



VCE INDUCTION PACKAGE 2022

UNITS 3 AND 4 BIOLOGY



Welcome letter

Dear Students,

Welcome to Biology Units 3 and 4. You have chosen to study one of the most popular subjects of VCE. Don't take our word for it, speak to people around, mention that you are studying year 12 Biology and most people will tell you it was one of their most favourite subjects. While the study design focuses on developing student understanding of biochemistry, immunology and evolution by natural selection we strongly recommend adopting some independent behaviours that will enable you to succeed in Biology.

Take charge of your learning, see yourself as a work in progress. Consider engaging in the following behaviours:

- ★ Read your Study Design before the year starts, throughout the year to gauge your learning and prior to assessments. Be aware of the key terms even before you learn them and the nature of the assessment tasks that you are expected to undertake.
- ★ Establish a working relationship with your teacher. Do not hesitate to seek your teacher's assistance in developing an independent study schedule, key revision strategies or to address any areas of concern. Reach out in person or via Teams. Your success is dependent on your ability to identify and address any problems as they arise.
- ★ Behave as a member of a collective. Your class offers you the opportunity to explore your understanding through collaborating with others. You might not know the answer but someone else will. Collaboration leads to improved outcomes for everyone involved! As Issac Newton famously said, *"If I have seen further it is by standing on the shoulders of giants"*.
- ★ Endeavour to manage your time to enable learning and reviewing throughout the year. Establish a set time every week for completing textbook work, Edrolo lessons and reviewing of work by completing single page summaries, concept maps, annotations and past exam questions. Review your practices. If your study plan isn't working, adjust your plan and try again.
- ★ Balance your time with a healthy mix of study, exercise, leisure and socialising. Your wellbeing is more important than any school result. Be kind to yourself by taking care of your responsibilities and if, or when, you feel overwhelmed by your workload, seek assistance from someone you trust. You do not have to do this alone, as a matter of fact you will do better with others.

"Don't waste this opportunity. Do everything you can to achieve your best. Use your teacher as a resource and always challenge your level of understanding"

Sincerely your Biology Teachers

Outline of Study Design for Units 3 & 4

Unit 3: How do cells maintain life?

AREA OF STUDY 1: What is the role of nucleic acids and proteins in maintaining life?

In this area of study students explore the expression of the information encoded in a sequence of DNA to form a protein and outline the nature of the genetic code and the proteome. They apply their knowledge to the structure and function of the DNA molecule to examine how molecular tools and techniques can be used to manipulate the molecule for a particular purpose. Students compare gene technologies used to address human and agricultural issues and consider the ethical implications of their use.

AREA OF STUDY 2: How are biochemical pathways regulated?

In this area of study students focus on the structure and regulation of biochemical pathways. They examine how biochemical pathways, specifically photosynthesis and cellular respiration, involve many steps that are controlled by enzymes and assisted by coenzymes. Students investigate factors that affect the rate of cellular reactions and explore applications of biotechnology that focus on the regulation of biochemical pathways.

Unit 4: How does life change and respond to challenges?

AREA OF STUDY 1: How do organisms respond to pathogens?

In this area of study students focus on the immune response of organisms to specific pathogens. Students examine unique molecules called antigens and how they illicit an immune response, the nature of immunity and the role of vaccinations in providing immunity. They explain how technological advances assist in managing immune system disorders and how immunotherapies can be applied to the treatment of other diseases. Students consider that in a globally connected world there are biological challenges that can be mediated by identification of pathogens, the prevention of spread and the development of treatments for diseases.

AREA OF STUDY 2: How are species related over time?

In this area of study students focus on changes to genetic material over time and the evidence for biological evolution. They consider how the field of evolutionary biology is based upon the accumulation of evidence over time and develop an understanding of how interpretations of evidence can change in the light of new evidence as a result of technological advances, particularly in molecular biology. Students consider the biological consequences of changes in allele frequencies and how isolation and divergence are required elements for speciation. They consider the evidence for determining the relatedness between species and examine the evidence for major trends in hominin evolution, including the migration of modern human populations around the world.

Outcomes and Activities - Assessment dates 2022

Unit 3 – How do cells maintain life?

Task	Date
<p>Outcome 1 – 40 marks</p> <p>On completion of this unit the student should be able to analyse the relationship between nucleic acids and proteins, and evaluate how tools and techniques can be used and applied in the manipulation of DNA.</p>	<p>Term 1 Week 10</p>
<p>Outcome 2 – 40 marks</p> <p>On completion of this unit the student should be able to analyse the structure and regulation of biochemical pathways in photosynthesis and cellular respiration, and evaluate how biotechnology can be used to solve problems related to the regulation of biochemical pathways.</p>	<p>Term 2 Week 6</p>

Unit 4 – How does life change and respond to challenges

Task	Date
<p>Outcome 1 – 40 marks</p> <p>On completion of this unit the student should be able to analyse the immune response to specific antigens, compare the different ways that immunity may be acquired and evaluate challenges and strategies in the treatment of disease.</p>	<p>Term 3 Week 3</p>
<p>Outcome 2 – 40 marks</p> <p>On completion of this unit the student should be able to analyse the evidence for genetic changes in populations and changes in species over time, analyse the evidence for relatedness between species, and evaluate the evidence for human change over time.</p>	<p>Term 3 Week 10</p>
<p>Outcome 3 – 40 marks</p> <p>On completion of this unit the student should be able to design and conduct a scientific investigation related to cellular processes and/or how life changes and responds to challenges, and present an aim, methodology and methods, results, discussion and a conclusion in a scientific poster.</p>	<p>Term 3 Week 4-6 (in class)</p>

External assessment

- The level of achievement for Units 3 and 4 is also assessed by an end-of-year examination.
- The examination will contribute 50 per cent to the study score.
- The examination will be set by a panel appointed by the VCAA. All the key knowledge that underpin the outcomes in Units 3 and 4 and the key science skills are examinable.

TIMELINE UNIT 3 & 4 2022

Note...some SAC dates are subject to change depending on timetabling in 2022.

Term 1: Monday 31st January – Friday 8th April (10 weeks)

Week	Date	Area of Study	Content	Outcome
1	31 Jan – 4 Feb (Year 12 Residential)	1	<ul style="list-style-type: none"> Nucleic Acids Year 12 Residential (Thursday 3rd February – Friday 4th February – no classes) 	
2	7 Feb – 11 Feb	1	<ul style="list-style-type: none"> Transcription and Translation Types of RNA 	
3	14 Feb – 18 Feb	1	<ul style="list-style-type: none"> Gene structure and expression Prokaryotic <i>trp</i> operon 	
4	21 Feb – 25 Feb	1	<ul style="list-style-type: none"> Proteome Hierarchical levels of protein Export of proteins and associated organelles 	
5	28 Feb – 4 Mar	1	<ul style="list-style-type: none"> DNA manipulation Use enzymes in manipulation Crispr 	
6	7 Mar – 11 Mar	1	<ul style="list-style-type: none"> PCR Gel electrophoresis 	
7	14 Mar – 18 Mar (Monday 14 th Labour Day Friday 18 th Athletics Day)	1	<ul style="list-style-type: none"> Recombinant plasmids Genetically modified and transgenic organisms in agriculture 	
8	21 Mar – 25 Mar	1	Catch up/Review	
9	28 Mar – 1 Apr	1	<ul style="list-style-type: none"> <i>Early commencement of U3AoS2 possible</i> 	SAC: U3AoS1
10	4 Apr – 8 Apr (Student progress conferences)	2	<ul style="list-style-type: none"> Biochemical pathways Factors that affect enzyme action 	

Term 1 Holiday: Monday 11th April – Friday 22nd April

Term 2: Tuesday 26th April – Friday 24th June (9 weeks)

Week	Date	Area of Study	Content	Outcome
1	26 Apr – 29 Apr (Monday 25 th ANZAC day)	2	<ul style="list-style-type: none">• Photosynthesis• Factors that affect photosynthesis	
2	2 May – 6 May	2	<ul style="list-style-type: none">• Cellular Respiration• Aerobic and Anaerobic respiration	
3	9 May – 13 May	2	<ul style="list-style-type: none">• Factors that affect cellular respiration	
4	16 May – 20 May	2	<ul style="list-style-type: none">• CRISPr and photosynthesis• Biofuel production	
5	23 May – 27 May	2	<ul style="list-style-type: none">• Revision	
6	30 May – 3 Jun	2	<ul style="list-style-type: none">• <i>Early commencement of U4AoS1 possible</i>	SAC: U3AoS2
7	6 Jun – 10 Jun	U4AoS1	<ul style="list-style-type: none">• Antigens• Physical and Chemical Barriers to pathogens• Innate immune response (steps in inflammation)	
8	14 Jun – 17 Jun (Queen's Birthday 13 th June)	2	<ul style="list-style-type: none">• Cells of the innate response• Lymphatic system (nodes, T and B cells)• Adaptive immunity	
9	20 Jun – 24 Jun	2	<ul style="list-style-type: none">• B and T cells	

Term 2 Holiday: Monday 27th June – Friday 8th July

Term 3: Monday 11th July – Friday 16th September (10 weeks)

Week	Date	Area of Study	Content	Outcome
1	11 Jul – 15 Jul	1	<ul style="list-style-type: none">• Natural and artificial immunity• Emerging diseases• Impact if European arrival on Aboriginal and Torres	<i>Commence class work on SAC: U4AoS3</i>
2	18 Jul – 22 Jul	1	<ul style="list-style-type: none">• Strategies for controlling outbreaks• Development of immunotherapy strategies for autoimmune disease and cancer	
3	25 Jul – 29 Jul	1	Review/Catch up	SAC: U4AoS1
4	1 Aug – 5 Aug	1	<ul style="list-style-type: none">• <i>Early commencement of U4AoS2 possible</i>	SAC: U4AoS3
5	8 Aug – 12 Aug	1	<ul style="list-style-type: none">• Changes to gene pool• Selection pressures• Genetic drift and Gene flow	
6	15 Aug – 19 Aug	2	<ul style="list-style-type: none">• Selective breeding• Bacterial resistance and viral antigenic drift	
7	22 Aug – 26 Aug	2	<ul style="list-style-type: none">• Fossil record• Evidence of speciation (allopatric and sympatric)	
8	29 Aug – 2 Sep	2	<ul style="list-style-type: none">• Evidence of relatedness• Phylogenetic trees	
9	5 Sep – 9 Sep		<ul style="list-style-type: none">• Human evolution• Trends from Australopithecine to Homo• Use of evidence to explain	
10	12 Sep – 16 Sep			SAC: U4AoS2

Term 3 Holiday: Monday 19th September – Friday 30th September
(Practice Examination to be held in this holiday break)

Term 4: Monday 3rd October

Week	Date	Area of Study	Content	Outcome
1	3 Oct – 7 Oct		<ul style="list-style-type: none">• Revision	
2	10 Oct – 14 Oct		<ul style="list-style-type: none">• Revision	
3	17 Oct – 21 Oct <i>(Valedictory Dinner)</i>		<ul style="list-style-type: none">• Swotvac – no classes	

Assessment Summary

UNIT 3 and 4 COURSEWORK AND SAC REQUIREMENTS:

In order to successfully pass a Unit, all students are required to;

- complete all set coursework.
- obtain a pass in all scheduled School Assessed Coursework (SACS).

Where a student does not pass a SAC, they will be given the opportunity to redeem the task in order to reach a satisfactory standard, however where this occurs the students will retain their original mark for VCAA purposes.

All students are required to be up to date with their coursework prior to sitting a SAC.

Percentage contributions to the study score in BIOLOGY are as follows:

- Unit 3 school-assessed coursework: 20per cent
- Unit 4 school-assessed coursework: 30per cent
- End-of-year examination: 50per cent

Coursework Requirements

For an outcome to be scored, complete the prescribed coursework questions **before** the date of the outcome.

Satisfactory Requirements

To obtain an S for each unit students are to:

- Attend a minimum of 90% of classes
- Complete the coursework
- Obtain at least 40% on all outcomes

Sources of support for the Study Including websites and documentation

Links

VCAA Study Advice: <http://www.vcaa.vic.edu.au/vce/studies/biology/biologyindex.html>

VCAA Biology Past Exams: <http://www.vcaa.vic.edu.au/vce/studies/biology/exams.html>

MS Teams: each class will upload all resources to their Microsoft Teams page and Class Notebook

The following resources will be available in your Teams Files and One Note:

- PowerPoints and screencast
- Cornell notes
- Suggested solutions to Heinemann Chapter Questions,
- Videos and suggested interactive websites to view interesting animations.

Materials Required – Texts, Stationery and other Resources

Required Materials to be brought to each class

- Writing materials
- A3 sketch pad
- A4 exercise book (logbook to be kept in classroom at all times)
- Texts: Heinemann Biology VCE Unit 3 & 4 (for the new 2022 Study Design)
- Biozone Biology 2022 Student Resource and Activity Manual
- Edrolo Subscription

Holiday Tasks to be completed in preparation for the beginning of the 2022 school year

Complete the following:

- Complete the first set of Cornell notes on Nucleic Acids – these can be found in your Class Notebook or on MS Teams.
- Update your A3 summary book to show a model of both the structure of the monomer for DNA and RNA.
- Read Chapter 2 pg 68-80 (2.1 & 2.2 of your Heinemann textbook) and produce your own Cornell notes on the key concepts.