

Biology 201
Koiora 201

Course Information

Biology
is **Life**

2016

Course Aim / Description

To provide an interesting course that can provide the knowledge required for continuation at Level 3 NCEA. In Biology 201 we will be offering 26 Credits at NCEA level 2. The minimum requirement for entry into Level 3 Biology is **14 credits at Level 2 Biology AND Passing at least one External.**

INTERNAL assessments include:

- | | | |
|-------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------|
| AS 91153 (2.1) | Carry out a practical investigation in a biological context. | 4 credits assessed by practical |
| AS 91155 (2.3) | Demonstrate understanding of adaptation of plants or animals to their way of life. | 3 credits assessed by class test |
| AS 91160 (2.8) | Investigate biological material at the microscope level. | 3 credits assessed by practical |
| AS 91190 (2.4)
<i>(optional)</i> | Investigate how organisms survive in an extreme environment | 4 credits assessed by independent research and write up |

Resubmissions available for Internal Assessments according to NZQA policy. A Further assessment opportunity will be offered where practicable.

EXTERNAL Assessments include:

- | | | |
|----------------|--------------------------------------------------------------------|-----------|
| AS 91156 (2.4) | Demonstrate understanding of life processes at the cellular level. | 4 credits |
| AS 91157 (2.5) | Demonstrate understanding of genetic variation and change. | 4 credits |
| AS 91159 (2.7) | Demonstrate understanding of gene expression. | 4 credits |

Standards that contribute to Level 1 Literacy and Numeracy

The Biology 2.3 (Adaptations), Biology 2.4 (Cells), Biology 2.5 (Genetic Variation) and Biology 2.7 (Gene expression) standards each contribute credits to Level 1 Literacy. The Biology 2.1 (Biology practical) standard contributes 4 credits towards Level 1 Numeracy.

KAPITI COLLEGE ASSESSMENT STATEMENT 2016
Biology 201

One week before each assessment you will be told

- * what learning outcomes will be assessed
- * how they will be assessed
- * how the assessment contributes towards your report.

Student to enter
Achieved (A), Merit
(M), Excellence (E) or
Not Achieved (NA)

Term	Week	Date	Achievement / Unit Task	Int/Ext	Credits
1	0				
	1				
	2				
	3				
	4				
	5		2.3 Assessment of animal nutrition	INT	3
	6				
	7				
	8				
	9		2.8 Microscope	INT	3
	10				
11					

2	1				
	2				
	3				
	4		Practise assessment for 2.4 cell processes	EXT	4
	5				
	6				
	7				
	8		2.1 Practical investigation	INT	4
	9				
	10				

3	1		2.4 Extreme environment (optional)	INT	4
	2				
	3				
	4		School Exams include 2.7 and 2.4		
	5				
	6				
	7				
	8				
	9		Practise test for 2.5 Genetics	EXT	4

4	1		Revision		
	2		Revision		
	3		Revision		
	4		Revision		

Refer to the Kapiti College NCEA Policy and Procedure file for assessment procedures including missed assessments and appeals.

Resubmissions available for Internal Assessments according to NZQA policy.

A Further assessment opportunity will be offered where practicable.

Authenticity: All assessed work is done individually under standard assessment conditions.

Biology 201 Standards - 2016

Conditions of Assessment and other resources related to any of the internal achievement standards can be found at <http://ncea.tki.org.nz/Resources-for-Internally-Assessed-Achievement-Standards>.

Assessment Specifications and other resources related to any of the external achievement standards can be accessed through the Science Resources page found at www.nzqa.govt.nz/ncea/resources.

Following is an outline of what is required in each of the available Achievement Standards.

Achievement Standard 91153 V2

Subject Reference		Biology 2.1			
Title		Carry out a practical investigation in a biology context, with supervision			
Level	2	Credits	4	Assessment	Internal
Subfield	Science				
Domain	Biology				
Status		Registered	Status date		17 November 2011
Planned review date		31 December 2018	Date version published		20 November 2014

This achievement standard involves carrying out a practical investigation in a biology context, with supervision.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> Carry out a practical investigation in a biology context, with supervision. 	<ul style="list-style-type: none"> Carry out an in-depth practical investigation in a biology context, with supervision. 	<ul style="list-style-type: none"> Carry out a comprehensive practical investigation in a biology context, with supervision.

Explanatory Notes

- 1 *Carry out a practical investigation* involves:
 - developing a statement of the purpose written as a hypothesis linked to a scientific concept or idea
 - using a method that describes:
 - for a fair test: a range for the independent variable, the measurement of the dependent variable and the control of some other key variables
 - for a pattern seeking or modelling activity: the data that will be collected, range of data/samples, and consideration of some other key factors
 - collecting, recording, and processing data relevant to the purpose of the investigation
 - interpreting and reporting on the findings
 - reaching a conclusion based on the student's processed data which is relevant to the purpose of the investigation
 - identifying and including relevant findings from another source.

Carry out an *in-depth practical investigation* involves:

- using a method that describes:
 - for a fair test: a valid range for the independent variable, the valid measurement of the dependent variable and the control of other key variables with consideration of factors such as sampling bias and sources of errors
 - for a pattern seeking or modelling activity: a valid collection of data with consideration of factors such as sampling bias and sources of errors
- collecting, recording, and processing data which enables a trend or pattern (or the absence of a trend or pattern) to be determined
- reaching a valid conclusion based on the student's processed data which is relevant to the purpose of the investigation
- a discussion of the biological ideas relating to the investigation that is based on the student's findings and those from other source(s).

Carry out a *comprehensive practical investigation* involves justification of the choices made during the sound investigation, ie evaluating the validity of the method or reliability of the data and explaining the conclusion in terms of the biology ideas relevant to the investigation.

- 2 A *practical investigation* is an activity covering the complete investigation process: planning and carrying out the investigation, collecting primary data, processing and interpreting data, and reporting on the investigation. Students may make changes to their initial method as they work through the investigation.
- 3 Assessment against this standard may be based on a stand-alone or an individual investigation that can contribute findings to a larger group or class investigation. In a group or class investigation, individual findings may be discussed and individual students may interpret their own findings in the light of other students' investigations and findings. Findings from outside the group or class such as published information or historical findings relevant to the investigation may also be used.
- 4 The nature of the investigation could be the manipulation of variables (fair test), the investigation of a pattern or relationship or the use of models.
- 5 It is intended that this investigation be carried out with supervision. This means that the teacher provides guidelines for the investigation such as the context for the investigation, instructions that specify the requirements for a comprehensive investigation, and broad experimental conditions such as the availability of equipment or chemicals. Students then develop and complete the investigation from the initial guidelines given by the teacher. Supervision may involve discussion between teachers and individual students in order to clarify the students' ideas and may also involve teachers managing the process of sharing findings.

Achievement Standard 91155 V2

Subject Reference		Biology 2.3			
Title		Demonstrate understanding of adaptation of plants or animals to their way of life			
Level	2	Credits	3	Assessment	Internal
Subfield	Science				
Domain	Biology				
Status		Registered	Status date		17 November 2011
Planned review date		31 December 2018	Date version published		20 November 2014

This achievement standard involves demonstrating understanding of adaptation of plants or animals to their way of life.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> Demonstrate understanding of adaptation of plants or animals to their way of life. 	<ul style="list-style-type: none"> Demonstrate in-depth understanding of adaptation of plants or animals to their way of life 	<ul style="list-style-type: none"> Demonstrate comprehensive understanding of adaptation of plants or animals to their way of life.

Explanatory Notes

- 1 *Demonstrate understanding* involves describing the adaptations and identifying the aspects of the adaptations that enable each organism to carry out its life process(es) in order to survive in its habitat.

Demonstrate in-depth understanding involves providing a biological reason that explains how or why the adaptations enable each organism to carry out its life process(es) in order to survive in its habitat.

Demonstrate comprehensive understanding involves showing understanding by linking several biological ideas. The linking of ideas may involve justifying, evaluating, comparing and contrasting, or analysing, and must include consideration of the two points from below appropriate to the chosen context.

In the context of *understanding of adaptation* related to one life process over three taxonomic or functional groups of multi-cellular plants or animals:

- comparing diversity of adaptation in response to the same demand across different taxonomic or functional groups
- limitations and advantages involved in each feature within each organism

In the context of *understanding of adaptation* across two related life processes within one taxonomic or functional group:

- connections between two life processes within each organism which enhance the effectiveness of both processes
- limitations and advantages involved in each feature within each organism.

- 2 *Understanding of adaptation* is demonstrated in relation to one life process over three taxonomic or functional groups of multi-cellular plants or animals, or across two related life processes within one taxonomic or functional group.

- 3 *Adaptation* involves the range of ways in which organisms have developed strategies to carry out the life processes. An adaptation refers to a feature and its function as it enables an organism to carry out a life process and thus occupy a specific ecological niche. It may include structural, behavioural, or physiological features of an organism. An adaptation provides an advantage for the organism in its specific habitat and ecological niche.

- 4 Way of life encompasses the ways in which an organism carries out all its life processes. It includes:

- relationships with other organisms – competition, predation, parasitism, mutualism
- reproductive strategies
- adaptations to the physical habitat.

- 5 Life processes are selected from:

- internal transport
- gas exchange
- transpiration
- nutrition
- excretion

- support and movement
- sensitivity and co-ordination
- reproduction.

Achievement Standard 91156 V2

Subject Reference		Biology 2.4			
Title		Demonstrate understanding of life processes at the cellular level			
Level	2	Credits	4	Assessment	External
Subfield	Science				
Domain	Biology				
Status		Registered	Status date		17 November 2011
Planned review date		31 December 2018	Date version published		20 November 2014

This achievement standard involves demonstrating understanding of life processes at the cellular level.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> • Demonstrate understanding of life processes at the cellular level. 	<ul style="list-style-type: none"> • Demonstrate in-depth understanding of life processes at the cellular level. 	<ul style="list-style-type: none"> • Demonstrate comprehensive understanding of life processes at the cellular level.

Explanatory Notes

1. *Demonstrate understanding* involves defining, using annotated diagrams or models to describe, and describing characteristics of, or providing an account of, life processes at the cellular level. *Demonstrate in-depth understanding* involves using biological ideas to give reasons how or why life processes occur at the cellular level. *Demonstrate comprehensive understanding* involves linking biological ideas about life processes at the cellular level. The discussion of ideas may involve justifying, relating, evaluating, comparing and contrasting, analysing.
2. *Life processes at the cellular level* include:
 - photosynthesis
 - respiration
 - cell division (DNA replication and mitosis as part of the cell cycle).
3. Biological ideas, as they relate to each of the life processes at the cellular level, are selected from:
 - movement of materials (including diffusion, osmosis, active transport)
 - enzyme activity (specific names of enzymes are not required)
 - factors affecting the process
 - details of the processes only as they relate to the overall functioning of the cell (specific names of stages are not required)
 - reasons for similarities and differences between cells such as cell size and shape, and type and number of organelles present.
4. Cells include plant cells and animal cells.

Achievement Standard 91190 V2

Subject Reference		Earth and Space Science 2.4			
Title		Investigate how organisms survive in an extreme environment			
Level	2	Credits	4	Assessment	Internal
Subfield	Science				
Domain	Earth and Space Science				
Status		Registered	Status date		17 November 2011
Planned review date		31 December 2018	Date version published		20 November 2014

This achievement standard involves investigating how organisms survive in an extreme environment.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> Investigate how organisms survive in an extreme environment. 	<ul style="list-style-type: none"> Investigate in depth how organisms survive in an extreme environment. 	<ul style="list-style-type: none"> Investigate comprehensively how organisms survive in an extreme environment.

Explanatory Notes

1 *Investigate* involves:

- selecting and processing information
- using the processed information:
 - describing why the conditions of the extreme environment require special biological adaptations or technological modifications for survival
 - describing how the biological adaptations or technological modifications allow the organism(s) to survive in the extreme environment
- recording sources of information used in a traceable format.

Investigate in depth is further developed by:

- selecting and processing information that provides links between conditions of the extreme environment and biological adaptations or technological modifications
- explaining, using the processed information, how the biological adaptations or technological modifications allow the organism(s) to survive the conditions of the extreme environment.

Investigate comprehensively is further developed by:

- selecting and processing information that provides integrated links between conditions of the extreme environment and biological adaptations or technological modifications
- justifying, using the processed information, how the biological adaptations or technological modifications allow the organism(s) to survive the conditions of the extreme environment.

2 *Organisms* can be the same or different species including humans.

3 *An extreme environment* can be selected from, but is not restricted to: outer space, deep oceans, deep sea trenches, extremes of temperature or salinity, anaerobic conditions, excess exposure to radiation or toxic chemicals, geothermal vents.

Achievement Standard 91157 V2

Subject Reference		Biology 2.5			
Title		Demonstrate understanding of genetic variation and change			
Level	2	Credits	4	Assessment	External
Subfield	Science				
Domain	Biology				
Status		Registered	Status date		17 November 2011
Planned review date		31 December 2018	Date version published		20 November 2014

This achievement standard involves demonstrating understanding of genetic variation and change.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> Demonstrate understanding of genetic variation and change. 	<ul style="list-style-type: none"> Demonstrate in-depth understanding of genetic variation and change. 	<ul style="list-style-type: none"> Demonstrate comprehensive understanding of genetic variation and change.

Explanatory Notes

- 1** *Demonstrate understanding* involves defining, using annotated diagrams or models to describe, and describing characteristics of, or providing an account of, genetic variation and change.

Demonstrate in-depth understanding involves providing reasons as to how or why genetic variation and change occurs.

Demonstrate comprehensive understanding involves linking biological ideas about genetic variation and change. The discussion of ideas may involve justifying, relating, evaluating, comparing and contrasting, or analysing.

- 2** *Genetic variation and change* involves the following concepts:
- sources of variation within a gene pool
 - factors that cause changes to the allele frequency in a gene pool.
- 3** Biological ideas and processes relating to sources of variation within a gene pool are selected from:
- mutation as a source of new alleles
 - independent assortment, segregation and crossing over during meiosis
 - monohybrid inheritance to show the effect of co-dominance, incomplete dominance, lethal alleles, and multiple alleles
 - dihybrid inheritance with complete dominance
 - the effect of crossing over and linked genes on dihybrid inheritance.
- 4** Biological ideas and processes relating to factors affecting allele frequencies in a gene pool are selected from:
- natural selection
 - migration
 - genetic drift.

Achievement Standard 91159 V2

Subject Reference		Biology 2.7			
Title		Demonstrate understanding of gene expression			
Level	2	Credits	4	Assessment	External
Subfield	Science				
Domain	Biology				
Status		Registered	Status date		17 November 2011
Planned review date		31 December 2018	Date version published		20 November 2014

This achievement standard involves demonstrating understanding of gene expression.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> Demonstrate understanding of gene expression. 	<ul style="list-style-type: none"> Demonstrate in-depth understanding of gene expression. 	<ul style="list-style-type: none"> Demonstrate comprehensive understanding of gene expression.

Explanatory Notes

1. *Demonstrate understanding* involves defining, using annotated diagrams or models to explain, and giving characteristics of, or an account of, gene expression.

Demonstrate in-depth understanding involves providing a reason as to how or why biological ideas and processes affect gene expression.

Demonstrate comprehensive understanding involves linking biological ideas and processes about gene expression. The explanation may involve justifying, relating, evaluating, comparing and contrasting, or analysing.

2. *Gene expression* involves a selection from the following biological ideas and processes:
 - nucleic acid structure and nature of the genetic code
 - significance of proteins
 - protein synthesis
 - the determination of phenotype via metabolic pathways
 - effect of environment on genotype through mutations
 - effect of environment on expression of phenotype.
3. Biological ideas and processes relating to nucleic acid structure and nature of the genetic code are selected from:
 - molecular components and their role in carrying the genetic code: nucleotide monomers, deoxyribose and/or ribose sugar, phosphate, nitrogenous bases, complementary base pairing resulting in coding and template strand
 - nature of the genetic code including triplets, codons and anticodons
 - redundancy due to degeneracy within the code.
4. Biological ideas and processes relating to the significance of proteins are selected from:
 - proteins as the products of gene expression: DNA → mRNA → polypeptide or protein
 - identification of one gene → one polypeptide relationship
 - significance of proteins is limited to their structural and catalytic role in living things.

5. Biological ideas and processes relating to protein synthesis are selected from:
 - the role of DNA sequence in determining the structure of a protein and how that protein is produced (transcription and translation)
 - the role of enzymes in controlling the process (specific names of enzymes are not required).
6. Biological ideas and processes relating to the determination of phenotype via metabolic pathways are selected from:
 - biochemical reactions are catalysed by specific enzymes and every enzyme is coded for by a specific gene(s)
 - biochemical reactions do not occur in isolation but form part of a chain reaction so that the product of one becomes the substrate of another step in metabolism
 - phenotype is determined by the presence, absence, or amount of specific metabolic products.
7. Biological ideas and processes relating to the effect of the environment on genotype through mutations are selected from:
 - mutagens (specific mutagens are recognised but their effect at molecular level is not required)
 - the potential effect on genotype and phenotype of gene mutations at the gene level.
8. Biological ideas and processes relating to the effect of environment on expression of phenotype involve ways that environmental factors may change phenotype without changing genotype.

Achievement Standard 91160 V2

Subject Reference		Biology 2.8			
Title		Investigate biological material at the microscopic level			
Level	2	Credits	3	Assessment	Internal
Subfield	Science				
Domain	Biology				
Status		Registered	Status date		17 November 2011
Planned review date		31 December 2018	Date version published		20 November 2014

This achievement standard involves investigating biological material at the microscopic level.

Achievement Criteria

Achievement	Achievement with Merit
<ul style="list-style-type: none"> • Investigate biological material at the microscopic level. 	<ul style="list-style-type: none"> • Investigate in-depth biological material at the microscopic level.

Explanatory Notes

1 *Carry out an investigation* involves:

- preparing biological material for viewing under a light microscope
- viewing biological material using a light microscope to enable detail of cell structures and components to be determined
- recording observations of biological material in biological drawings
- identifying observed specialised features and relating them to the function of the cells or tissues.

Investigate in-depth involves:

- giving reasons for how or why observed specialised features enable the cells to effectively carry out their specific function(s).

- 2** *Biological material for viewing* includes two different plant tissues and one unicellular organism.
- 3** To allow an accurate drawing to be produced, preparation of material may include: staining, use of cavity slides, use of cellulose, epidermal tear, cutting sections.
- 4** A biological drawing follows the accepted conventions to record observations consistent with the biological material being viewed. Consistency of observations with the biological material used must include recognisable shape and proportions and inclusion of typical organelles present in a cell, appropriate to the magnification. At the Achieved grade, the biological drawing may contain some errors in applying conventions or minor inaccuracies in representation. At the Merit grade the biological drawing may contain some minor errors as long as they do not affect the accuracy of the representation of the biological material being viewed.
- 5** Specialised features may include: arrangement of cells or cell types within a tissue, shape of a cell, presence or absence of a specific organelle, quantity or distribution of organelles within a cell. Notes about the specialised features may accompany the biological drawing (eg a fully annotated diagram).
- 6** Relating observed specialised features to the function of the cell or tissue must include: identifying the feature or organelle, stating its function, and giving reasons for why or how it contributes to the function of the cell or tissue.