

School administrators and Heads of Learning Area – Science and teachers of Biology ATAR Year 12 are requested to note for 2023 the following courses that have minor syllabus changes. These syllabuses are now available on course pages and labelled as ‘For teaching from 2023’.

Syllabus change
<p>The content identified by strikethrough has been deleted from the syllabus and the content identified in <i>italics</i> has been revised in the syllabus for teaching from 2023</p> <p>Unit 3</p> <p>Science Inquiry Skills</p> <ul style="list-style-type: none"> design investigations, including the procedure(s) to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics, including the rights of living organisms <i>the ethics of research involving living organisms</i> conduct investigations, including the use of probabilities to predict inheritance patterns, real or virtual gel electrophoresis, and the population simulations to predict population changes, safely, competently, ethically and methodically for the collection of valid and reliable data represent data in meaningful and useful ways, including the use of mean, median, range and probability; organise and analyse data to identify trends, patterns and relationships; discuss the ways in which measurement error, instrumental accuracy, the nature of the procedure and the sample size may influence uncertainty and limitations in data; and select, synthesise and use evidence to make and justify conclusions select, construct and use appropriate representations, including models of DNA replication transcription, and translation, Punnett Squares and allele frequencies in gene pools, to communicate conceptual understanding, solve problems and make predictions <p>Science as a Human Endeavour</p> <ul style="list-style-type: none"> transgenic organisms have been engineered for desirable traits, including <i>resistance to pests and herbicides</i>, faster growth rate, greater product quality and yield, and tolerance to adverse environmental conditions biotechnology can be used in environmental conservation for <ul style="list-style-type: none"> monitoring endangered species assessing gene pools for breeding programs quarantine <i>to prevent the translocation of exotic species and spread of diseases</i> <p>Science Understanding</p> <p>Heredity</p> <ul style="list-style-type: none"> DNA is a helical double-stranded molecule that occurs bound to proteins in chromosomes in the nucleus, and as unbound circular DNA in the cytosol of prokaryotes, and <i>is found</i> in the mitochondria and chloroplasts of eukaryotic cells the phenotypic expression of genes depends on the interaction of genes and the environment (<i>epigenetics not required</i>) frequencies of genotypes and phenotypes of offspring <i>can be predicted using Punnett squares and</i> are determined by patterns of inheritance, including dominance (<i>dominant/recessive, co-dominance, incomplete dominance</i>), autosomal and sex-linked alleles, multiple alleles and polygenes

- DNA sequencing enables mapping of species genomes; DNA profiling identifies the unique genetic makeup of individuals; *processes such as PCR (to amplify minute samples of DNA to testable amounts) and gel electrophoresis can be used to facilitate DNA sequencing of genomes*
- *pedigree charts can be used to reveal patterns of inheritance and assist in determining the probability of inheriting particular alleles in future generations*

Continuity of life on Earth

- evidence for the theory of evolution includes
 - comparative genomics (molecular evidence)
 - *comparative studies of proteins (amino acid sequences)*
 - the fossil record
 - comparative anatomy and embryology
- ~~evolutionary relationships between groups can be represented using phylogenetic trees~~
- ~~in addition to environmental selection pressures, sexual selection, mutation, gene flow and genetic drift can contribute to changes in allele frequency in a population gene pool~~
- *construction of phylogenetic trees, informed by protein, genomic and/or anatomical information, shows evolutionary relationships between groups*
- *gene pools are dynamic, with changes in allele frequency caused by:*
 - *mutations*
 - *differing selection pressures*
 - *random genetic drift, including the founder effect*
 - *changes in gene flow between adjoining groups*

Unit 4

Science Inquiry Skills

- design investigations, including the procedure(s) to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics, including ~~the rights of living organisms~~ *ethics of research involving living organisms*
- ~~conduct investigations, including using models of homeostasis and disease transmission,~~ safely, competently, ethically and methodically for the collection of valid and reliable data
- represent data in meaningful and useful ways, including the use of mean, median, range and probability; organise and analyse data to identify trends, patterns and relationships; discuss the ways in which measurement error, instrumental accuracy, the nature of the procedure and the sample size may influence ~~uncertainty and~~ limitations in data; and select, synthesise and use evidence to make and justify conclusions
- select, construct and use appropriate representations, ~~including diagrams and flow charts,~~ to communicate conceptual understanding, solve problems and make predictions

Science as a Human Endeavour

- contemporary models can *predict* the spread of disease and simulate the effects of possible interventions. Supercomputing has enabled models to predict the relationships between epidemic frequency and location, and factors such as population size, environmental change, persistence and antibiotic resistance

Science Understanding

Homeostasis

- homeostasis is the process by which the body maintains a relatively constant internal environment; it *can* involve a stimulus-response model in which change in external or internal environmental conditions is *commonly* detected and appropriate responses occur via negative feedback
- ~~changes in an organism's metabolic activity, in addition to structural features and changes in physiological processes and behaviour, enable the organism to maintain its internal environment within tolerance limits (temperature, nitrogenous waste, water, salts, and gases)~~

Infectious disease

- diseases caused by these major pathogen groups include
 - tuberculosis, ~~tetanus~~, crown gall of plants
 - chytridiomycosis (amphibian chytrid fungus disease)
 - malaria, Phytophthora dieback (jarrah dieback)*
 - influenza, Ross River virus, viral diseases of honeybees, ~~Australian bat lyssavirus~~
- the life cycle of a pathogen and its associated diseases, including the method of invading the host, the impact on the host, and the mode of transmission (~~direct or indirect~~), determines its success for survival
- management strategies are used to control the spread of infectious diseases, including
 - quarantine
 - immunisation – herd immunity
 - disruption of pathogen life cycle (*including antibiotics and antivirals*)
 - physical preventative measures
 - ~~medications – antibiotics and antivirals~~