



## Work Program

# Senior Biology

2004 Syllabus

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## 4. COURSE ORGANISATION

### 1. Course Organisation (see following pages) indicating:

- the sequence and time allocation in hours of the context-based units of work (minimum 55 hours per semester, including assessment)
- the general objectives, manipulative skills, key concepts and key ideas covered in each context

### 2. Assessment Plan

- a summary of Aviation High's assessment program indicating the following:
  - the tasks used to gather information about students' achievement
  - the task types (EEI, ERT, WT)
  - the timing and conditions (duration, supervision details, etc.) for each task.

### 3. General Objectives:

Each of the units of study will address at least two key concepts and a number of key ideas. The general objectives of understanding, investigating and evaluating biological ideas are covered in teaching topics in the unit of study and assessed within the framework of the alternate formats of in class Writing Tasks (WT), or through out of class activities in Extended Response (ER) or an Extended Experimental Investigation (EEI) format that will include some continuous and significant in class authentication components.

### 4. Field Studies:

A minimum of 10 hours of field studies will be included in the program of which at least 5 hours will be conducted in a natural environment.

## WORK PROGRAM TOPIC OVERVIEW

Semester	Task	Unit	Assessment Category	Key Concepts assessed	Criteria			Mode of assessment
					UB	IB	EBI	
A1	1	Cell Biology	<b>EEI 11 WT 12</b>	1, 2, 4, 5, 6.	X	X	X	<b>EEI-</b> Individual investigation and report (4 weeks, 800-1000 words) <b>WT-</b> 2hrs in class - (mainly short response items) supervised
	2	Disease	<b>ER</b>	2, 3, 4, 5.	X	X	X	Yr11 800-1000; Yr12 1000-1500 words Individual research and supervised essay (3 weeks)
	3	Independent Research project	<b>EEI</b>	3, 4, 5.	X	X	X	Yr11 800-1000; Yr12 1000-1500 words Individual investigation and report – multimedia presentation (4 weeks)
A2	4	Genetics	<b>WT</b>	4, 5, 6.	X	X	X	yr11-1.5hrs; yr12-2hrs; in class - (mainly short response items) supervised
	5	Evolution	<b>ER</b>	3, 6.	X	X	X	Yr11 800-1000; Yr12 1000-1500 words Individual written report & oral presentation (3 weeks)
B1	6	Organs and Systems 1	<b>ER</b>	1, 2, 5, 6.	X	X	X	Yr11 800-1000; Yr12 1000-1500 words Individual research and supervised essay (3 weeks)
	7	Organs and Systems 2	<b>WT</b>	1, 2, 5, 6.	X	X	X	yr11-1.5hrs; yr12-2hrs; in class (mainly short response items) – supervised
	8	Reproduction & Physiology	<b>WT</b>	1, 2, 4, 5, 6.	X	X	X	Yr11-1.5hrs; yr12-2hrs; in class - (mainly short response items) supervised
B2	9	Ecology	<b>EEI</b>	3, 4, 5.	X	X	X	Yr11 800-1000; Yr12 1000-1500 words Individual and or group collection of primary field data and analysis – individual report (4 weeks)
	10	Human Impacts	<b>WT</b>	1, 3, 4, 5, 6.	X	X	X	yr11-1.5hrs; yr12-2hrs; in class - (mainly short response items) supervised

**BIOLOGY COURSE SEMESTER OVERVIEW – (HENDRA SECONDARY COLLEGE) AVIATION HIGH**

UNITS / THEMES	UNIT LENGTH (weeks)	KEY CONCEPTS	KEY IDEAS	GENERAL OBJECTIVES			NATURE OF BIOLOGY CH. REF	LEARNING ACTIVITIES	MS	ASSESSMENT ITEMS
				UB	IB	EBI				
SEMESTER 1 A1  1. Cells Biology	10	1, 2, 4, 5, 6.	1, 2, 3, 4, 5.	1, 2.	2, 3, 4.	1, 2, 3, 4.	<b>Yr11</b> 1, 2, 3.  <b>Yr12</b> 1, 2, 3.	Definition of “Living” – class debate Laboratory Microscope work - prepare wet-mount slides and use a microscope to observe specimens teacher explanation of basic photosynthesis and cellular respiration, Energy flow through living systems  Teacher explanation of Fluid membrane Library and www research of the detail of photosynthesis and respiration - Calvin Benson Cycle - Krebs Cycle - Cellular organelle processes	1, 4, 5.	<b>Year 11= Extended Experimental Investigation (Task 1)</b> <b>In class time &amp; own time to conduct experiments and analyse data for write up.</b>  <b>Year 12 = Writing task (Task 1) – in class (mainly short response items)</b> <b>semester test on CELL BIOLOGY</b>
2. Disease  Healthy? Pathogens   Homeostasis Dialysis, +ve and -ve feedback loops, (hormonal controls)	4      4	2, 3, 4, 5.	1, 2, 7, 8, 21.	1, 2, 3.	1, 2, 3, 4, 5.	1, 2, 3, 4.	<b>Yr12</b> 7, 8.    <b>Yr11</b> 10,  <b>Yr12</b> 5, 6.	Collaborative development of physiologies, video, teacher lead dissection Group discussion on the nature of ‘healthy’ Research and manipulate data In class experimental investigation of Microbial techniques Identify personal / global health issues Make decisions about health management strategies Communicate findings Collaborative and teacher explanation Media observation to extract relevant information	3, 4, 5, 6.	<b>Extended response (Task 6)</b> <b>- an individual evaluation of management strategies for a named DISEASE (range of presentation styles available)</b> <b>Yr11 800-1000; Yr12 1000-1500 words</b>

UB = Understanding Biology, IB = Investigating Biology, EBI = Evaluating Biological Ideas

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UNITS / THEMES	UNIT LENGTH (weeks)	KEY CONCEPTS	KEY IDEAS	GENERAL OBJECTIVES			NATURE OF BIOLOGY CH. REF.	LEARNING ACTIVITIES	MS	ASSESSMENT ITEMS
				UB	IB	EBI				
SMESTER A1 3. Independent Research Project	4	3, 4, 5.	1, 2, 3, 4, 5, 6, 7, 10, 11, 17, 23.	1, 2, 3.	2, 3, 4, 5.	1, 2, 3, 4.	Students will plan execute and evaluate an investigation using appropriate equipment to perform experiments that demonstrate biological phenomena, eg. measure the rate of transpiration, demonstrate factors affecting photosynthesis, test food materials for their chemical components.	1, 3, 4, 5, 6.	<b>Extended Experimental Investigation (Task 7) – INDEPENDENT investigative analytic research project including written report and multimedia in-class presentation of findings</b>  <b>Yr11 800-1000; Yr12 1000-1500 words</b>	

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	UNITS / THEMES	UNIT LENGTH (weeks)	KEY CONCEPTS	KEY IDEAS	GENERAL OBJECTIVES			NATURE OF BIOLOGY CH. REF.	LEARNING ACTIVITIES	MS	ASSESSMENT ITEMS
					UB	IB	EBI				
SEMESTER A2	<b>ORIGINS</b>										
	4. Genetics	8	4, 5, 6.	1, 5, 16, 18, 20, 21, 22, 23.	1, 2, 3.	1, 2, 3, 4, 5.	1, 2, 3, 4.	<b>Yr12</b> 9, 10, 11, 13.	In class investigation of dihybrid cross (corn and barley) Teacher explanation of Monohybrid / dihybrid cross Software simulation for ratios and role / function of - Dominance - Base pairs - Crossing over - Linkage (including X) www research for models of - Transcription - Translation - Protein synthesis investigation of genome data from www	4, 5, 6.	<b>Writing task (Task 9) – unit test examining genetic principles and analysing the role of genetics in a range of natural and managed situations (mainly short response items)</b>  Yr11-1.5hrs; yr12-2hrs
	5. Evolution processes, evidence and other issues	3	3, 5, 6.	18, 19, 20, 21, 24, 25	1, 2, 3.	1, 2, 3, 4, 5.	1, 2, 3, 4.	<b>Yr12</b> 13, 15, 16.	Teacher explanation + independent and group work investigations for the comparison of evolutionary theories  Gene pool analysis using models Role of climate change as an evolutionary pressure investigated and communicated to class group through multimedia presentation Library Research into relevant forms of evidence and chronology Alternate theories	5, 6.	<b>Extended response (Task 10) Individual Investigation / research project with written report and oral presentation focussed upon contemporary biological issues</b> Yr11 800-1000; Yr12 1000-1500 words

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**BIOLOGY COURSE SEMESTER OVERVIEW – (HENDRA SECONDARY COLLEGE) AVIATION HIGH**

	UNITS / THEMES	UNIT LENGTH (weeks)	KEY CONCEPTS	KEY IDEAS	GENERAL OBJECTIVES			NATURE OF BIOLOGY CH. REF.	LEARNING ACTIVITIES	MS	ASSESSMENT ITEMS
					UB	IB	EBI				
SEMESTER B1	6. Organs and Systems 1	10	1, 2, 3, 5.	5, 17, 18, 22, 25	1, 2, 3.	3, 4, 5.	1, 2, 4.	Yr11 5, 6, 7, Yr12 5, 6.	Teacher explanation of how nutrients are obtained and distributed by mammalian organisms	1, 4, 5.	<b>Extended Response (Task 1)</b>  <b>An individual evaluation of the dietary issues associated with animals in captivity.</b> Yr11 800-1000; Yr12 1000-1500 words
	Student investigation on the links between diet, nutritional requirements and digestive systems.								Laboratory dissection of specimen material to observe structure and infer function Library independent research into some of the Transplant issues		<b>Writing Task (Task 2)</b>  <b>In class semester exam on physiology and transport systems (mainly short response items)</b> Yr11-1.5hrs; yr12-2hrs
	7. Organs and Systems 2	4	1, 2, 3, 4, 5, 6.	1, 2, 3, 4, 5, 6, 7, 10, 11, 17, 23	1, 2, 3.	2, 3, 4, 5.	1, 2, 3, 4.	Yr11 6, 7, 12.	Modelling of Asexual reproduction processes – mitosis, binary fission, Teacher explanation of cloning, laboratory investigation of plant propagation  Teacher explanation of Transport in plants	<b>Writing task (Task 3)– in class (mainly short response items) semester test</b>  Yr11-1.5hrs; yr12-2hrs	

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UNITS / THEMES	UNIT LENGTH (weeks)	KEY CONCEPTS	KEY IDEAS	GENERAL OBJECTIVES			NATURE OF BIOLOGY CH. REF.	LEARNING ACTIVITIES	MS	ASSESSMENT ITEMS
				UB	IB	EBI				
SMESTER B2 9. Ecology (a) Classification Systems	4	1, 6.	26, 25, 6.	1, 2.	1, 2, 3.	1, 3.	Yr11 8, 9, 10, 11, 12, 13, 14, 15, 16	Teacher explanation of collection and Identification using reference texts Examination and recording of samples teacher explanation of the principals of naming - types of organisms	2, 4, 5.	<b>Extended Experimental Investigation (Task 4)</b> <b>Journal Booklet 1 – Classification (processes)</b> <b>Journal Booklet 2 Diversity (&gt;10 hours of Field studies with &gt;5 in natural setting).</b> <b>(Individual and or group Data collection and individual analytic report)</b> <b>Human Impacts (independent topic or extended research using primary and secondary field data analysis)</b> Yr11 800-1000; Yr12 1000-1500 words <b>Writing Task (Task 5) - in class semester test including evaluation of human impacts (mainly short response items)</b> Yr11-1.5hrs; yr12-2hrs
	8	3, 4, 5.	15, 10, 11, 16, 17, 5, 9, 12, 13, 7, 20.	1, 2, 3.	2, 3, 4.	1, 2, 3.		* Investigate Biodiversity in the region (Kedron Brook / Nudgee Beach / Boondall Wetlands) * Identification of community types – rainforest, sclerophyll, wetlands, mangrove, mudflats. * Field Studies including collection and analysis of primary and secondary data teacher explanation and laboratory / filed studies activities	3, 4, 5.	
10. Human impacts	5	1, 2, 3, 4, 5.	14, 19, 20, 21,	1, 2, 3.	1, 2, 3, 4, 5.	1, 2, 3, 4.	Yr11 13, 15, 16.  Yr12 16	Make decisions about relevant issues Research appropriate data Collate and synthesise reaserch data - record observations of biological specimens by sketch/ draw/ photograph/ video  * Develop understanding of dynamic equilibrium * The concept of Wild? Optional topics for student to select and communicate by diverse means to show understandings of Human impacts including Recycling / Waste Management / Urban development impacts	3, 4, 5, 6.	

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## 2. TEACHING UNITS

The following section contains an outline of the work program's semester one unit, showing:

- name of unit
- the time in weeks
- a brief overview of the points of interest
- samples of main learning experiences
- identified General Objectives for each unit
- the key ideas (using codes from the syllabus and earlier in the work program)
- resources available (where appropriate)
- assessment objectives covered in the unit
- manipulative skills as identified from Syllabus p15 for each unit

The unit summaries attached are:

- Ecology– Semester B2 containing Major Field Studies
- Cell Biology – Semester 1 A1
- Disease – Semester 1 A1

**Thematic Unit: (9b) Ecology**

**Overview:** This part of the unit deals with descriptions and identification of the environment of planet earth structured in terms of biotic and abiotic factors.

The non living components of a location can all be recorded as indicators of the factors that determine the relative survival patterns of individuals, groups, populations and webs. Students use a variety of devices to record these factors at a location and across a zone.

The biota comprises distinct numbers / proportions of organisms each living in particular niche habitats to which they have acquired adaptations through evolutionary processes. Distributions of organisms are determined through a range of sampling techniques in order to attain an assessment of the current state of the ecosystem recognising that such snapshots are temporary as the network of organisms is in a state of dynamic equilibrium in accordance with the local and global environmental variations.

Main Focus	Time	Points of interest	Key ideas	Learning Experiences	General Objectives			
					AV	UB	IB	EBI
Features of environments	8	Abiotic factors - Minerals - climate		* Field Studies including collection and analysis of primary and secondary data using school grounds, local communities, possible visits (Kedron Brook / Nudgee Beach / Boondall Wetlands)	1, 2, 3, 4, 5, 6.	1, 2, 3.	2, 3, 4.	1, 2, 3.
Investigation of Biodiversity in the region		15,	teacher explanation of					
Tolerance Limits		10,	- sampling techniques transects quadrats					
Niche concept / species concept		11,	- data presentation					
Adaptations of organisms to habitats		16,	- species distributions using a variety of data sources					
Comparative ecology		- Diversity - Populations - Distributions - Identification of community types - Abundance - Demographics - Succession	17, 5, 9, 12,	Field activities to develop expertise in data collection and in class group collaborative development of methods for representing the overview of an ecosystem				
Energy Flow		Food webs Trophic levels pyramids / biomass analyses	13, 7,	Teacher explanation and software simulations, video resources, a range of media				
		<b>Extra topics for Yr 12 students</b>  • Evidence based cost/benefit analysis Evaluation of data to justify threatened, endangered and extinct classifications.	20.	(MS 3, 4, 5.)				

**Thematic Unit: (2) Disease**
**Time: 7 weeks**

**Overview:** All organisms potentially have a 'healthy state'. There are many factors that limit an organism's capacity to survive within its environment. These can be catalogued into a variety of diseases – nutritional, pathogenic, inherited (genetic). The main focus of this unit is to examine a range of organisms that cause diseases in humans, plot the course of the diseases, body responses including immunity and vaccination as mechanisms of disease control, and investigate the bio-technologies used in the management of a range of diseases.


Main Focus	Time	Points of interest	Key ideas	Learning Experiences	General Objectives			
					AV	UB	IB	EBI
Healthy bodies	4	An understanding of a state of health – population norms – issues in population health management Awareness of the basic homeostatic conditions prevailing in an organism that is healthy		Investigation of physiology by dissection/ video/ classroom and external resources. class discussion on the nature of 'Healthy'.	1, 2, 3, 4, 5, 6.	1, 2, 3.	1, 2, 3, 4, 5.	1, 2, 3, 4.
Pathogens and Immunity		Diversity of disease causing organisms and their ecology Body responses – immunity (T-cells)		Research data to Investigate the course of a disease using external sources				
Culturing		Microbial techniques Fleming & Penicillium Feedback (+ve / -ve) Hormonal Controls Dialysis	1, 2, 7, 8, 21	In class experimental investigation of Sterile technique, inoculating, plating out, culturing, incubating.  Analyse microbial data  Research into disease management strategies for a named disease – multimedia or alternate format presentation of assignment  (MS 3, 4, 5, 6)				
Homeostasis		<b>Extra topics for Yr 12 students</b>  <ul style="list-style-type: none"> <li>HIV and cure for cancer</li> <li>Acid/base equilibria for homeostasis</li> <li>Cost/benefit analysis of immigration and disease.</li> </ul> Drug therapy for hormonal imbalances		Collaborative and teacher explanation Media observation to extract relevant information An investigation of menstrual cycle as example of hormonal interplay Teacher explanation of the role and function of Kidney as homeostatic control organ				

**Thematic Unit: (1) Cell Biology**

**Time: 6 weeks**

**Overview:** All eukaryotic cells have a range of specific microstructures identified by a range of techniques (TEM, SEM) that have specific functions in the cell. Each tissue type specialises in a subset of these organelles. The fluid mosaic model of plasma membrane structure provides a convenient representation of the process of managing the internal chemistry of cells. The factory model provides a real life example of complexity derived from simplicity.

Main Focus	Time	Points of interest	Key ideas	Learning Experiences	General Objectives			
					AV	UB	IB	EBI
Microstructures	4	Awareness of membranes as control features for a range of cellular organelles Chemical signature Diffusion and active transport models Cell size limitations as a function of the rate of biochemical processes Structural examination of endoplasmic reticulum, Golgi, lysosomes, nucleus, nucleolus, mitochondria, chloroplast, centriole. Use of electron microscope for examination of microstructures – limitations Functional attributes of organelles in maintaining the internal environment of the cell	1, 2, 3, 4, 5,	Practical investigations on cell size and membrane limitations (beetroot) – write a report Use of digital images for biochemical processes Accessing external Web sites for 3D views Develop a model for structural features Microscope work + em limitations Investigation of nanotechnologies – build a cell (MS 1, 3, 4, 5, 6)	1, 2, 3, 4, 5, 6.	1, 2, 3.	2, 3, 4, 5.	1, 2, 3, 4.
Cell biochemistry	2	Cell respiration Krebs Cycle Photosynthesis TCA Cycle Use of radioisotopes and electrophoresis for tracking products Mitochondria and chloroplast as evolutionary steps towards eukaryotes Role of genetic information in cell biochemistry  <b>Extra topics for Yr 12 students</b>  <ul style="list-style-type: none"> <li>Anatomy and physiology of neurons</li> <li>Stem cell research</li> <li>Chemotherapy and specificity</li> </ul>	6, 7, 10, 11, 17, 23.	www / library research biochemical pathway software for theory interpretation demonstrate factors affecting photosynthetic rates Factory models for biosynthetic pathways Teacher explanation, video, modelling Investigate stem cell research (MS 1, 3, 4, 5, 6)	1, 2, 3, 4, 5, 6.	1, 2, 3.	2, 3, 4, 5.	1, 2, 3, 4.

Year					Student Profile
Subject	Biology				
Teacher					
Student					
		Criteria			Overall
Assessment		UB	IB	EBI	
Sem 1	1. EEI				
	2. ER				
	End Semester 1				
Sem 2	3. EEI				
	4. WT				
	5. ER				
	Monitoring				
Sem 3	6. ER				
	7. WT				
	End Semester 3				
Sem 4	8. WT				
	9. EEI				
	Verification				
	10. WT				
	Exit				