**Sample Course Outline**

Engineering Studies

General Year 11

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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****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:
	+ 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
* 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 21–8 | **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 processDetermine a design briefInvestigate materials and components, and energy within specialist fieldLearning 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** componentsAll 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

**Specialist field content** **Task 11:** Pre-productionof 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 |