



VCE BIOLOGY 2006–2014

Relationship between the key knowledge and key skills of the 2000–2005 Study Design and the 2006–2014 Study Design

The following table provides a comparison of the key knowledge (and some key skills) in the *VCE Biology Study Design 2006–2014* with the 2000–2005 Study Design.

In the *VCE Biology Study Design 2006–2014* there are two areas of study in each unit. For a list of the key skills refer to page 12 of the Study Design.

This document should be read in conjunction with the *VCE Biology Study Design 2006–2014*, *VCE Biology Assessment Handbook* and the ‘Frequently Asked Questions’ published in the *VCAA Bulletin*, August 2005, page 5.

UNIT 1	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
Area of Study 1	<p><i>Key knowledge</i></p> <ul style="list-style-type: none"> • ecological groupings of organisms • diversity of living things • principles of classification • identification of organisms • environmental requirements of organisms • components of ecosystems • classification of consumers • energy flow in ecosystems • bioaccumulation of toxins in food webs • cycling of matter • interactions between organisms • population studies • survival within ecosystems 	<p>Unit 2 Area of Study 2</p> <p>Unit 2 Area of Study 1 (part of adaptations)</p> <p>Unit 1 Area of Study 2</p> <p>Unit 2 Area of Study 2</p> <p>Unit 2 Area of Study 2 (bioaccumulation part of the cycling of matter)</p> <p>Unit 2 Area of Study 2</p> <p>Unit 2 Area of Study 2 (as relationships)</p> <p>Unit 2 Area of Study 2 (as population dynamics)</p> <p>Unit 2 Area of Study 2 (as changes to ecosystems over time)</p>
Area of Study 2	<p><i>Key knowledge</i></p> <ul style="list-style-type: none"> • the variety and effects of regular short-term environmental change and irregular environmental change on ecosystems 	<p>Unit 2 Area of Study 2</p>

UNIT 1	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
	<ul style="list-style-type: none"> <li data-bbox="465 304 1348 373">• longer-term environmental change and its effects on the present-day global distribution of organisms <li data-bbox="465 416 1084 448">• species adaptations to environmental change <li data-bbox="465 560 792 592">• ecological succession <li data-bbox="465 671 1003 703">• human-induced environmental change 	<p data-bbox="1375 304 1666 336">Unit 2 Area of Study 2</p> <p data-bbox="1375 416 1935 520">Unit 2 Area of Study 1 (part of adaptations) Unit 2 Area of Study 2 (part of changes to ecosystems over time)</p> <p data-bbox="1375 560 1912 628">Unit 2 Area of Study 2 (part of changes to ecosystems over time)</p> <p data-bbox="1375 671 1666 703">Unit 2 Area of Study 2</p>
Area of Study 3	The key knowledge and key skills are related to conducting and reporting on a scientific investigation (field work).	<p data-bbox="1375 751 1666 783">Unit 2 Area of Study 2</p> <p data-bbox="1375 788 1644 820">Outcome 2 statement</p> <p data-bbox="1375 825 1576 857">Set of key skills</p> <p data-bbox="1375 861 1576 893">Assessment task</p>
UNIT 2	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
Area of Study 1	<p data-bbox="465 1043 658 1075"><i>Key knowledge</i></p> <ul style="list-style-type: none"> <li data-bbox="465 1118 936 1150">• provision of energy and nutrients <li data-bbox="465 1193 1272 1225">• cellular respiration, photosynthesis and energy conversions <li data-bbox="465 1268 1061 1300">• transport of materials in plants and animals <li data-bbox="465 1343 1128 1375">• removal of waste products and toxic substances 	<p data-bbox="1375 1118 1666 1150">Unit 1 Area of Study 2</p> <p data-bbox="1375 1193 1666 1225">Unit 1 Area of Study 2</p> <p data-bbox="1375 1268 1666 1300">Unit 1 Area of Study 2</p> <p data-bbox="1375 1343 1666 1375">Unit 1 Area of Study 2</p>

UNIT 2	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
	<ul style="list-style-type: none"> • water balance • experimental methods used to investigate the requirements for life 	Unit 2 Area of Study 2 Unit 1 Area of Study 1, Outcome 1 statement, set of key skills and assessment task
Area of Study 2	<i>Key knowledge</i> <ul style="list-style-type: none"> • asexual and sexual reproduction • mitosis • meiosis • reproductive systems in animals • reproductive systems in plants • fertilisation/pollination • provision of nutrients to the developing organism-seeds, yolk, placenta • development and growth in plants and animals • biological basis for modern technologies which enable human intervention in reproductive and developmental processes • experimental methods used to investigate reproduction and development 	Unit 1 Area of Study 2 Unit 1 Area of Study 1 Unit 4 Area of Study 1 Unit 1 Area of Study 2 and Unit 2 Area of Study 1 Unit 1 Area of Study 2 (part of reproduction) Unit 2 Area of Study 1 Unit 2 Area of Study 1 Unit 1 Area of Study 2 Unit 4 Areas of Study 1 and 2 Unit 4 Areas of Study 1 and 2

UNIT 3	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
Area of Study 1	<p><i>Key knowledge</i></p> <ul style="list-style-type: none"> • cellular environments • cell structure, functioning and specialisation • the structure, function and properties of cell membranes • experimental methods used to investigate cells <p><i>Key skills</i></p> <ul style="list-style-type: none"> • distinguish between prokaryotic and eukaryotic cells • identify cellular organelles and state their functions • compare plant and animal cells • model the structure and functioning of cell membranes 	<p>Unit 1 Area of Study 1</p> <p>Unit 1 Area of Study 1 (general principles)</p> <p>Unit 1 Area of Study 1</p> <p>Unit 1 Area of Study 1, Outcome 1 statement, set of key skills and assessment task</p> <p><i>New key knowledge</i></p> <ul style="list-style-type: none"> • applications of molecular biology in medicine including the design of drugs in medical diagnosis <p>Unit 1 Area of Study 1</p> <p>Unit 3 Area of Study 1</p> <p>Unit 1 Area of Study 1</p> <p>Unit 1 Area of Study 1 (mostly) The molecular nature of the membrane remains in Unit 3 Area of Study 1</p>

UNIT 3	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
	<ul style="list-style-type: none"> • relate cell functions to the survival of unicellular and multicellular organisms • compare the processes of photosynthesis and cellular respiration • synthesise enzyme action in the functioning cell • use microscopy techniques to section, stain, examine and draw cells • design and/or perform investigations involving enzymes and movement across a cell membrane 	<p>Unit 1 Area of Study 2 (reproduction) Unit 2 Areas of Study 1 and 2</p> <p>Unit 1 Area of Study 1 (as general treatment of cellular processes) Unit 1 Area of Study 2 (as obtaining energy) Unit 3 Area of Study 1 (as the specific stages)</p> <p>Unit 3 Area of Study 1 (enzyme action as a biochemical process) Unit 1 Area of Study 1 (the general role of enzymes)</p> <p>Unit 1 Area of Study 1</p> <p>Assessment tasks for Unit 3 Area of Study 1 (enzyme action as an example of a biochemical process and/or movement of substances across the cell membrane)</p>
Area of Study 2	<p><i>Key knowledge</i></p> <ul style="list-style-type: none"> • homeostasis • nervous and hormonal control systems • detection of and response to changing conditions • feedback mechanisms 	<p>Unit 3 Area of Study 2 (principles of homeostasis are part of coordination and regulation)</p> <p>Unit 3 Area of Study 2 (part of coordination and regulation)</p> <p>Unit 3 Area of Study 2 (the stimulus response model as part of detecting ‘self’ and ‘non-self’)</p> <p>Unit 3 Area of Study 2 (part of coordination and regulation)</p>

UNIT 3	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
	<ul style="list-style-type: none"> • control mechanisms and adaptations involved in water balance and the regulation of body temperature and blood glucose in animals • the ways in which modern technology contributes to homeostasis • hormonal control of plant responses • regulation in plants of water balance and carbon dioxide supply • experimental methods used to investigate the response of organisms to changing conditions <p><i>Key skills</i></p> <ul style="list-style-type: none"> • compare the structures and actions of the nervous and hormonal systems in homeostasis 	<p>Unit 2 Area of Study 1</p> <p>No longer included</p> <p>Unit 2 Area of Study 1 (as plant tropism) Unit 3 Area of Study 2 (as part of chemical communication)</p> <p>Unit 1 Area of Study 2 (as part of common requirements of living things) Unit 2 Area of Study 2 (as part of cycling of matter)</p> <p>Unit 3 Area of Study 2 (example of an assessment task)</p> <p><i>New key knowledge</i></p> <ul style="list-style-type: none"> • cell membranes, signalling molecules and signal transduction <p>Unit 3 Area of Study 2 (note nervous and endocrine systems)</p>

UNIT 3	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
	<ul style="list-style-type: none"> • identify the ways in which organisms detect changing conditions • construct flowcharts illustrating feedback mechanisms • identify and explain adaptations involved in water balance and the regulation of body temperature and blood glucose in animals • model hormonal control of plant responses • predict the effect of maintaining water balance in plants on the supply of carbon dioxide 	<p>Unit 3 Area of Study 2</p> <p>Unit 3 Area of Study 2</p> <p>Unit 2 Area of Study 1</p> <p>Unit 2 Area of Study 1 (as plant trophisms)</p> <p>Unit 1 Area of Study 2 (as part of common requirements of living things) Unit 2 Area of Study 2 (as part of cycling of matter)</p>
Area of Study 3	<p><i>Key knowledge</i></p> <ul style="list-style-type: none"> • characteristics of pathogenic organisms and agents • parasitic infections • aetiology of disease caused by pathogenic organisms and agents • defence mechanisms of plants • defence mechanisms in animals • non-specific and specific immunity in humans 	<p>Unit 3 Area of Study 2</p> <p>Unit 3 Area of Study 2 (as physical and chemical barriers to infection in plants and animals)</p> <p>Unit 3 Area of Study 2 (as physical and chemical barriers to infection in plants and animals)</p> <p>Unit 3 Area of Study 2 (as the details of cellular and chemical components of the immune response)</p>

UNIT 3	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
	<ul style="list-style-type: none"> • experimental methods used to investigate disease and defence against disease <p><i>Key skills</i></p> <ul style="list-style-type: none"> • identify characteristics of pathogenic organisms and agents • synthesise ideas about the mechanisms by which organisms defend themselves against pathogenic organisms and agents 	<p>Unit 3 Area of Study 2 (as part of vaccine technologies)</p> <p>Unit 3 Area of Study 2 (as part of cellular and non-cellular agents)</p> <p>Unit 3 Area of Study 2</p>
UNIT 4	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
Area of Study 1	<p><i>Key knowledge</i></p> <ul style="list-style-type: none"> • DNA structure and replication • the genetic code and protein synthesis • chromosomes, genes, alleles • mutations 	<p>Unit 3 Area of Study 1 (structure and general function of DNA and RNA)</p> <p>Unit 4 Area of Study 1 (DNA replication in the context of the cell cycle)</p> <p>Unit 4 Area of Study 1 (gene expression: details of transcription and translation)</p> <p>Unit 3 Area of Study 1 (synthesis of biomacromolecules: proteins)</p> <p>Unit 4 Area of Study 1</p>

UNIT 4	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
	<ul style="list-style-type: none"> mitosis and meiosis 	Unit 1 Area of Study 2 (for mitosis) Unit 4 Area of Study 1 (for meiosis)
	<ul style="list-style-type: none"> genotype and phenotype environmental influences on phenotype 	Unit 4 Area of Study 1
	<ul style="list-style-type: none"> inheritance at one gene locus and two gene loci 	Unit 4 Area of Study 1 (as one or two genes carried on different pairs of chromosomes)
	<ul style="list-style-type: none"> variation 	Unit 4 Area of Study 1
	<ul style="list-style-type: none"> gene technology (manipulation of genetic material), for example, role of reverse transcriptase, endonucleases, DNA ligases, vectors, polymerase chain reaction (PCR) 	Unit 4 Area of Study 1 (with specific applications to be studied)
	<ul style="list-style-type: none"> applications of gene technology 	Unit 4 Areas of Study 1 and 2
	<ul style="list-style-type: none"> an introduction to social, ethical, legal and economic implications of gene technology 	Included in set of key skills (refer to page 12 of study design)
	<ul style="list-style-type: none"> experimental methods used to investigate mechanisms and patterns of inheritance in organisms 	Example of an assessment task for Unit 4 Outcome 1, Task 1 related to genetic crosses
	<p><i>Key skills</i></p>	
	<ul style="list-style-type: none"> investigate DNA structure and replication 	Unit 3 Area of Study 1 (structure and function of DNA and RNA) Unit 4 Area of Study 1 (principal events in replication)

UNIT 4	2000–2005 STUDY DESIGN	2006–2014 STUDY DESIGN
	<ul style="list-style-type: none"> model mitosis and meiosis 	Unit 1 Area of Study 2 (for mitosis) Unit 4 Area of Study 1 (for meiosis)
Area of Study 2	<p><i>Key knowledge</i></p> <ul style="list-style-type: none"> the causes of variation between individuals factors affecting allele frequencies within a gene pool adaptations selection pressures and natural selection speciation, extinction evidence of evolution divergent, convergent and parallel evolution homind evolution effects of human activity on evolutionary processes methods used to investigate variation, natural selection and evolution <p><i>Key skills</i></p> <ul style="list-style-type: none"> compare divergent, convergent and parallel evolution 	Unit 4 Area of Study 2 Unit 2 Area of Study 1 Unit 4 Area of Study 2 Unit 4 Area of Study 2 (only divergent and convergent patterns of evolution) Unit 4 Area of Study 2 (as patterns and origins) Unit 4 Area of Study 2 has been extended to include the impact of cultural and technological change Unit 4 Area of Study 2 Unit 4 Area of Study 2 (only divergent and convergent patterns of evolution)