VCE Systems Engineering Combined

**Classroom Expectations**

**Equipment Expectations**

Students are expected to come to every class with a charged laptop; all students that own a computer are expected to bring it to every class. Students without a laptop are to make arrangements with the school for daily use. **DO NOT** turn up to class without a laptop computer expecting the teacher to organise one for you.

Head Phones, Ear buds; for use with laptop when listening to video tutorials and video research content.

Systems Engineering Textbook (Nelson); for the Engineering Principles Outcomes

Folio, stationary; A3 folio that can have pockets added to, Notepad, Display folders, pens, pencils, erasers, highlighters, etc.

USB stick;as another means to store and transfer files for teacher access.

Safety Glasses; a **must have** for all practical based activities for your personal protection.

**Behavioural Expectations**

* **NO mobile phones** are to be used in class.
* Students are to follow the entry and exit routines in an orderly manner.
* Students must conduct themselves in a safe and orderly manner in class, at all times.
* Students must be respectful of the teacher and other classmates physically, verbally and educationally.

**Learning Expectations**

* Students have the right to a safe and fair learning environment.
* Students are expected to make the most of their educational opportunity.
* Students are expected to come to class with a willingness to learn and participate.
* Students are expected to put in effort to the best of their abilities.
* Students are to be respectful of times for teaching and times for learning.
* Students are expected to cooperate with one another and share material resources in a fair and respectful manner.

VCE Systems Engineering – Combined

**Assessment**

Unit 1 & 2 Unit 3 & 4

Mechanical Folio S School Assessed Task 50%

Mechanical System S School Assessed Coursework – Energy 10%

Mechanical Principles S School Assessed Coursework – New Technology 10%

Exam S External Exam 30%

Electrotechnology Folio S

Electrotechnology System S

Electrotechnology Principles S

Exam S

The Systems Engineering Design Process (Wheel) V2

**Investigate**

* Define problem with constraints and considerations.
* Research possibilities

**Model & Design**

* Model/ analyse system electronics and mechanics.
* Design a range of options.
* Select and justify option.
* Post design research.

**Test & Analyse**

* Devise & use testing methods to test performance.
* Analyse test results to

Solve problems and improve performance.

**Evaluate**

* End product evaluation.
* Use of design process evaluation.

**Plan**

* List resources needed.
* Plan steps & timelines.
* Risk Assessment
* Set out production log structure.

**Produce**

* Use tools, materials and processes safely.
* Document production in a log, noting modifications to plan.

VCE Systems Engineering

**Folio Stages**

**Stage 1:** Identify and document problem/need/opportunity/situation

Design Brief

Evaluation Criteria

**Stage 2:** Research feasibility and alternatives

Research

Design Options

Design Selection

**Stage 3:** Design and model the system

System Description

System Trialling/ Modelling

Calculations

Diagnostic Test Design

Production Journal - start

**Stage 4:** Plan, fabricate, integrate and produce system

Production Sequence

Production Steps

Gant Chart – estimated time/ actual time

Risk Assessment

Tools and Materials Resource List

Production Journal

**Stage 5:** Test and diagnose/analyse performance

Diagnostic Test Results and Analysis

**Stage 6:** Re-evaluate, modify and document

Production Journal – modifications

Diagnostic Test; Re-testing, results and analysis

**Stage 7:** Evaluate and report on the system produced and processes used

Evaluation Criteria Addressed

System Performance Evaluation

Design Process Evaluation

VCE Systems Engineering

Design Brief Explanation

Folio Section: Design Brief Organisation

There are 4 parts to the design brief with each part having 2 areas;

1. Problem and Need (Why?)
2. Client and End user (Who?)
3. Constraints and Considerations (What?)
4. Potential Tests and Initial Research (How?)

Breaking it down: **Problem and Need (Why?)**

What's the Difference?

The problem is all about the issue that has arose and the difficulties it is causing. There may be some background or context needed to explain how the issue came about. You could say it is a negative focus on a situation.

The need looks at what is required in general terms to overcome the problem presented without locking in anything too specific just yet, that will come in later sections of the folio. This is setting your direction and a general description of the system to be developed (what should the system do?).

Simple example of problem and need;

Problem: My feet are cold and wet due to my shoes having a hole in them and the leather doesn't repel the water well.

Need: I need to waterproof my shoe leather and the holes in my shoes needs repairing.

(The need doesn't specify what product will be used for waterproofing or what part of the shoe needs repairing or how it will be repaired)

\*The **solution** is then explored through the rest of the folio with research undertaken, options sort, decisions made, planning done, action taken, solution tested and evaluation of the results to see that the problem has indeed been solved.

Breaking it down: **Client and End user (Who?)**

The client is the person who has come to you with the problem. Give some information about the client that may be useful in considering the factors effecting the design of the solution. The client may or may not be the person who will be using the designed solution.

The end user is the person who will be using the designed solution. This is important as their needs must be considered carefully, as they will be most affected if something doesn't work or goes wrong. Think of the market segment targeted.

Breaking it down: **Constraints and Considerations (What?)**

The constraints of a project talk about the necessary requirements (must have's) and also the restriction placed on the project (limited by). Must haves could be features needed or often safety requirements. The limits could be many and varied, but often relate to cost, size, weight, appearance, materials, etc. Constraints are quite specific in detail.

The considerations of a project talk about the areas of the project that requires your input through research and development to come up with some viable options to present to the client. Considerations usually lack specific detail in most cases and are the basis of your folio exploration.

Breaking it down: **Potential Tests and Initial Research (How?)**

The potential tests are a bank of test ideas brainstormed to be draw upon to develop tests for the finished product, to check performance and diagnose any problems. From this modifications can be made for re-testing and/or improvement to meet the required outcome.

The Initial Research is a pool of research starting points that can help to give direction to focus efforts in collecting the right types of information. A follow on or extension of this could be the creation of a mind map, helping to link and extend important ideas.