

Human Biology

(ATAR)

Pre-requisite: a 'B' grade or better in Year 10 Science is highly recommended

The Human Biology ATAR course gives students a chance to explore what it is to be human—how the human body works, the origins of human variation, inheritance in humans, the evolution of the human species and population genetics. Through their investigations, students research new discoveries that increase our understanding of human dysfunction, treatments and preventative measures.

Practical tasks are an integral part of this course and develop a range of laboratory skills; for example, biotechnology techniques. Students learn to evaluate risks and benefits to make informed decisions about lifestyle and health topics, such as diet, alternative medical treatments, use of chemical substances and the manipulation of fertility.

Course Structure

Year 11

Unit 1 – The functioning human body

This unit looks at how human structure and function supports cellular metabolism and how lifestyle choices affect body functioning.

Focus areas include:

- Cells are the basic structural and functional unit of the human body. Cells contain structures that carry out a range of functions related to metabolism, including anabolic and catabolic reactions.
- Respiratory, circulatory, digestive and excretory systems control the exchange and transport of materials in support of metabolism, particularly cellular respiration.
- The structure and function of the musculo-skeletal system provides for human movement and balance as the result of the co-ordinated interaction of the many components for obtaining the necessary requirements for life.
- Investigate questions about problems associated with factors affecting metabolism. Students trial different methods of collecting data, use simple calculations to analyse data and become aware of the implications of bias and experimental error in the interpretation of results.

Unit 2 – Reproduction and inheritance

This unit provides opportunities to explore, in more depth, the mechanisms of transmission of genetic materials to the next generation, the role of males and females in reproduction, and how interactions between genetics and the environment influence early development.

Focus areas include:

- The transfer of genetic information from parents to offspring involves the replication of deoxyribonucleic acid (DNA), meiosis and fertilisation.
- The reproductive systems of males and females are differentially specialised to support their roles in reproduction, including gamete production and facilitation of fertilisation. The female reproductive system also supports pregnancy and birth.
- Reproductive technologies can influence and control the reproductive ability in males and females.
- Disruptions to the early development stages can be caused by genetic and environmental factors: inheritance can be predicted using established genetic principles.

- The testing of embryos, resulting from assisted reproductive technologies, is conducted for embryo selection, and the detection of genetic disease.
- The application of technological advances and medical knowledge has consequences for individuals and raises issues associated with human reproduction.

Year 12

Unit 3 – Homeostasis and disease

This unit explores the nervous and endocrine systems and the mechanisms that help maintain the systems of the body to function within normal range, and the body's immune responses to invading pathogens.

Focus areas include:

- The complex interactions between body systems, in response to changes in the internal and external environments, facilitate the maintenance of optimal conditions for the functioning of cells.
- Feedback systems involving the autonomic nervous system, the endocrine system and behavioural mechanisms maintain the internal environment for body temperature, body fluid composition, blood sugar and gas concentrations within tolerance limits.
- The structure and function of the endocrine system, including the glands, hormones, target organs and modes of action, can demonstrate the many interactions that enable the maintenance of optimal cellular conditions.
- The structure and function of the autonomic nervous system, and its relationship with other parts of the nervous system, can be linked to the roles each play in maintaining homeostasis of internal environmental conditions.
- Different body systems have mechanisms, including physical and chemical barriers that protect the body against invasion by pathogens. The non-specific actions of the body can be aided by the use of antibiotics and antiviral drugs to counter the invasion or reduce the effect of the pathogen.
- Vaccinations can result in immunity to infection by exposure to attenuated versions of the pathogens.

Unit 4 – Human variation and evolution

This unit explores the variations in humans in their changing environment and evolutionary trends in hominids.

Focus areas include:

- The changing environment can influence the survival of genetic variation through the survival of individuals with favourable traits.
- Population gene pools vary due to interaction of reproductive and genetic processes and the environment. Over time, this leads to evolutionary changes.
- Gene flow between populations can be stopped or reduced by barriers. Separated gene pools can undergo changes in allele frequency, due to natural selection and chance occurrences, resulting in speciation and evolution.