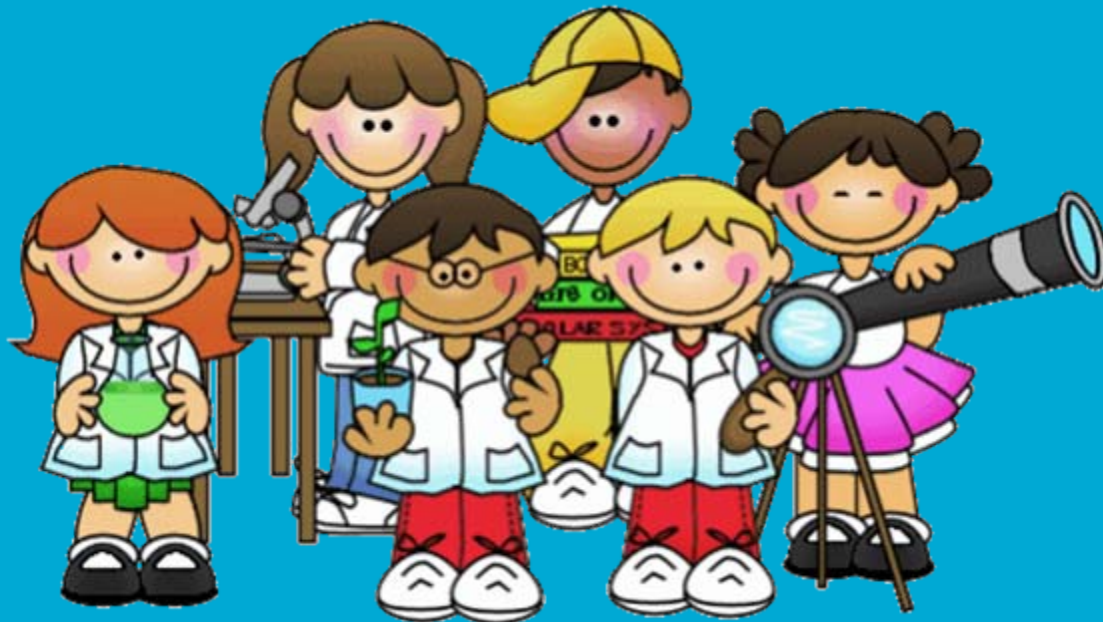


Implementation workshop for laboratory technicians VCE Sciences 2016-2021



September
2015
STAV
House

Maria James
VCAA

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Workshop aims

- Provide an overview for laboratory technicians about the changes to the study design
- Workshop ideas related to implementation issues for laboratory technicians
- Respond to questions

Implementation timelines

- ❑ **Staged implementation :**
 - **Units 1&2 in 2016**
 - **Units 3&4 in 2017**
- ❑ **Implementation workshop Units 3 and 4: planned Term 1, 2016**
- ❑ **Implementation support materials – developed throughout 2015 and 2016**

Online publication of study design

- ❑ For planning purposes for Units 1 and 2, the 2016-2021 VCE Biology study design can be accessed via the VCE ‘futures’ pages:

<http://www.vcaa.vic.edu.au/Pages/vce/studies/futuresd.aspx>

- ❑ Teachers should ensure that the current study design is used in 2016 for Units 3 and 4:

<http://www.vcaa.vic.edu.au/Documents/vce/biology/BiologySD-2016.pdf>

Who is the study design for?

- Students progressing to further studies in science and/or associated science disciplines (science literacy)**
- Students with a general interest in science and its applications in society (scientific literacy)**

Rationale for changes

- ❑ **Content reduction: increased time for conceptual understanding and discussion of scientific ideas and methodologies**
- ❑ **Increased emphasis on investigative work**
- ❑ **Increased emphasis on critical thinking**
- ❑ **Student choice (Area of study 3; Units 1 & 2)**
- ❑ **Determination of essential senior secondary science concepts in the suite of VCE sciences**
- ❑ **Meaningful application of science concepts**
- ❑ **International standards**

VCAA online implementation support materials

A number of resources will be developed to support implementation

Question: Are there any resources that the VCAA should or could provide for laboratory technicians?

Science faculty experimental investigation planner

- Lab managers and science leaders should work together to plan investigations across all VCE sciences for a calendar year so that neither human nor physical resources are exhausted
- Units 1 and 2 can be taught in any order; Units 3 and 4 must be taught as a sequence

Sample experimental investigation planner

VCE Science	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Biology	1	Yellow	Blue	Blue	Blue	Blue	Blue	Light Green	Light Green	Light Green	Light Green	Light Green	Yellow
	2	Yellow	Light Green	Light Green	Light Green	Light Green	Light Green	Red	Red	Red	Red	Red	Yellow
	3&4	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Yellow
Chemistry	1	Yellow	Red	Red	Red	Red	Red	Light Green	Light Green	Light Green	Light Green	Light Green	Yellow
	2	Yellow	Light Green	Light Green	Light Green	Light Green	Light Green	Blue	Blue	Blue	Blue	Blue	Yellow
	3&4	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Yellow
Enviro Science	1	Yellow	Blue	Blue	Blue	Blue	Blue	Light Green	Light Green	Light Green	Light Green	Light Green	Yellow
	2	Yellow	Light Green	Light Green	Light Green	Light Green	Light Green	Red	Red	Red	Red	Red	Yellow
	3&4	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Yellow
Physics	1	Yellow	Red part	Red part	Red part	Red	Red	Light Green	Light Green	Light Green	Light Green	Light Green	Yellow
	2	Yellow	Light Green	Light Green	Light Green	Purple	Purple	Purple	Purple	Blue	Blue	Blue	Yellow
	3&4	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Yellow
Psychology	1	Yellow	Red	Red	Red	Red	Red	Light Green	Light Green	Light Green	Light Green	Light Green	Yellow
	2	Yellow	Light Green	Light Green	Light Green	Light Green	Light Green	Blue	Blue	Blue	Blue	Blue	Yellow
	3&4	Yellow	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Yellow

Colour coding

No labs

Experimental investigation

Research investigation

Physics options

VCE Science stories



VCE Science story - Biology

UNIT 1: How do living things stay alive?

Area of Study 1: How do organisms function?

Area of Study 2: How do living systems sustain life?

Area of Study 3: Practical investigation: students design and undertake an investigation related to the survival of an organism or species

UNIT 2: How is continuity of life maintained?

Area of Study 1: How does reproduction maintain the continuity of life?

Area of Study 2: How is inheritance explained?

Area of Study 3: Investigation of an issue: students investigate and communicate a response related to an issue in genetics and/or reproductive science

UNIT 3: How do cells maintain life?

Area of Study 1: How do cellular processes work?

Area of Study 2: How do cells communicate?

UNIT 4: How does life change and respond to challenges over time?

Area of Study 1: How are species related?

Area of Study 2: How do humans impact on biological processes?

Area of Study 3 (Unit 3 and/or 4): Practical investigation: students design and undertake a practical investigation related to cellular processes and/or biological change and continuity over time

VCE Science story - Chemistry

UNIT 1: How can the diversity of materials be explained?

Area of Study 1: How can knowledge of elements explain the properties of matter?

Area of Study 2: How can the versatility of non-metals be explained?

Area of Study 3: Investigation: students communicate findings from a self-selected research investigation into materials

UNIT 2: What makes water such a unique chemical?

Area of Study 1: How do substances interact with water?

Area of Study 2: How are substances in water measured and analysed?

Area of Study 3: Practical investigation: students design and undertake a practical investigation related to water quality

UNIT 3: How can chemical processes be designed to optimise efficiency?

Area of Study 1: What are the options for energy production?

Area of Study 2: How can the yield of a chemical product be optimised?

UNIT 4: How are organic compounds categorised, analysed and used?

Area of Study 1: How can the diversity of organic compounds be explained and categorised?

Area of Study 2: What is the chemistry of food?

Area of Study 3 (Unit 3 and/or Unit 4): Practical investigation: students design and undertake a practical investigation related to energy and/or food

VCE Science story – Environmental Science

UNIT 1: How are Earth's systems connected?

Area of Study 1: How is life sustained on Earth?

Area of Study 2: How is Earth a dynamic system?

Area of Study 3: Practical investigation: students design and undertake a practical investigation related to the monitoring of ecosystems or their components and/or change in ecosystems

UNIT 2: How can pollution be managed?

Area of Study 1: When does pollution become a hazard?

Area of Study 2: What makes pollution management so complex?

- **Category 1: Air pollution**
- **Category 2: Water pollution**
- **Category 3: Soil pollution**

Area of Study 3: Case study: students investigate and communicate a substantiated response to an issue related to the management of a selected pollutant of local interest

UNIT 3: How can biodiversity and development be sustained?

Area of Study 1: Is maintaining biodiversity worth a sustained effort?

Area of Study 2: Is development sustainable?

UNIT 4: How can the impacts of human energy use be reduced?

Area of Study 1: What is a sustainable mix of energy sources?

Area of Study 2: Is climate predictable?

Area of Study 3 (Unit 3 and/or 4): Practical investigation: students design and undertake a practical investigation related to biodiversity or energy use from an environmental management perspective

VCE Science story - Physics

UNIT 1: What ideas explain the physical world?

Area of Study 1: How can thermal effects be explained?

Area of Study 2: How do electric circuits work?

Area of Study 3: What is matter and how is it formed?

UNIT 2: What do experiments reveal about the physical world?

Area of Study 1: How can motion be described and explained?

Area of Study 2 - Focus study: students choose one of 12 focus studies related to astrobiology, astrophysics, bioelectricity, biomechanics, electronics, flight, medical physics, nuclear energy, nuclear physics, optics, sound or sports science

Area of Study 3: Practical investigation: students design and undertake an investigation related to content in Areas of Study 1 and/or Areas of Study 2 of Unit 2

UNIT 3: How do fields explain motion and electricity?

Area of Study 1: How do things move without contact?

Area of Study 2: How are fields used to move electrical energy?

Area of Study 3: How fast can things go?

UNIT 4: How can two contradictory models explain both light and matter?

Area of Study 1: How can waves explain the behaviour of light?

Area of Study 2: How are light and matter similar?

Area of Study 3: Practical investigation: students design and undertake an investigation related to content in Units 3 and/or 4

VCE Science story - Psychology

UNIT 1: How are behaviour and mental processes shaped?

Area of Study 1: How does the brain function?

Area of Study 2: What influences psychological development?

Area of Study 3: Student-directed research investigation: students communicate a substantiated response to a selected question related to one of six topics: biopsychology; brain and the use of technology; cognition; psychological development; mental health and disorder; and changing thoughts, feelings and behaviour

UNIT 2: How do external factors influence behaviour and mental processes?

Area of Study 1: What influences a person's perception of the world?

Area of Study 2: How are people influenced to behave in particular ways?

Area of Study 3: Student-directed practical investigation: students design and undertake a practical investigation related to external influences on behaviour

UNIT 3: How does experience affect behaviour and mental processes?

Area of Study 1: How does the nervous system enable psychological functioning?

Area of Study 2: How do people learn and remember?

UNIT 4: How is wellbeing developed and maintained?

Area of Study 1: How do levels of consciousness affect mental processes and behaviour?

Area of Study 2: What influences mental wellbeing?

Area of Study 3 (Unit 3 and/or 4): Practical investigation: students design and undertake a practical investigation related to mental processes and psychological functioning

Topic selection in the sciences

Concept	Biology	Chemistry	Enviro	Physics	Psychology
behaviour	✓ (animal)		✓ (social)		✓ (human)
ecology	✓		✓		
energy	✓	✓	✓	✓	
genetics	✓ Unit 2- classic Unit 4 - modern				✓ Units 1-4 (nature-nurture)
human body	✓ systems/genetics	✓ food	✓ pollution effects	✓ biomechanics / bioelectricity	✓ brain and nervous system
sensory perception	✓			✓	✓

Overview of changes – general study design features

- ❑ Introduction includes a ‘Scope of study’ section
- ❑ Two science-specific aims; seven generic science aims
- ❑ ‘Units’ and ‘Areas of study’ have questions as titles
- ❑ ‘Safety and wellbeing’ has been updated re regulations, and a new section related to ethical conduct of experimental investigations added
- ❑ ‘Cross-study specifications – new section – added to incorporate key science skills and scientific investigation (including a template for poster production) as being applicable to all VCE sciences
- ❑ Mandated practical logbook Units 1-4

Focus on scientific inquiry

scientific method

experiment hypothesis observation
question predict variables conclusion
data research

Key science skills

Victorian Curriculum Science Inquiry Skills	VCE key science skills
Questioning and predicting	Develop aims and questions, formulate hypotheses and make predictions
Planning and conducting	<ul style="list-style-type: none">• Plan and undertake investigations• Comply with safety and ethical guidelines• Conduct investigations to collect and record data
Recording and processing	Conduct investigations to collect and record data
Analysing and evaluating	<ul style="list-style-type: none">• Analyse and evaluate data, methods and scientific models• Draw evidence-based conclusions
Communicating	Communicate and explain scientific ideas

VCE Physics Unit 2 Area of Study 2

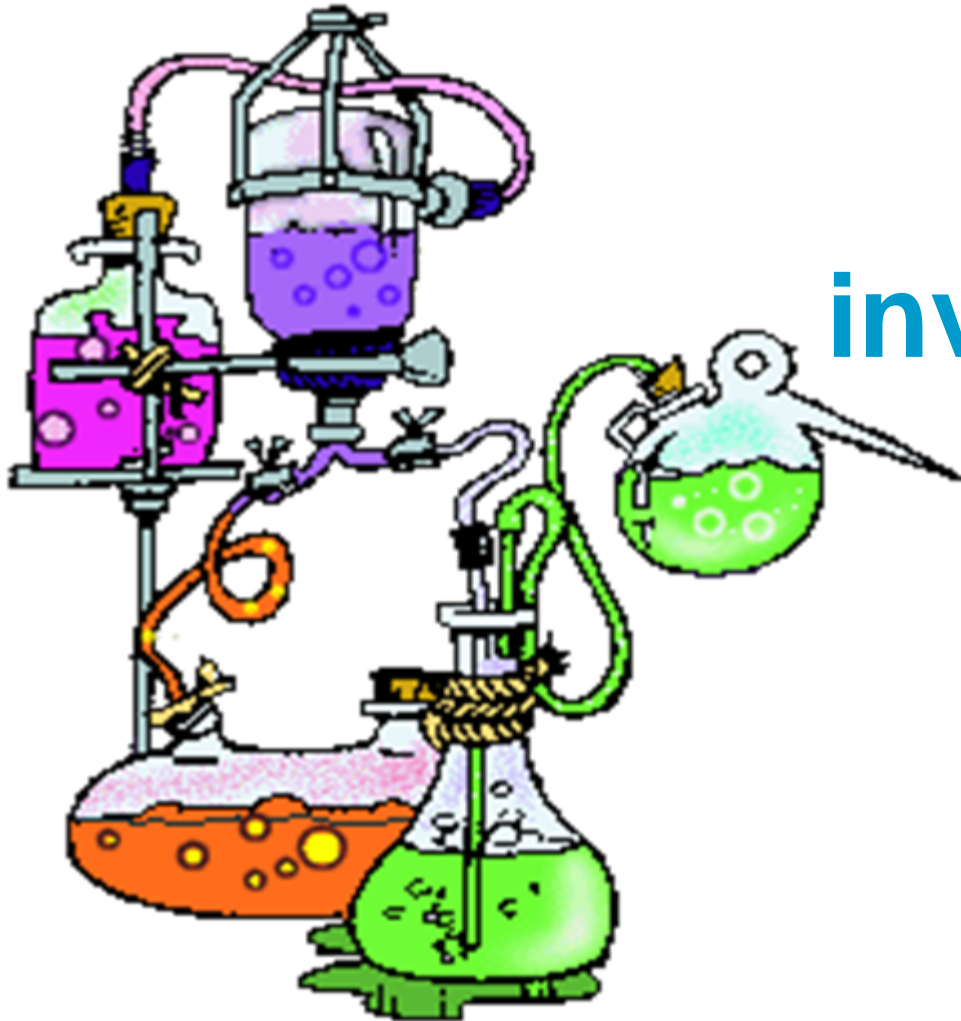
Choice of twelve options (more than one may be taught in a class):

- 2.1 What are stars?
- 2.2 Is there life beyond Earth's Solar System?
- 2.3 How do forces act on the human body?
- 2.4 How can AC electricity charge a DC device?
- 2.5 How do heavy things fly?
- 2.6 How do fusion and fission compare as viable nuclear power sources?
- 2.7 How is radiation used to maintain human health?
- 2.8 How do particle accelerators work?
- 2.9 How can human vision be enhanced?
- 2.10 How do instruments make music?
- 2.11 How can performance in ball sports be improved?
- 2.12 How does the human body use electricity?

Logbook

- Mandated across Units 1-4
- Content may include:
experimental results, research notes, simulation outcomes, visual presentations, field trips, photographs and other images, demonstration summaries and database extract
- May be electronic or paper copy: e-files/ notebook/ folder/ scrapbook/ section in folder/ duplicate book
- Does not need to be 'formally' presented
- Use for record, authentication and assessment purposes
- Entries should be dated and in chronological order

Student- designed investigations



Planning
Doing
Analysing
Concluding
Communicating

Use of scientific posters

- In Victorian schools - for example, Science Talent Search, and Year 7 to 10 presentations
- Student entry into tertiary courses/ work experience/ part-time employment
- In international schools - Singapore, USA – ‘science fairs’, competitions
- At tertiary institutions - research presentations
- At professional science conferences – trend towards minimal keynotes and rest being poster presentations, including an oral component – focus on science communication (concise)

Scientific poster

Section

- Title
- Introduction
- Methodology
- Results
- Discussion
- Conclusion
- Acknowledgments and references

VCAA poster template

Poster content

The poster must display no more than 1000 words including those in titles, diagrams and images. References are not included in the word count and must be written using standard referencing styles eg APA and Harvard.

Layout

In Normal View, on the Home tab, click Layout and select the desired layout from the three options.

Change colour scheme

In the Design tab, select Colours and click the desired colour scheme

Change view to read text easily

In Normal View, on the Home tab, click Zoom to enlarge the poster to a comfortable size to read the text.

Add text

Click a text box, then start writing your own text or copy and paste from your electronic notebook. All text must be your own work. Change font size to suit. Save the poster using a suitable file name.

Edit headings

Headings may be moved and resized and text boxes reduced or enlarged as needed.

Diagrams and images

These are not compulsory and may be inserted in suggested locations or according to your preference. They must be labelled appropriately.

Viewing

The poster is best viewed as a slide show on a computer device or projected onto a large screen.

Printing

If you wish to print the poster, set the printer to A3 paper size for best reproduction. A4 paper size may be used.

Insert Title here			School logo
Insert Author name here			
Introduction This is a test run	Results Enter text here	Discussion Enter text here	Conclusion Enter text here
Method Enter text here			References Enter text here

Poster authentication strategies

- Adopt and/or adapt current authentication strategies for tasks requiring extended experiments and/or practical activity reports
- Mark poster sections progressively
- Use specific questions about science investigation processes as part of the poster development under test conditions
- Logbook with dated entries should correlate to student work on poster
- Observed practical procedures in class
- Question students about content in specific parts of their poster

Poster logistics

- ❑ No drafts
- ❑ In Units 1 and 2, a scientific poster may be based on research (library), bioinformatics exercise or primary research
- ❑ In Unit 3 or 4, or across Units 3 and 4, the poster:
 - must involve collection of primary data
 - must include seven sections of poster template, with acknowledgment of level of guidance
 - may be an extension of a common experiment or fieldwork exercise
 - may be generated by students based on their own research and subject to authentication (use of photos/video...noted in logbook)
 - may be undertaken as a class with students contributing to design
 - may be assessed in stages (if modification required, original marks hold)
 - marks will be moderated against the examination – class rank order important

Units 3 and 4 Assessment - internal

Unit	Outcome	% study score	Unit % study score	VASS entry marks
3	1	8	16	50
	2	8		50
4	1	8	24	30
	2	8		30
	*3 (poster)	8		30

***Unit 4 Outcome 3 may be undertaken in either Unit 3 or Unit 4, or across both Units 3 and 4**

Workshop Activity 1: extended investigations

- What works now?
- What will be different?
- What are the main issues in schools? Solutions?

Workshop Activity 2: Secondary data activities

Laboratory assistance – opportunities for involvement???

Workshop Activity 3: VCAA support for laboratory technicians

**Other ideas,
please??**

VCAA contact

Maria James

Curriculum Manager, Science

Email:

james.maria.m@edumail.vic.gov.au

Telephone: 9032 1722