**Systems Engineering Unit 3 & 4 Timeline Overview 2020**

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| **Term** | **Timeline Unit 3 & 4 (Dates are Fridays)** | **SACs – Energy & New Tech** | **Revision** | **Work designation** | **Breakdown (Simplified)**  Folio & Production journal |
| Term 1 | W1 Introduction |  |  | Folio Work | Design brief |
| W2 Design Brief (7 Feb) | Advantages and disadvantages of renewable and non-renewable energy | Identifying/ Defining a System | Evaluation Criteria |
| W3 Evaluation Criteria (14 Feb)  \*Authentication 1 | Technological developments in carbon reduction and efficiencies for non-renewables | Energy Types and Uses | Design Research |
| W4 Design Research (21 Feb)  \*Authentication 2 | Technologies to harness, generate and store energy | Force and Motion types | Design Options/ Selection |
| W5 Design Options/ Selection (28 Feb)  \*Authentication 3 | Factors of efficiency of energy conversion | Force and Moment | System Description  \*Design Modelling, options |
| W6 System Description (6 Mar) | Evaluation of wind, solar and non-renewables | Levers, MA, VR | Calculations, selection |
| W7 Modelling/ Calculations (13 Mar) | Energy transformations through power supply life cycle | Efficiency, Work done and power | Diagnostic test design |
| W8 Diagnostic Test Design (20 Mar) | Revision | Linkages | Production plan/ timeline |
| W9 Production Planning (27 Mar) | Energy Test | Chains, Pulleys and Ratchets | Risk assessment/ resources |
| Term 2 | W1 Risk Ass/ Resources (17 Apr) | Internet of things/ Smart cities | Gears, Ratios and Speeds | Front cover/ contents page |
| W2 Front cover/ contents (24 Apr) | Autonomous Cars | Cranks, Cams and Friction |  |
| W3 Prod’ Journal 1st viewing (1 May) | Ag Tech/ Farm bots | Pneumatic and Hydraulic  Systems | Modelling & Prototyping | Post-design research |
| W4 (8 May) | Computer vision | System Descriptions | System Prototyping |
| W5 (15 May) | Augmented and Virtual Reality | Revision |  |
| W6 Post-design system (22 May) |  | Revision |  |
| W7 Planning Folio Due (29 May)  \*Authentication 4 |  | Revision | Folio | \*Planning Folio Due |
| W8 Commence Production (5 Jun) |  | Electrotechnology Systems | System Production |  |
| W9 Production (12 Jun)  \*Authentication 5 |  | Components; Resistors |  |
| W10 Production (19 Jun) | New Tech Test | Components; Capacitors | \*Written Test |
| W11 Production (26 Jun) |  | Components; Semiconductor |  |
| Term 3 | W1 Production (17 Jul)  \*Authentication 6 |  | Components; Transistors | Production journal |
| W2 Production (24 Jul) |  | Components; ICs | Photo record |
| W3 Production (31 Jul) |  | Components; Transducers, sensors and switches | System construction |
| W4 Production (7 Aug) |  | Electrical power sources | System testing/ diagnostics |
| W5 Production (14 Aug)  \*Authentication 7 |  | Understanding circuits | Evaluation Criteria Answers |
| W6 Production (21 Aug) |  | Basic circuit theory | Design Process Evaluation |
| W7 Production (28 Aug) |  | AC Electricity | System Evaluation |
| W8 Diagnostic Testing (4 Sep)  \*Authentication 8 |  | Digital Circuits |  |
| W9 System Evaluation(11 Sep) |  | Designing and Modelling Systems |  |
| W10 (18 Sep) \*\*Folio & System Due \*\*  \*Authentication 9 & 10 |  | Revision |  |
| Term 4 | W1 (9 Oct) |  | Revision | Exam Preparation | Practice exams/ review sheets |
| W2 (16 Oct) |  | Revision | Topic summaries |
| W3 (23 Oct) |  | Revision |  |

**Assessment Breakdown**

Energy SAC (Unit 3) 10% Structured questions in class

New Technology SAC (Unit 4) 10% Structured questions in class

System folio and production 50% Units 3 & 4 outcome 1

Exam 90 minutes 30% Externally set and assessed

**Folio Sections**

1. Design Brief;

Problem, need, client profile, end user profile, constraint, consideration, initial research, potential tests

1. System Description;

Written description, Block diagram, IPOC diagram, Flow diagram

1. Evaluation Criteria;

Identified important aspects to measure performance against written as a question, stating relevance and how it will be tested.

1. Pre/ post design Research;

Pre-design research looks at the subsystems with possible components, parts and materials for the system; of which a selection will need to be made.

Post-design research looks at selections made and the detail needed to use them in making the system work with hardware connection and programming needed.

1. Calculations;

Maths needed to workout mechanical/ electrical requirements of the system. Reference to content learned in Units 1 and 2.

1. Design Options;

3 to 4 design options in the system’s design, system’s housing, system’s interface that can be expressed through 3D drawings/ models, circuit diagrams, layout diagrams, etc.

1. Selection;

PMI chart, Justification statement; reference to trialling and testing results of options.

1. Diagnostic test design;

3 tests with detailed sections; Purpose, Procedure, Results and Analysis

1. Production planning;

Production sequence, Production steps, Gant chart, Risk assessment, Resource list

1. Prototyping/ Modelling;

Experiment with breadboards, Veroboard, Tinkercad circuits/ 3D modelling, Cardboard/ foam core/ foam/ plasticine modelling, PCB making, 3D printing, Laser cutting/ engraving,

Plastic forming – vacuum forming/ strip heater

1. Production Journal;

Weekly – Work done, Issues/ modifications/ solutions, Progress, photos of progress, Gant chart update

1. Evaluation;

Address Evaluation Criteria, Final evaluation of system, Final evaluation of design process, updated system description, Detail difficulties and modifications made for better performance.

VCE Systems Engineering Unit 3 & 4

**Exam Revision Weekly Focus**

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| Week | Topics |
| 1 |  |
| 2 |  |
| 3 | Defining a System |
| 4 | Force and Motion |
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| Week | Topics |
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VCE Systems Engineering Unit 3 & 4

**SCHOOL ASSESSED TASK (SAT): Fast Facts**

* This is a **self-chosen** and **self-managed** integrated systems project that is worth **50%** of your total mark. To be carried out by **individual** students.
* The SAT is a **solution driven** **project** that addresses a **problem** presented in the **design brief**.
* The SAT is both a **unit 3** and **unit 4** assessable task; unit 3 covers the **research, design** and **planning stages**, and unit 4 covers the **construction, testing and evaluation stages**.
* The project contains two major parts; the **folio** which documents your journey and the **system** which is the physical result of that journey.
* The **folio** is made up of smaller sections such as the ‘design brief’, ‘production plan’ and ‘system testing’ for example. This must be presented in an **A3 format** (A3 Folio).
* The **integrated** **system** must be a combination of an **electronic system** and **mechanical system**.
* The SAT is assessed by **8 set criterion** that the folio and the completed system will need to cover.
* The focus on the **integrated system** is for it to **function** in some capacity for testing to take place.
* The project will be **monitored by the teacher** throughout the process with the **VCAA authentication record document**. The project is considered completed only when both student and teacher **sign off** on this document.
* The SAT is mainly a **student funded project**, but the technology department will support wherever possible within reason.
* Students are required to use an **Arduino based microcontroller** as part of their system solution. This can include the **Uno, Mini, Nano, Leonardo** or **Mega**.
* The problem/ project needs to be within your scope of **experience** and considers the **limited time** you have to complete it (less than 3 terms). Aim to have it fully completed and submitted to the teacher by the **end of term 3**.
* The Choice of project must be **appropriate and safe**; no weapons, no high power vehicles, no circuits over 50V, no project with the potential to cause injury, etc.
* Students are urged to use **out of class time** to work on the SAT project to ensure enough time is given for the success of the SAT undertaken. This includes **study periods**, **after school sessions**, **lunchtimes** and **holiday workshop** opportunities.

Recommendations

* Keep your SAT project problem/ solution focused with 3rd party client.
* Your solutions need to be simple, but extendable if time allows.
* Avoid the following projects; Dangerous, expensive, complex, time consuming, outside your skill set,