YEARS 11&12

# HOUSING AND DESIGN

## TEACHING & LEARNING SUPPLEMENT

INDEPENDENT SCHOOLS TASMANIA
TASMANIAN CATHOLIC education office
Tasmanian Government

Teaching and Learning Supplement

# HOUSING AND DESIGN (HDS315118)

## ADVICE FOR TEACHERS

This document helps to describe the nature and sequence of teaching and learning necessary for students to demonstrate achievement of course outcomes.

It suggests appropriate learning activities to enable students to develop the knowledge and skills identified in the course outcome statements.

Tasks should provide a variety and the mix of tasks should reflect the fact that different types of tasks suit different knowledge and skills, and different learning styles. Tasks do not have to be lengthy to make a decision about student demonstration of achievement of an outcome.

## COURSE SPECIFIC ADVICE

This *Housing and Design* level 3 Teaching and Learning Supplement must be read in conjunction with the *Housing and Design* level 3 course document and relevant External Assessment Specifications and Examination Guidelines.

It contains advice to assist teachers delivering the course and can be modified as required. This Teaching and Learning Supplement is designed to support teachers new to or returning to teaching this course.

Housing and Design emphasises the development of design thinking through the use of imagination and creativity in making proposals and choices in the creation of innovative and enterprising solutions to problems. Learners study a variety of strategies for meeting identified needs, and addressing considerations of a design brief.

Learners learn to draw on a wide spectrum of thinking, including design and systems thinking, and use creativity to plan, generate, synthesise and realise ideas. They use a diverse range of techniques to communicate this thinking, and their design proposals (e.g. graphical, oral, notational, textual, mathematical, digital, virtual or three-dimensional presentations). Learners engage with complexity, being adaptive, creative and enterprising in their work. Their outcomes reflect qualities of appropriateness of designs and sensitivity, having learned to critically challenge housing values to improve the social and environmental impacts of the built environment.

## COURSE CONTENT

| | **Unit Title** | **Indicative Times** |
|---|---|---|
| **Unit 1** | Design Communication | 20 hours |
| **Unit 2** | Design and Systems Thinking | 20 hours |
| **Unit 3** | Form and Function | 40 hours |
| **Unit 4** | Passive Solar Design and Sustainability | 25 hours |

| Unit 5 | Project Management | 45 hours |
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# TEACHING AND LEARNING ACTIVITIES

**Unit 1** ***Design Communication***

In this Unit learners develop the necessary communication skills to undertake the design process and communicate underpinning research, design thinking and proposed solutions. Learners will investigate communication models relevant to particular design briefs and develop an understanding of techniques used to communicate all phases of the design process.

***Examples of learning activities***

Learners:

- measure up a room at home or at school, noting heights as well as other dimensions such as windows and doors. Draw up the room using architectural conventions
- create a mood board for a bathroom renovation to communicate design ideas
- use a simple shape of specific dimensions. Ask them to draw it in scales of 1:20, 1:50 and 1:100. Discuss why different scales might be used for different purposes and what these might be
- undertake regular quick sketch challenges based on the book Draw me a House Herem, T 2012 Cicada Books London
- curate a Pinterest board to show current trends in living space design
- use Canva or Adobe Spark to showcase a particular colour and the applications of that colour in interior design
- work cooperatively in a small group to create a design and give an oral presentation of a design concept and seek feedback from the rest of the class
- calculate and draw a ramp suitable for universal access to a building that is 500mm above ground level
- create an A3 poster showing examples of particular styles of housing, with annotations identifying key features of the house style
- use a provided site plan with two or more units to draw shadow diagrams investigating how two of the buildings might impact on one another's solar access
- undertake a library investigation, sourcing and practising referencing material from a variety of sources e.g. web sites, journals, magazines
- create a table showing the most commonly used symbols in architectural drawings and name what each represents
- use a drawing pen to create lines of different weight and discussed what each might be used for in communicating designs
- explore the use of watercolour pencils, pigment pens and copic markers in drawings, particularly design development sketching
- use bubble diagrams to consider layout possibilities for a unit design. Annotate each option with advantages and disadvantages of the potential layout
- draw a very simple cabin design. Communicate the same layout using a scale drawing, 3D model made from card and electronically using a program such as

Sketch Up. Compare the three and discuss the advantages and disadvantages of each presentation method.

**Resources**

CANVA
https://www.canva.com/
Adobe Spark
https://spark.adobe.com/home/

Sketch up
https://www.sketchup.com/

Australian Standards – Technical Drawing Architectural Drawing
https://infostore.saiglobal.com/en-au/Standards/AS-1100-301-2008-1081251/

Preparing a shadow diagram
http://www.daonline.net.au/userfiles/file/planners%20toolbox/Planner's%20Tool%20Box%20Shadow%20Diagram%20Instructions%20TTG%20Council.pdf

Understanding Scale
http://www.firstinarchitecture.co.uk/understanding-scales-and-scale-drawings/

**Unit 2**

***Design and Systems Thinking***

In this Unit learners develop knowledge and confidence to critically analyse and creatively respond to challenges. Systems thinking involves the use of various techniques to study systems of many kinds. Learners develop an awareness of the systems within a design scenario, and the impact individual components can have on the functioning of these.
Learners respond to design briefs, and critique needs or opportunities to develop their own design briefs. They will develop practical and analytical skills to visualise, generate and evaluate practical and creative solutions.

***Examples of learning activities:***

Learners:

- write a design brief related to an area of your school that needs improvement. From your design brief, draft aims that will be achieved in fulfilling the brief
- undertake a precedents investigation to inform possible design options
- draw a flowchart representing one system within a house e.g. plumbing, roofing, electrical
- undertake a needs analysis for a design scenario
- create a scale model of a simple room layout showing furniture. This could be done in any way that suits the students and facilities available from using hand drawing, card and sticky tape through to laser cutting balsa
- develop a context analysis for a design scenario
- investigate the building regulations and any planning restrictions in the local area. Discuss a planned or completed local building which is controversial in its design. Should it exist within the local environment? Why or why not?

- complete a quick ideation/feedback response to a design scenario. Spend two minutes sketching a response. Another two minutes improving that response, then a third two minutes to further refine. Partner up to give one another feedback. Spend a further 10 minutes using that feedback to finalise your quick design response
- investigate three different design thinking approaches. Unpack the processes and compare the approaches
- investigate the changing features of Australian Architecture. Discuss how social change has impacted on home design.

**Resources**

IDEO Design Thinking for Educators
https://designthinkingforeducators.com/toolkit/

Interaction Foundation – 5 Stages of Design Thinking
https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
Stanford dSchool resources
https://dschool.stanford.edu/resources/

**Unit 3**

***Form and Function***

In this Unit learners will learn to understand, select and apply the architectural design principles relating to both aesthetics and functional use of space. Aesthetics and functionality are key factors that contribute to the success of a design solution in meeting identified needs. Learners will learn to make informed decisions when designing spaces for both general and specific uses. Learners will develop an understanding of the specific design requirements for particular groups of people such as those with young children and those with universal access requirements.

***Examples of learning activities:***

Learners:

- design a small space house for a single person
- prepare an electronic presentation explaining and giving examples of one element or principle of design. Share this with the class
- design an outdoor living space for a given building, making sure there is a seamless transition from indoor to outdoor living
- design a small accessible living unit for a single person. Demonstrate the consideration of layout, flow and circulation spaces
- investigate features that can be incorporated into a bathroom design to make it as safe as possible for a family with young children. Use this information to design a suitable bathroom using a 2.5 x 3m space
- borrow a wheelchair and have students use this to try to carry out day to day operations using available facilities e.g. going to the bathroom, moving about the school, preparing snacks, accessing classrooms. Discuss the experience and identify aspects of a current built environment that needs to be modified to suit people using a wheelchair
- prepare a poster analysing the work of a contemporary Australian architect
- design a compact home office which can meet the ergonomic needs of both children and adults

- take an empty house plan and sketch in appropriate furniture. Consider circulation paths and zoning, illustrating these on your sketch
- using an existing older large house design, design a renovation to convert it to two independent units which could be used as a short term rental property for holiday makers
- create an aesthetically pleasing layout and decoration for a given room, including colour scheme and furniture for functional and decorative items. Present and justify your choices from an aesthetic perspective using annotations
- visit a building site to observe a domestic dwelling under construction. Draw a diagram showing the key construction methods used in the same or similar building
- convert an existing kitchen design to be universally accessible.

**Resources**

Livable Housing Design Guidelines
http://livablehousingaustralia.org.au/library/help/Livable_Housing_Design_Guidelines_Web1.pdf

What is ergonomics?
http://www.ergonomics.com.au/what-is-ergonomics/

Child safe kitchen design
http://www.build.com.au/child-safe-kitchen-design

Architectural Concepts : Circulation
http://portico.space/journal//architectural-concepts-circulation

Intelligent traffic flow
http://www.designbasics.com/articles/intelligent-trafiic-flow.asp

**Unit 4**

***Passive Solar Design and Sustainability***

This Unit focuses on the achievement of human comfort through the use of passive solar design principles. Learners will develop an understanding of the influence of climate on comfort and the impact design and material choices can have on energy consumption. This Unit also explores the broader considerations of sustainability related to housing, including energy generation, water use and material production.

***Examples of learning activities:***

Learners:

- use the Bureau of Meteorology web site to analyse the macroclimate of a city or town. Draw conclusions regarding the building design decisions which will be influenced by the climate
- discuss the variety of heating methods, both active and passive, used in local homes. Investigate other heating methods which could be used for homes in Tasmania. using a digital tool create a graphical way of comparing initial cost and running coasts of these heating methods

- use the windfinder website or similar to consider the wind pattern in local areas. discuss what this might mean for effective house design in those areas. Brainstorm ways to encourage the wind in, or to block the wind from a dwelling
- invite a professional in to discuss the concept of embodied energy and to compare the embodied energy in a range of common building materials
- observe the concept of thermal mass by heating a variety of materials (metal tray, ceramic plate, oven-proof glass bowl, water) in a domestic oven at 100o for 20 minute. Measure the temperature of the different materials on removal from the oven, and at each 2 minute interval for half an hour. Graph the cooling process for each material. Discuss what impact thermal mass properties of materials can have on the heating or cooling of a home
- create scale models with removable roofs of very basic dwellings. Use a protractor and strong torch to demonstrate the effect of different sun angles in summer and winter on these. Discuss the solar penetration and the effect of this on heating in the winter. Adapt the models, or create new ones, to improve the solar penetration in the rooms commonly used the most throughout the day
- visit a local building that has been constructed using passive solar design principles. Talk to the architect, owners or occupiers about the building and the PSD features that best support the inhabitants'
- discuss what is sustainability? List all of the aspects of a home – building and running – which might be considered when trying to create a 'sustainable' house
- investigate how solar hot water and photovoltaic solar cells work. Debate whether they are a positive investment for home owners.

**Resources**

YOUR HOME
http://www.yourhome.gov.au/

Sustainable Living Tasmania
www.sustainablelivingtasmania.org.au

Construction Details for Cool Temperate Climate, Australian Energy Council - Tasmanian Branch
http://www.rjmcgregor.iinet.net.au/pdf/ASES_Construction_details_web.pdf
Windfinder
https://www.windfinder.com/

Bureau of Meteorology
http://www.bom.gov.au/

**Unit 5** ***Project Management***

In this Unit, learners work collaboratively and as individuals to manage design projects. Learners take projects through to successful completion through planning, organising and managing time and resources effectively to create designed solutions.

***Examples of learning activities:***

Learners:

- investigate different formats for creating action plans. Consider the advantages and disadvantages of each and make a recommendation as to which one might suit you best to use for projects
- create a Gantt chart to show the sections and timelines required for the externally assessed folio
- set SMART goals when undertaking a design process
- co-construct a set of class protocols to use when students and evaluating and providing feedback to one another on design concepts
- investigate a range of decision making processes/protocols suitable to use in a small group when designing collaboratively. Working in small groups test three of these and demonstrate the preferred one to the rest of the class
- identify and explore five self-management techniques that can be used within the classroom
- develop negotiation skills by using active listening, empathy and paraphrasing to structure conversations within design groups.

**Resources**

The right way to do collaborative design
http://99u.com/articles/51643/the-right-way-to-do-collaborative-design-how-to-avoid-designing-by-committee

Helping students learn project management
http://www.spencerauthor.com/helping-students-learn-project-management/

## SUPPORTING STUDENT RESPONSES AND ELABORATIONS

| | | |
|---|---|---|
| Unit 1 | Design Communication | One sketching development activity<br><br>One electronic presentation |
| Unit 2 | Design and Systems Thinking | One supported introductory design brief |
| Unit 3 | Function and Aesthetics | Design Brief focusing on interior design<br><br>Design Brief focusing on accessible design |
| Unit 4 | Passive Solar Design and Sustainability | Design brief focusing on Tropical Design<br><br>Design brief focusing on Temperate Design<br><br>Poster focusing on thermal performance |
| Unit 5 | Project Management | Externally assessed Design Folio |

**NOTE**

All websites cited were accessed and checked for accuracy and appropriateness of content and were current as of January 2018.