



Biology General Course Year 12

Selected Unit 3 syllabus content for the

Externally set task 2023

This document is an extract from the *Biology General Course Year 12 syllabus*, featuring all of the content for Unit 3. The content that has been highlighted in the document is the content on which the Externally set task (EST) for 2023 will be based.

All students enrolled in the course are required to complete an EST. The EST is an assessment task which is set by the Authority and distributed to schools for administering to students. The EST will be administered in schools during Term 2, 2023 under standard test conditions. The EST will take 50 minutes.

The EST will be marked by teachers in each school using a marking key provided by the Authority. The EST is included in the assessment table in the syllabus as a separate assessment type with a weighting of 15% for the pair of units.

Unit 3 – Reproduction and inheritance

Unit description

Organisms exhibit a diverse and interesting range of reproductive structures and behaviours to ensure reproductive success. This unit explores the genetic basis for variation and inheritance of characteristics by the next generation. Environmental conditions can also influence observable traits, including the sex of the offspring, and the timing and behaviours of reproduction. Life cycles of living organisms involve different modes of reproduction, methods of fertilisation, gestation, and distribution to maximise survival. Natural selection occurs when changing environments cause differential survival of organisms with adaptive characteristics.

Scientists use knowledge of reproduction and inheritance to inform practice in animal husbandry, horticulture and pest control. Understanding of reproduction and life cycles helps with the successful implementation of fire regimes, and rehabilitation of natural communities devastated by bushfires.

This unit will use practical and investigative skills involving fieldwork, dissections and microscope work to explore reproductive behaviours and structures. It may also include propagation of plants by different methods and keeping animals to research life cycles.

Unit 3 and Unit 4 can be integrated to provide a year-long course. A student's choice of Unit 4 citizen science longitudinal study may influence, or be influenced by, the selection of organisms covered for Unit 3.

Unit content

An understanding of the Year 11 content is assumed knowledge for students in Year 12. It is recommended that students studying Unit 3 and Unit 4 have completed Unit 1 and Unit 2.

This unit includes the knowledge, understandings and skills described below.

Science Inquiry Skills

- construct questions for investigation; propose hypotheses; and predict possible outcomes
- plan, select and use appropriate investigation methods, including laboratory experimentation, real or virtual dissections and microscopy techniques, to collect reliable data; assess risk and address ethical issues associated with these methods
- represent data in meaningful and useful ways; organise and analyse data to identify trends, patterns and relationships; qualitatively describe sources of measurement error; and use evidence to make and justify conclusions
- interpret a range of scientific and media texts, and evaluate the conclusions by considering the quality of available evidence
- use appropriate representations, including DNA models, diagrams, flow charts and graphs to communicate conceptual understanding, solve problems and make predictions

- communicate scientific ideas and information for a particular purpose using appropriate scientific language, conventions and representations

Science as a Human Endeavour

- banksias, eucalypts and many other Australian plants are adapted to regular burning of their habitat for seed dispersal and recolonisation
- since the discovery that smoke promotes germination of many native Australian plants, smoke-water is now widely used in nursery production, bushland management and mine-site restoration
- apiarists facilitate pollination of native plants through the movement of beehives
- selective breeding is used in animal husbandry; for example, agriculture, horticulture and domestic pets
- knowledge of the life cycles of organisms is important in the control of pests; for example, dung beetles to control flies, spraying wet areas to interrupt mosquitoes' life cycle

Science Understanding

Reproduction

Living things use a variety of methods to reproduce and support their offspring.

- there are a number of asexual methods of reproduction in plants and animals, including:
 - binary fission
 - budding
 - vegetative propagation
 - cuttings
 - bulbs and tubers
 - spores
 - parthenogenesis
- cell division has a critical role in reproduction and growth:
 - mitosis (description of the main events)
 - meiosis (description of the main events)
 - comparison of mitosis and meiosis, including:
 - haploid and diploid cells
 - number of divisions
 - variability of daughter cells produced
 - number of daughter cells produced
- sexual reproduction involves the production and union of gametes:
 - types of gametes (haploid)
 - fertilisation (restoring the diploid number)
- flowering plants differ in their methods of reproduction:
 - main reproductive structures and their functions
 - mechanisms of pollination

- seed dispersal
- requirements for germination
- animals differ in their methods of reproduction:
 - reproductive structures for external and internal fertilisation
 - timing of reproduction
 - strategies for the survival of offspring, including parental care and number of offspring
- animals and plants have a range of life cycles:
 - insects or amphibians
 - flowering plants
 - Australian marsupials.

Inheritance and change

Variation is the result of genetics and the environment. Genetic information is transferred to offspring by DNA to produce specific traits.

- the DNA of an organism determines its characteristics:
 - structure and function of DNA (double helix, nucleotides, complementary base pairing)
 - genes (sequence of bases that codes for traits)
- the external environment influences observable traits of an organism; for example, fur colour in Himalayan rabbits, flower colour in hydrangeas
- sex determination is influenced by genetics and environmental conditions; for example, temperature, day length
- mutations, the ultimate source of genetic variation, introduce new alleles into a population:
 - gene
 - chromosome (structure and number)
- variations in the genotype of offspring arise as a result of the processes of meiosis, sexual reproduction and mutations
- natural selection occurs when selection pressures in the environment confer a selective advantage on a specific phenotype to enhance its survival and reproduction