



Biology Levels 2-3

Overview and Key Features

Years 9 to 12 Learning 2020



The purpose of this paper

The purpose of this paper is to provide information about the overview and key features of the proposed *Biology Levels 2-3*.

It is designed to enable all interested stakeholders to reflect and provide feedback on key features including learning outcomes, structure, sequencing and likely content. This feedback will be considered in writing the draft course.

Consultation

Throughout the course development process there will be four opportunities for formal stakeholder consultation:

- Course Scope
- Structural Overview and Key features (Nov/Dec 2020)
- Initial Draft Course (March 2021)
- Final Draft Course (June 2021)

This paper represents the second of four course consultation points for teachers to engage in the course development process for *Biology Level 2-3*.

Course Rationale

Australian, regional and global communities rely on the biological sciences to understand, address and successfully manage environmental, health and sustainability challenges facing society in the twenty-first century. These include the biosecurity and resilience of ecosystems, the health and wellbeing of humans and other organisms and their populations, and the sustainability of biological resources. Students use their understanding of the interconnectedness of biological systems when evaluating both the impact of human activity and the strategies proposed to address major biological challenges now and in the future in local, national and global contexts.

The Biology suite of courses explores ways in which scientists work collaboratively and individually in a range of integrated fields to increase understanding of an ever-expanding body of biological knowledge. Students develop their investigative, analytical and communication skills through field, laboratory and research investigations of living systems and through critical evaluation of the development, ethics, applications and influences of contemporary biological knowledge in a range of contexts.

Understanding of biological concepts, as well as general science knowledge and skills, is relevant to a range of careers, including those in the medical, veterinary, food and marine sciences, agriculture, biotechnology, environmental rehabilitation, biosecurity, quarantine, conservation and eco-tourism. This course will also provide a foundation for students to critically consider, and to make informed decisions about, contemporary biological issues in their everyday lives.

Years 9 to 12 Curriculum Framework

[Years 9 to 12 Education Framework](#) informs the design of *Biology Level 2-3* course and it fits within the Discipline-based Study focus area of the [Years 9 to 12 Curriculum Framework](#).

Pathways in

The proposed *Biology Levels 2-3* has a clear pathway from Australian Curriculum Science F-10 and other TASC Science as well as some TASC HaSS, HPE, Technologies and Mathematics courses.





Level 2

Learning Outcomes

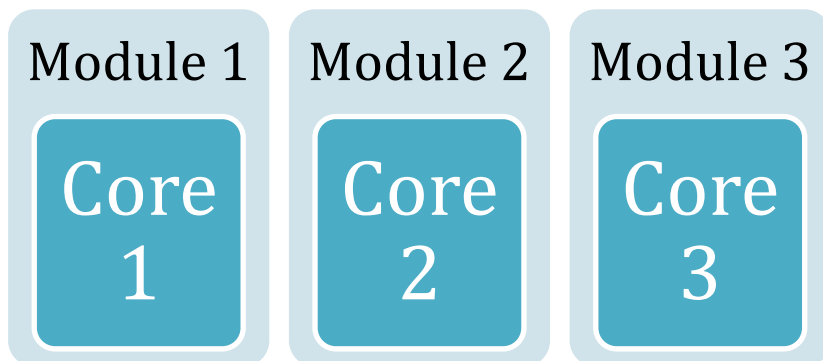
On successful completion of this course learners will be able to:

- undertake and complete scientific activities and tasks (including practical tasks) individually and as a group
- inquire into biological systems, using practical skills and techniques, safely utilising equipment, collecting data and finding trends and patterns to draw valid conclusions
- collect, process, organise and communicate biological data and information following accepted conventions
- describe how biological knowledge has developed over time and continues to develop; a wide range of applications of biology and how biological knowledge influences society in local, regional and global contexts
- describe biodiversity and apply concepts used to represent and understand it such as classification, morphology, and biotic and abiotic interactions
- describe and utilise ecosystem dynamics, how basic biological systems interact and are interrelated; the flow of matter and energy through and between these systems; and processes by which they persist and change
- describe and utilise basic biological concepts, theories and models of biochemical and cellular processes that support life; in particular, within the context of biotechnology and genetics
- describe and utilise basic biological concepts, theories and models for cells, systems and multicellular organisms.

Course Structure

Two Options are described below, Model 2A is one possible approach, Model 2B is an alternative.

Model 2A



Modules Available

Core 1: Cells and multicellular organisms

Core 2: Multicellular organisms and biodiversity

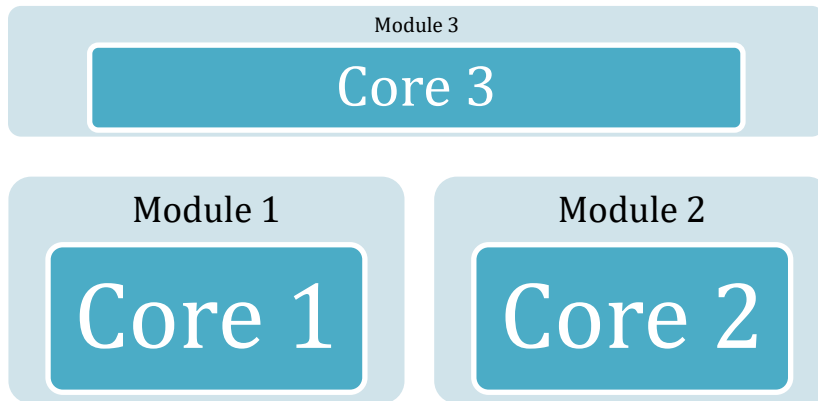
Core 3: Biodiversity and ecosystem dynamics

Course Delivery

To be developed through consultation.



Model 2B



Modules Available

Core 1: Cells and multicellular organisms

Core 2: Biodiversity and ecosystem dynamics

Core 3: Science inquiry and science as a human endeavour

Course Delivery

To be developed through consultation.

Module content

Model 2A	Model 2B
<p>Module 1</p> <ul style="list-style-type: none"> • science as a human endeavour <ul style="list-style-type: none"> ○ practical and research and applied to module content • science inquiry skills <ul style="list-style-type: none"> ○ inquiry cycles applied to module content • cells as the basis of life (introductory) <ul style="list-style-type: none"> ○ material input/output ○ biochemical processes in the cell ○ DNA, genes and gene expression • multicellular organisms <ul style="list-style-type: none"> ○ structural organisation <p>Module 2</p> <ul style="list-style-type: none"> • science as a human endeavour <ul style="list-style-type: none"> ○ practical and research and applied to module content • science inquiry skills <ul style="list-style-type: none"> ○ inquiry cycles applied to module content • multicellular organisms (cont.) <ul style="list-style-type: none"> ○ circulatory, respiratory and digestive systems in animals ○ gas exchange and transport mechanisms within plants • describing biodiversity <ul style="list-style-type: none"> ○ classification of species, environments and environmental factors ○ feeding relationships <p>Module 3</p> <ul style="list-style-type: none"> • science as a human endeavour <ul style="list-style-type: none"> ○ practical and research and applied to module content ○ themed approach to biotechnology • science inquiry skills <ul style="list-style-type: none"> ○ inquiry cycles applied to module content ○ themed approach to biotechnology • describing biodiversity (cont.) <ul style="list-style-type: none"> ○ definitions of diversity • ecosystem dynamics <ul style="list-style-type: none"> ○ energy flow ○ cycling of matter ○ ecosystems and change over time 	<p>Module 1</p> <ul style="list-style-type: none"> • cells as the basis of life (introductory) <ul style="list-style-type: none"> ○ material input/output ○ biochemical processes in the cell ○ DNA, genes and gene expression • multicellular organisms <ul style="list-style-type: none"> ○ structural organisation ○ circulatory, respiratory and digestive systems in animals ○ gas exchange and transport mechanisms within plants <p>Module 2</p> <ul style="list-style-type: none"> • describing biodiversity <ul style="list-style-type: none"> ○ classification of species, environments and environmental factors ○ feeding relationships ○ definitions of diversity • ecosystem dynamics <ul style="list-style-type: none"> ○ energy flow ○ cycling of matter ○ ecosystems and change over time <p>Module 3</p> <ul style="list-style-type: none"> • science as a human endeavour <ul style="list-style-type: none"> ○ practical and research applied to course content ○ themed approach to biotechnology • science inquiry skills <ul style="list-style-type: none"> ○ inquiry cycles applied to course content ○ themed approach to biotechnology



Level 3

Learning Outcomes

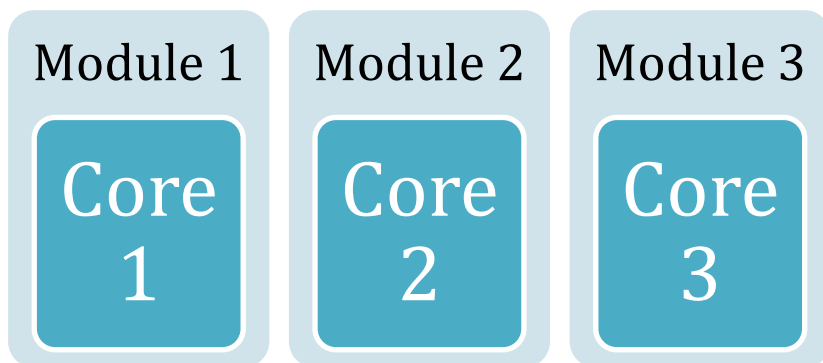
On successful completion of this course learners will be able to:

- develop, conduct, interpret and evaluate the progress of scientific activities and tasks (including experiments) individually and as a group
- apply biological concepts and practical skills, safely using equipment, collecting and interpreting biological data and information to support valid conclusions and predictions
- communicate, predict and explain biological phenomena, using qualitative and quantitative representations in appropriate modes and genres, and following accepted conventions and terminology
- connect, through research and practical experiments, how biological knowledge has developed over time and continues to develop with wide range of applications; and how biological knowledge influences society in local, regional and global contexts
- apply concepts related to DNA, genes and the continuity of life (including biochemistry and cellular processes) to interpret observations and processes
- apply concepts related to continuity of life on Earth to interpret observations and processes
- apply concepts related to homeostasis (including biochemistry and cellular processes) to interpret observations and processes
- apply concepts related to infectious diseases (including biochemistry and cellular processes) to interpret observations and processes

Course Structure

Two Options are described below, Model 3A is one possible approach, Model 3B is an alternative.

Model 3A



Modules Available

Core 1: DNA, genes and continuity of life

Core 2: Continuity of life on Earth and homeostasis

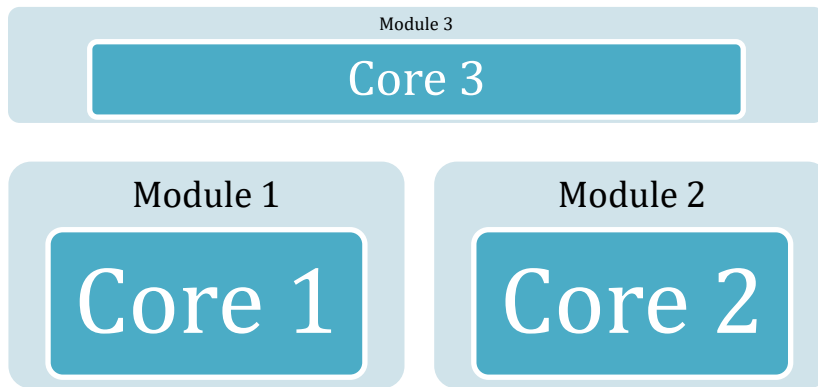
Core 3: Homeostasis and infectious disease

Course Delivery (3A)

To be developed through consultation.



Model 3B



Modules Available

Core 1: DNA, genes and continuity of life

Core 2: Homeostasis and infectious disease

Core 3: Science inquiry and science as a human endeavour

Course Delivery Model 3B

To be developed through consultation.

Module content

Module 3A	Module 3B
<p>Module 1</p> <ul style="list-style-type: none"> • science as a human endeavour <ul style="list-style-type: none"> ○ practical and research and applied to module content • science inquiry skills <ul style="list-style-type: none"> ○ inquiry cycles applied to module content • cells as the basis of life (extension) <ul style="list-style-type: none"> ○ cell differentiation and structural changes during growth • DNA, genes and the continuity of life <ul style="list-style-type: none"> ○ gene expression and regulation ○ cell structure and function ○ continuity of life • continuity of life on Earth <ul style="list-style-type: none"> ○ genetic factors and mechanisms <p>Module 2</p> <ul style="list-style-type: none"> • science as a human endeavour <ul style="list-style-type: none"> ○ practical and research and applied to module content • science inquiry skills <ul style="list-style-type: none"> ○ inquiry cycles applied to module content • continuity of life on Earth (cont.) <ul style="list-style-type: none"> ○ geographic, environmental, and population pressures ○ natural selection • homeostasis (incl. cell structure and function) <ul style="list-style-type: none"> ○ nervous system ○ endocrine system <p>Module 3</p> <ul style="list-style-type: none"> • science as a human endeavour <ul style="list-style-type: none"> ○ practical and research and applied to module content • science inquiry skills <ul style="list-style-type: none"> ○ inquiry cycles applied to module content • homeostasis (cont.) <ul style="list-style-type: none"> ○ stimulus response model – negative feedback • infectious disease (incl. cell structure and function) <ul style="list-style-type: none"> ○ organisms that cause disease ○ lymphatic system ○ lines of defence inside the body ○ passive or active immunity ○ how disease spreads 	<p>Module 1</p> <ul style="list-style-type: none"> • cells as the basis of life (extension) <ul style="list-style-type: none"> ○ cell differentiation and structural changes during growth ○ structure and function related to body systems in remainder of the course • DNA, genes and the continuity of life <ul style="list-style-type: none"> ○ gene expression ○ gene regulation ○ continuity of life • continuity of life on earth <ul style="list-style-type: none"> ○ genetic factors and mechanisms ○ geographic, environmental, and population pressures ○ natural selection <p>Module 2</p> <ul style="list-style-type: none"> • homeostasis <ul style="list-style-type: none"> ○ nervous system ○ endocrine system ○ stimulus response model – negative feedback • infectious disease <ul style="list-style-type: none"> ○ organisms that cause disease ○ lymphatic system ○ lines of defence inside the body ○ passive or active immunity ○ how disease spreads <p>Module 3</p> <ul style="list-style-type: none"> • science as a human endeavour <ul style="list-style-type: none"> ○ practical and research applied to course content • science inquiry skills <ul style="list-style-type: none"> ○ inquiry cycles applied to course content

Relationship to possible Future Provision

Focus Area	P	I	2	3	4
DISCIPLINE-BASED			Biology Physical Sciences		
TRANSDISCIPLINARY			Transdisciplinary Science Environmental Science		
PROFESSIONAL STUDIES					Chemistry Physics
WORK-BASED					
PERSONAL FUTURES	Science	Introductory Science			

Note: Subject to ongoing accreditation considerations in line with the Accreditation Framework