work. **Students** • Analyse and identify their chosen tools, materials and techniques for the development of their project idea through the development of a Manufacturing Plan within the portfolio document. • Participate within a discussion and Think – Pair – Share activity relating to the advantages and disadvantages of advanced manufacturing techniques. • Develop and undertake an experiment to assess the suitability of a range of materials for their project or an element of their project. • Select and use a range of tools, equipment and processes in the development of their design solution. Processes include; marking out and preparing timber, metal or fabric using hand tools and basic machinery for cutting, drilling and shaping, laser-cutting and etching of acrylic, and surface preparation for finishing. Reflect upon the range of appropriate tools and techniques to produce their project and justify their selection within the portfolio document.	Workshop tools, machines and materials.

Content	Teaching, Learning and Assessment	Resources
Stage 4/5 - Core: Design Processes **Evaluating** ▪ document and evaluate design processes and solutions against criteria for success (ACTDEK046, ACTDEP051) ▪ justify and document decisions made during development of design projects (ACTDEP049) ▪ self-assess and peer-assess design processes and solutions evaluate the short and long-term consequences of design projects on the individual, society and the environment (ACTDEK040)	**Project Evaluation Phase** *Focus Question: How do I know whether my solution is effective?* **Teacher** • **Students**	

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UNIT EVALUATION

Unit	*Click here to enter text.*	Class	*Click here to enter text.*
Dates	Start Date – End Date	Teacher	*Click here to enter text.*

Teaching of the Unit

Were all the outcomes and dot points including any skills in the unit covered? If not, please specify.
Click here to enter text.

List any strategies or adjustments you made to meet the learning needs of students with a disability and those across a variety of student backgrounds and learning profiles, including Aboriginal and Torres Strait Islander students. *List individual students and corresponding frequency and type of adjustments.* This data may be collected for NCCD.
Click here to enter text.

Do you have any other comments on your teaching of the unit?
Click here to enter text.

Evaluation of the Unit

Were the teaching strategies (incl. differentiation), ICT, activities and resources in the program relevant and varied? Give specifics.
Click here to enter text.

Did the Assessment *for, of and as* learning task reliably and appropriately assess learning and inform teaching? Explain.
Click here to enter text.

Evaluation of the Unit

Do you have any comments on how this unit could be improved? Consider timing, sequence, additional resources, ICT, teaching strategies, Ad Altissima (extension) and Remediation.
Click here to enter text.