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

SAMPLE COURSE OUTLINE

ENGINEERING STUDIES
GENERAL YEAR 11

Sample course outline

Engineering Studies – General Year 11

Unit 1 and Unit 2

Semester 1

Week	Key teaching points
Term 1 1–2	Overview of unit and assessment requirements Introduction to **Engineering design process** **Investigating** • interpret a design brief • use research skills to identify and describe existing solutions or similar products **Task 1:** Design project one
3–5	**Investigating** • describe materials and components relevant to the design brief • describe suitable forms of energy **Materials** **Classify types** • metals (pure) • alloys (ferrous) • alloys (non-ferrous) • polymers • composites **Task 2 Part A:** Investigate materials and components **Engineering in society** **Energy** • definition of energy, power and work • forms of energy as listed in this section of Unit 1 of the syllabus Learning of specialist theory and specific understandings from either specialist field: Mechanical or Mechatronics **Mechanical** **Materials, Statics, Dynamics and Mechanisms** All dots points and sub-dot points in this section of Unit 1 of the syllabus **Mechatronics** **Electrical/electronic, Components, Laws and principles, Production, Quantities, Systems and control, Nature of control systems and Interfacing with microcontroller** All dots points and sub-dot points in this section of Unit 1 of the syllabus **Task 2 Part B:** Research the definitions of energy, power and work
6–8	**Engineering design process** **Devising** • annotated pictorial drawings of design ideas • annotated orthographic drawings of design ideas • identify and describe the chosen option **Task 3:** Develop a solution for project one

9–10	**Fundamental engineering calculations**
	• examine dimensioned drawings to calculate:
	  ▪ overall length, height and width
	  ▪ direct and indirect dimensions
	  ○ linear measurements
	  ○ radii and diameters
	Use formulae, from the syllabus, for the following
	Perimeter
	Surface area

Week	Key teaching points
	Quantity estimates • estimation of lengths and surface area for: ▪ geometric shapes and forms ▪ individual shapes ▪ simple combinations of shapes and forms **Engineering design process** **Producing** • present specifications for the selected solution ▪ dimensioned pictorial and orthographic drawings ▪ orthographic drawings and sketches are 3rd angle projections and include: o lines – outlines, hidden detail and centrelines o dimensioning – linear, radii, circles, holes through or partial depth with flat base ▪ materials selected ▪ parts lists ▪ costing of prototype or working model • timelines to construct and test the solution **Specialist field content and principles** **Task 4:** Pre-production of proposed project one: detailed orthogonal working drawings with lists of materials, parts and components, and production plan on a timeline
Term 2 1–8	**Engineering design process** **Producing** • solution construction by selecting and using appropriate tools and machines, and following safe work practices • solution testing for correct function **Task 5:** Pre-production skill exercises **Task 6:** Manufacture of proposed project one: using prepared production plan, materials and available equipment
9–10	**Engineering design process** **Evaluating** • final solution in terms of: ▪ meeting the requirements of the design brief ▪ function and finish of the product **Task 7:** Evaluation of completed project one, with written report and photographs of completed project

Semester 2

Week	Key teaching points
Term 3 1–2	Overview of unit and reintroduction to Engineering design process **Engineering design process** **Investigating** Develop a design folio • interpret a design brief
3–5	**Investigating** • use research skills to identify and describe existing solutions or similar products • describe materials and components relevant to the design brief • describe suitable forms of energy **Materials** **Physical properties of materials** • definition of density, elasticity, strength – tensile and compressive, malleability, conductivity – electrical and thermal **Task 8:** Design project two – design process Determine a design brief Investigate materials and components, and energy within specialist field Learning of specialist theory and specific understandings from either specialist field; **Mechanical** **Materials, Statics, Dynamics and Mechanisms** All dots points and sub-dot points in this section of Unit 2 of the syllabus **Mechatronics** **Electrical/electronics, Laws and principles, Systems and control, Interfacing with microcontroller, Mechanics, Types of motion, Mechanical drive systems and Calculations** **Mechanical** materials, **Mechatronics** components All dots points and sub-dot points in this section of Unit 2 of the syllabus **Engineering in society** **Automation and technical innovation** • define the terms automation and innovation and give examples of each in the engineering context • describe advantages and disadvantages for society, business and the environment of automation and innovation in the engineering context **Task 9:** Research and report on automation and technical innovation
6–10	**Engineering design process** **Devising** • annotated pictorial drawings of design ideas • annotated orthographic drawings of design ideas • features of the chosen option **Task 10:** Develop a solution for project two
Term 4 1–3	**Engineering design process** **Producing** • specifications for the selected solution ▪ dimensioned pictorial and orthographic drawings ▪ orthographic drawings and sketches are 3rd angle projections and include: ○ lines – outlines, hidden detail and centrelines ○ dimensioning – linear, radii, circles, holes through or partial depth with flat base ▪ materials selected ▪ parts lists ▪ costing of prototype or working model • a timeline to construct and test the solution **Fundamental engineering calculations** • volume, density and quantity estimates

Week	Key teaching points
	Specialist field content **Task 11:** Pre-production of proposed project two: detailed orthogonal working drawings, with lists of materials, parts and components, and production plan on a timeline
4–7	**Engineering design process** **Producing** • solution construction through selection and use of appropriate tools and machines and following safe work practices • solution testing for correct function **Task 12:** Manufacture of proposed project two: using prepared production plan, materials and available equipment; recording progress in a design portfolio
8	**Engineering design process** **Evaluating** • final solution evaluation in terms of: ▪ meeting the requirements of the design brief ▪ function and finish of the product **Task 13:** Evaluation of completed project two: written report and photographs of completed product