Y11 MATERIALS TECHNOLOGY
2012

COASTAL TARANAKI SCHOOL

All Materials Technology courses are developed around the three learning strands of the New Zealand Technology Curriculum:

- Technological Knowledge and Understanding
- Technological Practice
- Nature of Technology.

It is recommended that students have studied Materials Technology in Year 10.

Course Description:
Students are provided an opportunity to explore a variety of materials when undertaking two major units of work. Each unit will require students to research, design and use technical to construct practical solutions. They will be involved in a variety of activities that require them to develop mock-ups, and models, and/or prototypes of final product outcomes.

Course Duration:

- Design Technology is a year-long practical based course.
- The Design Technology class has up to 6 x 50 minute lessons timetabled per week. There will be a double period at least once a week.

Unit 1: Jewellery

- Terms 1-2

Unit 2: Creative Gift item

- Terms 3-4

Achievement/Learning Objectives:

TP: PLANNING FOR PRACTICE Students will:

Critically analyse their own and others' past and current planning practices in order to make informed selection and effective use of planning tools. Use these to support and justify ongoing planning that will see the development of an outcome through to completion.

TP: OUTCOME DEVELOPMENT AND EVALUATION Students will:

Critically analyse their own and others' outcomes to inform the development of ideas for feasible outcomes (conceptual design and prototype). Undertake ongoing experimentation and functional modelling, taking account of stakeholder feedback and trialing in the physical and social environments. Use the information gained to select, justify, and develop a final outcome. Evaluate this outcome's fitness for purpose against the brief and justify the evaluation using feedback from stakeholders

TK: TECHNOLOGICAL PRODUCTS Students will:

Understand how materials are formed, manipulated, and transformed in different ways, depending on their properties, and understand the role of material evaluation in determining suitability for use in product development.

TK: TECHNOLOGICAL MODELLING Students will:

Understand that functional models are used to represent reality and test design concepts and that prototypes are used to test technological outcomes.

NOT: CHARACTERISTICS OF TECHNOLOGY Students will:

Understand the interdisciplinary nature of technology and the implications of this for maximising possibilities through collaborative practice.

VISUAL COMMUNICATION Students will:

Demonstrate understanding of and skills in fundamental visual communication techniques.

Unit 1: Jewellery/ wearable object	Y11 Design Technology - Unit Planner 2012 Terms 1-2

Unit Objectives / Learning outcomes – students will:

Students will:

- Develop practical skills competency - Y11 practical skills / basic procedures and skills in construction techniques and processes.
- Become competent in using specialist jewellery making tools and equipment.
- Develop a series of mock-ups to demonstrate proficiency and skill in basic jewellery making techniques, for example: measuring,marking, cutting, shaping, joining, texturing, colouring, finishing.
- Use visual research to explore ideas, link to current artists, and of materials and techniques.
- Examine a selection existing jewellers and jewellery, and analyse these for function, improvement, and feature identification.
- Select and use appropriate resources through informed testing, trialing and evaluation.
- Develop skills in freehand sketching and rendering and use these skills to communicate design ideas.
- Develop an understanding of the importance of functional modeling (mock-ups, materials selection, testing, techniques, and sketching……)
- Undertake a range of self-reflection practices.
- Develop an understanding of ergonomics related to jewellery and apply this to own outcome development.
- Develop a series of jewellery mock-ups that lead to choosing or developing a final design concept for an item of wearable jewellery which will then be manufactured. (The student will have input, but the design manufacturing specifications can be teacher or student derived.
- Create own construction sequence in discussion with teacher. This must include ;
  - one or more of measuring/marking out
  - one or more of sizing/shaping/forming
  - one or more of joining/assembling
  - one or more of finishing/detailing/tuning
- Produce a self-constructed final outcome.
- Demonstrate how testing has occurred.
- Carry out a comprehensive evaluation process.

Assessment Standards

AS91057 (1.20) Implement basic procedures using resistant materials to make a specified product. (6 credits: Internal)

Contributes to AS 91059 (1.22) Demonstrate understanding of basic concepts used to make products from resistant materials. (4 credits: Internal)

Contributes to AS 91063 (1.30) Design and Visual Communication: Produce freehand sketches that communicate design ideas. (3 credits: Internal)

Competencies	Values
Thinking • Critical and reflective, decision making with justification, problem solving and following manufacturing instructions. Using language, symbols and texts • Following instructions to develop and and manufacture outcome, and comply with safety codes. Managing self • Time management, resource preparation and purchase, meeting deadlines and milestones, following instructions. Relating to others • Sharing equipment and resources, consultation with stakeholders. Participating and contributing • Sharing ideas and progress, participation in class testing and sample making, active work in class and practical workshops.	Excellence – by aiming high and by persevering in the face of difficulties. • Producing quality practical outcomes. Persevering with design and construction complexities. Innovation, inquiry and curiosity – by thinking critically, creatively and reflectively. • Producing original design concepts, weekly reflection practice. Diversity – as found in our different cultures, languages, and heritages. • Meeting the brief specifications and having the freedom to use imagery, materials, design form in a personalised way. Equity – through fairness and social justice. • Respecting others – ideas, designs, skills, equipment, physical space. Community and participation – for the common good. • Participates in all set activities. Integrity – involves being honest, responsible, accountable and acting ethically. • Meets the set budget, adheres to copyright law, originality in design.

Technology Strands – Achievement Objectives	Assessment Opportunities	Subject Links
Level 6 **TP – Technological Practice – <u>Outcome development and Evaluation</u>** Students will be able to: • *Generate design ideas that are informed by research and analysis of existing outcomes.* • *Undertake functional modeling to develop design ideas into a conceptual design that addresses the specifications.* • *Evaluate design ideas in terms of their ability to support the development of a conceptual design for a feasible outcome.* • *Evaluate suitability of materials/components, based on their performance properties, to select those appropriate for use in the production of a feasible outcome.* • *Evaluate the conceptual design against the specifications to determine the proposed outcomes potential fitness for purpose.* • *Produce and trial a prototype of the outcome.* • *Evaluate the fitness for purpose of the final outcome against the specifications.* • *Use stake-holder feedback to support and justify key design decisions and evaluations of fitness for purpose* **TK – Technological Knowledge – <u>Technological Modelling</u>** Students will be able to: • *explain practical and functional reasoning and how they work together to enhance technological modelling* **TK – Technological Knowledge – <u>Technological Products</u>** **Students will be able to:** • *Explain how the composition of different materials enables them to be shaped in different ways.* • *Explain how the composition of materials determines the way they can be joined* • *Explain how the composition of materials determine the types of "finishing" techniques suitable for use.* • *Describe the role of material evaluation in determining material suitability for use in a technological product* **Nature of Technology – <u>Characteristics of Technology</u>** Students will be able to: • *explain examples of technological developments that are interdisciplinary in nature to demonstrate how the range of disciplines involved impacted on the technological practice.* • *explain examples of technological developments to demonstrate how collaborative practices of technologists have enhanced and/or inhibited technological developments.*	<u>Self:</u> • Weekly reflection • Final evaluation <u>Formative:</u> • Mock-ups: completion of set manufacturing tasks • Up keep of visual diary, manufacturing notes and evaluations • Design concepts and deciding on outcome to manufacture • Research <u>Summative:</u> • Completed visual diary • completed mock-ups • Completed outcome • Final design sketches • Final evaluation	• Art • Graphics • Mathematics • Science **Community Links** • local jewellery manufacturers • local art/design jewellery outlets **Resources** • Jewellery making equipment • Teacher topic ring-binder • Student project guide • graphics equipment • Powerpoints – e.g. Freehand sketching / contemporary jewellery/ New Zealand designers and techniques • Existing construction and jewellery exemplars • Visual display in class: images of current / historical exemplars • internet websites Jewellery making books

LEARNING ACTIVITIES

Learning Activities overview:

Initial Research Activities

- Research – jewellery, uses, features, function. Ergonomics/aesthetics. What is important in a successful jewellery outcome?
- Examine existing solutions – ***discuss those that require skills and techniques at a level which would allow students to be assessed against AS91057***
- Opinions from others.
- Materials examination. Identifying material properties and environmental and economical factors for designing an item of jewellery.

Initial Research and skill development Activities: Prototype and Functional Modeling Development Activities

- Teach, trialing and selecting materials / techniques: e.g. Teacher demonstration – then student testing techniques & skills on own materials: e.g. annealing, chasing, forming, soldering, etching...
- Research, and then practice skills such as: preparation, measuring, marking, cutting, shaping, forming, sizing, testing, joining, colouring, cleaning, finishing, through following simple projects:
- Make a simple textured ring, first in copper, then in silver.
- Make a pendant from two materials, using positive/negative space, cutting, and cold joining (eg, rivets)
- Develop a range of surface texturing possibilities (e.g. :chasing, etching ,printing).
- Develop a range of colour and finished surfaces (e.g. lime sulphur patination, enamel, heat treatments, scratch/polish).

Freehand Sketching Introduction Activities

- Teach students basic three dimensional techniques: e.g. Oblique, isometric, crating, perspective, proportion, shading, tonal rendering.
- Practice freehand sketching and using media for rendering.
- Apply techniques to research and conceptual design work for jewellery item. ***(Contributes evidence towards AS 91063)***

Functional Modeling Development Activities: Development of final design concept

- Concept sketches, development sketches. Select design - ***stakeholder/teacher approval required***.(NB the design component is not assessed)
- Design development, mock-ups, ergonomic testing (is the design **likely** to fit/function on the body?)
- Trial and select materials / techniques to determine those that will be used to construct a prototype
- Completed final design: a working drawing with specified materials and construction techniques –***teacher to check to ensure design and techniques will allow students access to AS91057***
- Ensure stakeholder consultation and self evaluation throughout whole process.

Prototype final design

- Plan construction sequence to manufacture prototype to student/teacher agreed specifications – ***discuss with teacher***
- Construct jewellery following specified techniques to meet agreed design specifications using safe practice

Functional Testing of Prototype Activities

- Test jewellery on a model in intended environmental setting.
- Provide evidence photos.
- Explain techniques used, and justify material choice ***(Contributes evidence towards AS 91059)***
- Evaluate the technical skill, and choice of materials, relating to the brief specifications.
- Complete final evaluation against brief specifications. Note potential areas for improvement. Refer to stakeholder/teacher comments on jewellery functionality, areas for improvement. ***(Assess against AS91057)***

Gift: Small/medium sized object design e.g. Bandsaw box	Y11 Materials Technology - Unit Planner 2011 Term 3-4

Unit Objectives / Learning outcomes – students will:

- Select and use appropriate resources through informed testing, trialing and evaluation.
- Develop an understanding of the important of functional modeling (mock-ups, materials selection, testing, techniques, sketching……)
- Develop and apply technical workshop skills taught in terms 1&2.
- Examine existing solutions and analyse these for function, improvement, feature identification.
- Develop self-designed mock-ups and final design for intended outcome.
- Develop competent skills in freehand sketching and rendering.
- From the brief, develop the specifications for the outcome in collaboration with teacher.
- Utilize a range of planning techniques to help manage time and resources.
- Undertake a range of self-reflection practices.
- Develop an understanding of ergonomics and apply this to own outcome development.
- Develop practical skills competency - Y11 practical skills / basic procedures and developing skills in construction techniques and processes.
- Create own construction sequence.
- Produce a self-constructed final outcome.
- Implement the outcome and provide photographic evidence of testing.
- Carry out a comprehensive evaluation process.

Assessment Standards, Level 1

- **AS91045 (1.2) v1** Use planning tools to guide the technological development of an outcome to address a brief –(4 credits: internal)
- **AS91047 (1.4) v1** Undertake development to make a prototype to address a brief (6 credits: Internal)
- **AS 91059 (1.22)** Demonstrate understanding of basic concepts used to make products from resistant materials. (4 credits: Internal)
- **AS91063 (1.30) v1** Produce freehand sketches that communicate design ideas (3 credits: External)

Competencies	Values
Thinking • Critical and reflective, decision making and planning, with justification, originality and creativity in design, problem solving. Using language, symbols and texts • Following a brief.Writing a conceptual statement with specifications. Using drawing to communicate ideas Managing self • Time management, resource preparation and purchase, meeting deadlines and milestones, following instructions. Relating to others • Sharing equipment, consultation with stakeholders. Participating and contributing • Sharing ideas and progress, participation in class testing and mock-up making, active work in class and practical workshops.	Excellence – by aiming high and by persevering in the face of difficulties. • Producing quality practical outcomes. Persevering with design and construction complexities. Innovation, inquiry and curiosity – by thinking critically, creatively and reflectively. • Producing original design concepts, weekly reflection practice. Diversity – as found in our different cultures, languages, and heritages. • Meeting the brief specifications .Exploring ideas and materials in a way that may have personal cultural meaning or significance. Equity – through fairness and social justice. • Respecting others – ideas, designs, skills, equipment, physical space. Community and participation – for the common good. • Participates in all activities and assist others by offering feedback and assistance if needed. Integrity –involves being honest, responsible, accountable and acting ethically. • Meets the set budget, adheres to copyright law, originality in design.

Technology Strands – Achievement Objectives	Assessment Opportunities	Subject Links
Level 6 **TP – Technological Practice – *Planning for Practice*** ***Students will be able to:*** • select appropriate planning tools informed by the critical analysis of own and other's planning practices. • Use planning tools to plan for the effective management of resources to ensure completion of an outcome. • Use planning tools to record initial plans and ongoing revisions in ways which provide justification for planning decisions made. **TP – Technological Practice – *Outcome development and Evaluation*** ***Students will be able to:*** • Evaluate suitability of materials/components, based on their performance properties, to select those appropriate for use in the production of a feasible outcome. • Produce and trial a prototype of the outcome. • Evaluate the fitness for purpose of the final outcome against the specifications. **TK – Technological Knowledge – *Technological Modelling*** ***Students will be able to:*** • Explain practical and functional reasoning and how they work together to enhance technological modelling • Explain the role of technological modelling in the exploration and identification of possible risk/s • Describe examples to illustrate te strengths and weakneses of technological modelling for risk exploration.	**Self:** • Weekly reflection and planning review. • Final evaluation **Formative:** • Selection and use of of planning tools at each stage of development • Mock-ups – functional modelling • Design concepts • Brief development • Research • Evaluation of design steps **Summative:** • Completed visual diary with all planning and reviews included. • Evidence and evaluation of all mock-ups • Completed outcome • Final design sketches • Final evaluation; outcome in intended location, with stakeholder feedback & judgement as to it's fitness for purpose.	• Art • Graphics • Mathematics • Science • Social Studies/ Te Reo **Community Links** • local designers • local business mentor (for planning) • local experts, e.g. jewellers, joiners, carvers, weavers • local art/design outlets/galleries **Resources** • Woodworking, jewellery, materials technology making equipment • Graphics equipment • Teacher topic ring-binder • Teacher provided exemplars of quality outcomes. • Display images – exemplars of jewellery, gift boxes, band-saw boxes, design solutions using mixed media, diverse imagery/ideas; looking at elements of design in a selection of specific designer's work. List of influential designers and helpful websites, book resources for students to access.

TK – Technological Knowledge – *<u>Technological Products</u>* ***Students will be able to:*** • Explain how the composition of different materials enables them to be shaped in different ways • Explain how the composition of materials determines the way they can be joined • Explain how the composition of materials determine the types of "finishing" techniques suitable for use • Describe the role of material evaluation in determining material suitability for use in a technological product. **Nature of Technology – <u>Characteristics of Technology</u>** ***Students will be able to:*** • Explain examples of technological developments that are interdisciplinary in nature to demonstrate how the range of disciplines involved impacted on the technological practice • Explain examples of technological developments to demonstrate how collaborative practices of technologists have enhanced and/or inhibited technological developments.		

LEARNING ACTIVITIES

Learning Activities overview:

This unit focuses on:

TP: Planning for practice

TP: Outcome Development and Evaluation

Other components of technology embedded into the unit include:

TK – Technological Knowledge – Technological Modelling

TK – Technological Knowledge – Technological Products

Nature of Technology – Characteristics of Technology

Initial Research Activities:

- Class context / setting discussion. Suitable possible outcomes, skills complexity, time management for second half year topic, topic constraints.
- Elements of design. Look at designers and contemporary exemplars – how to identify design features / elements and use these ideas in your own work. Teacher resources – designer sketches / connecting images from magazines / exemplars from books and galleries etc.
- Examine work from previous year students.
- Review/ discuss planning tools available.
- Teach specific skills such as use of band saw, revise metal and woodworking skills.
- Revise/teach characteristics of materials available – e.g. wood, metals, plastics, fabrics.

Freehand Sketching Activities:

- Teach students how to further develop design concept drawings from photographs or initial concept sketches.
- Teach how to draw sequential views / angles/ cross sectional drawings to communicate design detail.
- Practice freehand sketching and using media for rendering to show different materials, light, and three dimensions.
- Apply techniques to generate development concepts and a detailed final conceptual design for a gift. This will need to demonstrate different viewpoints, detail and some rendering.

Planning for Practice activities

- Discuss and evaluate different planning tools and techniques. Reflect on prior experience, and analyse examples of good practice
- Select planning tools that will work for individual students learning and working styles.
- Set out visual diary/ portfolio/ templates to make planning easily documented.
- Identify key issues for planning such as time, resources, access to equipment, skill development.
- Use planning tools such as brainstorms, mind maps, idea banks, reflective journals, scrap books, plans of action, Gannt charts, flow diagrams, graphical organisers, spread sheets, databases, throughout the development of the outcome.
- Reflect on the usefulness or otherwise of each planning tool used.

Outcome Development and Evaluation Activities

- Brainstorm and evaluate initial concept possibilities
- Research examples of existing design ideas and solutions and develop deeper research as ideas evolve as to the form the gift item will take. Continue research throughout the project as more information is needed.
- Develop ideas through means such as drawing, mock-ups, trials, analyses, questionnaires and evaluations until the conceptual design meets the specifications of the brief.
- Test material/ design suitability and show how the material/ technical choices for the outcome have arisen
- Manufacture the outcome, remembering to comply with all Health and Safety in the Workshop regulations.
- Test and evaluate the outcome for it's fitness for purpose, set against the specifications.
- What, if anything, could be improved/further developed?