

ENGINEERING PLANNING AID



QR CODE FOR SPECIFICATION



In this strand, students employ the fundamental processes and principles of engineering by applying their knowledge of materials and processes to manufacture and design products. Students develop an engineering mindset as they appreciate that accuracy and precision, together with the use of established engineering principles and processes lead to the production of innovative and efficient solutions of high quality and finish

In this strand, as they develop an engineering mindset, students learn about the key stages of the engineering design and manufacture process. They learn about the importance of design for both the end-user experience and the economic and social impact of the product. They discover how the combination of informed choice of materials and correct processes produces a solution that is functional and efficient. Students come to appreciate the value of good project management and learn how to manage themselves and the process of product development from design to manufacture.

In this strand, students may work with a combination of mechanical, manufacturing, electronic and computing systems and software to explore relationships between simple inputs, processes and outputs. They will learn about systems, and how they can be coordinated to ensure the desired output. Students develop the mindset to appreciate how control systems operate on a larger scale, and how the design of control systems can impact on the environment and sustainability. They appreciate the role that engineers have in employing 'systems thinking' to design products and services that contribute to a better future.

1. PROCESSES AND PRINCIPLES

2. DESIGN APPLICATION

3. MECHATRONICS

ENGINEERING KNOWLEDGE AND AWARENESS

- 1.1 **understand** the concepts and approaches that are required when solving an engineering problem
- 1.2 **demonstrate** a range of manufacturing processes
- 1.3 **recognise** and adhere to health and safety standards
- 1.4 **understand** the properties associated with a range of engineered materials

- 2.1 **understand** the key stages of the engineering design process
- 2.2 **evaluate** the factors that influence design
- 2.3 **choose** a suitable material to **engineer** a product

- 3.1 **explain** the operation of basic mechatronic systems
- 3.2 **investigate** relationships between inputs, processes and outputs for basic control systems
- 3.3 **appreciate** the application of mechanisms in a controlled system

INNOVATION AND EXPLORATION

- 1.5 **research** applications of existing and emerging technological developments
- 1.6 **engage** with the various engineering disciplines by relating them to everyday application

- 2.4 **explore** how design impacts on the function and quality of a product including ergonomic considerations
- 2.5 **apply** appropriate engineering concepts and approaches in the execution of their design solutions
- 2.6 **use** relevant information to enhance design and function

- 3.4 **explore** the application of systems in an engineering setting such as the classroom, home and industry
- 3.5 **investigate** the impact of mechatronics on the environment and society
- 3.6 **configure and program** basic mechatronic systems using appropriate software
- 3.7 **design** a basic mechatronic system either individually or collaboratively

DEVELOPING AND MANUFACTURING

- 1.7 **develop** engineered solutions to various challenges
- 1.8 **identify** appropriate tools and equipment specific to a task
- 1.9 **apply** suitable manufacturing processes to **engineer** a product
- 1.10 **demonstrate** high-quality work, to include accuracy and surface finish

- 2.7 **apply** their knowledge of the properties associated with a range of engineering materials
- 2.8 **manufacture** a product from a working drawing
- 2.9 **modify** an existing product/design
- 2.10 **incorporate** basic project management techniques

- 3.8 **build and test** a basic mechatronic system with specific inputs or outputs
- 3.9 **incorporate** basic mechatronics into their engineered products

COMMUNICATING

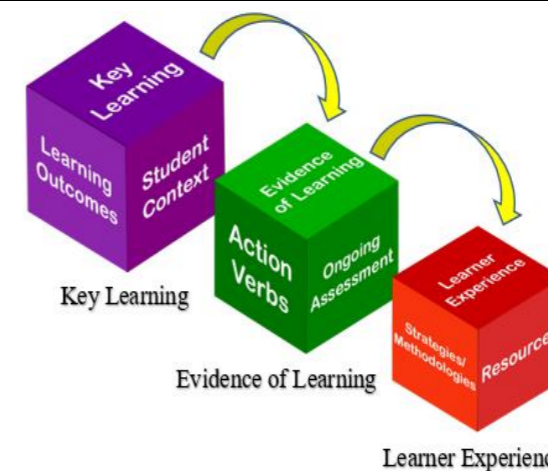
- 1.11 **create** sketches, models and working drawings
- 1.12 **interpret** working drawings
- 1.13 **use** appropriate technical language and notations

- 2.11 **present** ideas through modelling and prototyping, using appropriate media
- 2.12 **communicate** their design decisions using suitable media

- 3.10 **represent** key information using appropriate media
- 3.11 **justify** their choice of the most appropriate system or systems for a specified purpose



Action Verb	Description
Apply	select and use information and/or knowledge and understanding to explain a given situation or real circumstances
Appreciate	Appreciate recognise the meaning of, have a practical understanding of
Build	construct by putting parts or material together
Choose	pick out as being the best or most appropriate of two or more alternatives
Configure	arrange or put together in a particular form or configuration
Communicate	use visual, gestural, verbal or other signs to share meaning or exchange information; interaction between sender and recipient; both work together to understand
Create	process and give form to the topic that is to be created using selected methods and material and/or to give the material used a new form
Demonstrate	prove or make clear by reasoning or evidence, illustrating with examples or practical application
Design	planning the features of a solution that solves a perceived user problem
Develop	advance a piece of work or an idea from an initial state to a more advanced state
Engage	enter into or become occupied by an activity or interest; to attract or hold interest and attention
Engineer	develop/build an item for a specific purpose that includes critical-to function components
Evaluate	collect and examine evidence to make judgements and appraisals; describe how evidence supports or does not support a judgement; identify the limitations of evidence in conclusions; make judgements about the ideas, solutions or methods
Explain	give a detailed account including reasons or causes
Explore	to think or talk about something in order to find out more about it
Identify	recognise patterns, facts, or details; provide an answer from a number of possibilities; recognise and state briefly a distinguishing fact or feature
Incorporate	take in or contain something as part of a whole
Interpret	use knowledge and understanding to recognise trends and draw conclusions from given information
Investigate	observe, study, or make a detailed and systematic examination, to establish facts and reach new conclusions
Justify	give valid reasons or evidence to support an answer or conclusion
Manufacture	something made from raw materials by hand or by machinery
Modify	to alter one or more particulars of an object/product
Present	make objects perceivable for others
Program	to instruct a device or system to operate in a particular way or at a particular time
Recognise	identify facts, characteristics or concepts that are critical (relevant/ appropriate) to the understanding of a situation, event, process or phenomenon
Represent	bringing clearly and distinctly to mind by use of description or imagination
Research	the study of materials and sources in order to establish facts and reach new conclusions; revision of accepted theories or laws in the light of new facts
Test	establish the quality, performance, or reliability of something
Understand	have and apply a well-organised body of knowledge
Use	apply knowledge or rules to put theory into practice; employ something in a targeted way



PLANNING APPROACH
Identifying student context and selecting appropriate learning outcomes will outline **KEY LEARNING**.
Outline action verbs to help to plan for ongoing assessment. This outlines **EVIDENCE OF LEARNING**.
Having outlined what key learning and evidence of learning are present in the unit. Strategies/methodologies and resources need to be considered. This outlines **LEARNER EXPERIENCE**.