

# Biology

The subjects under the biology umbrella serve to introduce students to modern concepts in biological science, the study of life. In addition to emphasising the principles of the diversity of life, it uses the principles as a framework underlying the unity and diversity of life. The subjects biology 600-141 and 600-142 together prepare students for further study in the biological and pre-clinical sciences. Biology 600-142 normally follows biology 600-141. The subject 600-111 Biology of Australian Flora and Fauna supplements 600-141 and 600-142, and is not required for further study in the biological sciences. Biology 600-131 and 600-132 are only available to students enrolled in the Bachelor of Biomedical Science degree.

## Biology subject descriptions

### 600-111 Biology of Australian Flora & Fauna

**Note:** This subject is a joint botany/zoology subject

**Credit points:** 12.5

**HECS-band:** 2

**Coordinator:** Prof P Ladiges

**Contact:** 36 lectures (three per week) and 10 self-study activities and six tutorials (*Semester 2*).

**Description:** By the completion of this subject students should have:

- knowledge of the evolutionary history of the Australian biota, and the influence of past changes in geology, climate and soil;
- an appreciation of the great diversity and genetic resources of the Australian biota;
- knowledge of the structure and physiology of native plants and animals in relation to surviving in Australian environments;
- an understanding of the impact of humans on Australian ecosystems and issues of conservation biology; and
- skills to improve their self-study and analysis and evaluation of biological information.

This study will include the history of Australia from the Cretaceous to the present, and influence of Australian Aborigines and Europeans; Australian environments, climatic zones, major biomes; terrestrial biota: diversity, endemism and biology of Australian plants, relictual rainforests, sclerophylly, adaptation to fire, diversity, endemism and biology of unique habitats, low nutrients and aridity; diversity, endemism and biology of vertebrate fauna including amphibians and marsupials; marine environments, algae, invertebrates, reefs, mangrove communities, inland waterbodies; and ecology, conservation, and management of Australian ecosystems.

**Assessment:** A 3-hour written examination at the end of the subject and submission of three activities from the self-study program.

**Prescribed texts:** R B Knox, P Y Ladiges, B K Evans and R Saint, *Biology*, McGraw-Hill, 2000.

### 600-131 Biomed: Molecules, Cells & Organisms

**Note:**

- This subject is only available to Bachelor of Biomedical Science students
- Experiments involving the use of animals are an essential part of this subject; exemption from these experiments is not possible.
- Credit cannot be gained for this subject and 600-141
- This is a joint botany/zoology subject.

**Credit points:** 12.5

**HECS-band:** 2

**Coordinator:** Ms D Gleeson

**Corequisites:** Students are expected to enrol in both 600-131 and 600-132

**Contact:** 36 lectures (three a week), 36 hours of practicals (3 hours a week), 10 1-hour tutorial/workshop sessions (*Semester 1*).

**Description:** This subject aims to familiarise students with modern concepts of molecular, cell and organismal biology as a foundation for further studies in biomedical science. Two major topics are addressed. Cell and molecular biology includes the chemical building blocks of life, functioning cells, cell evolution and endosymbiosis; cell organelles, their structure and function; movement across membranes: structure, permeability and transport; the cell wall and extracellular matrix; cell metabolism: enzymes and cellular reactions; excitable cells; energy transformations; cell divisions: mitosis and meiosis; cells and tissues; cellular communication and signalling; tissue culture and cloning. Animal physiology includes a comparative approach to circulation, nutrition and digestion, excretion, respiration and gaseous exchange, thermoregulation, reproduction, development, the immune system, hormonal control and nervous systems.

**Assessment:** A 3-hour written examination on theory and practical components of the subject at the end of semester, practical assessment and mid-

semester tests. Satisfactory performance in the practical assessment is a hurdle requirement for passing the subject.

**Prescribed texts:** W K Purves, G H Orians, H C Heller and D Sadava, *Life*, Sinauer/Freeman, 1998.

### 600-132 Biomed: Genetics & Biodiversity

**Note:**

- This subject is only available to Bachelor of Biomedical Science students
- Experiments involving the use of animals are an essential part of this subject; exemption from these experiments is not possible.
- Credit cannot be gained for this subject and 600-142
- This is a joint botany/genetics/zoology subject.

**Credit points:** 12.5

**HECS-band:** 2

**Coordinator:** Ms D Gleeson

**Corequisites:** Students are expected to enrol in both 600-131 and 600-132

**Contact:** 36 lectures (three a week), 36 hours of practicals (3 hours a week), 10 1-hour tutorial/workshop sessions (*Semester 2*).

**Description:** Topics include the genetic consequences of meiosis; inheritance; chromosomes, genes/alleles, dominance relationships, autosomal/sex-linked inheritance; one locus, blood groups, pedigree analysis, examples of human genetic disease; more than one locus, gene interaction, linkage, multifactorial/quantitative inheritance, heritability; DNA structure and function, replication, protein synthesis, mutation; genes and development; tools used for molecular genetic analysis: restriction enzymes, PCR, gel electrophoresis, aims of the Human Genome Project; recombinant DNA technology; genes in populations; human diversity, polymorphisms, selection, the Theory of Evolution; generation of species; biodiversity and genetic resources; model systems for biomedical research; Monera: beneficial and harmful bacteria; viruses and infectious molecules; fungal pathogens and the role of fungi in medicine; Protista: including parasitology; plants: phytochemistry, natural products chemistry, allergens and toxic plants; animals: including invertebrate parasitology, and their role as vectors of disease; evolution of chordates and vertebrates; and evolution of primates and humans.

**Assessment:** A 3-hour written examination on theory and practical components of the subject at the end of semester, practical assessment and a mid-semester test. Satisfactory performance in the practical assessment is a hurdle requirement for passing the subject.

**Prescribed texts:** W K Purves, G H Orians, H C Heller and D Sadava, *Life*, Sinauer/Freeman, 1998.

### 600-141 Biology of Cells and Organisms

**Note:**

- Experiments involving the use of animals are an essential part of this subject; exemption from these experiments is not possible.
- Credit cannot be gained for this subject and 600-101, 600-002, 600-015, 600-112 or 600-131.
- This is a joint botany/zoology subject.

**Credit points:** 12.5

**HECS-band:** 2

**Coordinator:** Ms D Gleeson

**Pre or Corequisites:** VCE Chemistry is recommended. Students are expected to enrol in both biology 600-141 and 600-142.

**Contact:** 36 lectures (three a week), 33 hours of practicals (3 hours a week), 10 1-hour tutorial/workshop sessions (*Semester 1*).

**Description:** The aim of this subject is to familiarise students with modern concepts of cell and organismal biology, including structure and function.

At the completion of this subject you should:

- have a knowledge of the basic processes of life;
- be familiar with the structure and function of both prokaryotic and eukaryotic cells;
- understand the structure and function of organisms, and how these features contribute to the overall functioning of organisms;
- understand the mechanisms of plant and animal reproduction and development;
- be able to complete basic manipulations with laboratory equipment, in particular the use of microscopes; and
- develop skills in recording observations, analysis and interpretation of data, and dissection techniques.

This subject considers basic life processes, structure and function of prokaryotic and eukaryotic cells; cell physiology, energy transformations, metabolism and photosynthesis; structure and function of multicellular organisms including systems involved in nutrition, gas exchange, circulation, and immune responses; plant and animal reproduction and development; mechanisms involved in responsiveness and coordination: hormonal control in plants and animals, and nervous systems in animals; and animal movement and behaviour.

**Assessment:** A 3-hour written examination on theory and practical work (80%); work in practical classes (20%). A pass in the practical work is necessary to pass the subject.

**Prescribed texts:** R B Knox, P Y Ladiges, B K Evans and R Saint, *Biology*, McGraw-Hill, 2000.

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### 600-142 Genetics & The Evolution of Life

**Note:**

- Experiments involving the use of animals are an essential part of this subject; exemption from these experiments is not possible.
- Credit cannot be gained for this subject and 600-101, 600-002, 600-015, 600-112 or 600-132.
- This is a joint botany/genetics/zoology subject.

**Credit points:** 12.5

**HECS-band:** 2

**Coordinator:** Ms D Gleeson

**Corequisites:** Normally 600-141 Biology of Cells and Organisms. Students are expected to enrol in both biology 600-141 and 600-142.

**Contact:** 36 lectures (three a week), 33 hours of practicals (3 hours a week), 10 1-hour tutorial/workshop sessions (*Semester 2*).

**Description:** This subject aims to familiarise you with the modern concepts of genetics, evolution, the nature of diversity and the unity of life.

At the completion of this subject you should be able to:

- understand the basic mechanisms of inheritance, including the relationship between phenotype and genotype, transmission genetics, recombination and mutation;
- know the structure of DNA, its replication and the molecular basis of gene action;
- understand the nature of genetic variation in populations, natural selection, microevolution, reproductive isolation and speciation;
- understand the evidence for the evolution of life including molecular, fossil and phylogenetic data;
- understand and apply the principles of classification; be aware of the diversity of organisms and their relationship to each other and the environment; and
- be aware of the concepts of population ecology, community structure and ecosystem.

Topics studied include the nature of variation, inheritance, genes and chromosomes, human genetics, DNA replication, gene action and expression, population genetics, selection, the genetics of speciation, molecular evolution, evolutionary biology and the origin of life, classification of organisms into five kingdoms (Monera, Protista, Fungi, Plantae and Animalia), diversity of life, communities, ecosystems and the relationship of organisms to their environment, human impact, preserving habitats and genetic variation.

**Assessment:** A 3-hour written examination on theory and practical work (80%); work in practical classes (20%). A pass in the practical work is necessary to pass the subject.

**Prescribed texts:** R B Knox, P Y Ladiges, B K Evans and R Saint, *Biology*, McGraw-Hill, 2000.