Biology

Advanced General Certificate of Education

The science courses offered here at Health Futures UTC are designed to offer academic and vocational experiences to prepare students for both higher education and health-centred careers. We also offer unique opportunities to work with local universities and health professionals as part of our contribution to the extra-curricular programme.

Course details:

Awarding body: Edexcel Biology A (salters-Nuffield) 2015 specification (9BN0)

Content:

You will study four topics in the first year and a further four in the second year:

Year 1 topics

Topic 1: Lifestyle, Health and Risk

This topic builds on students' knowledge and understanding of the functioning of the circulatory system and the importance of lifestyle choices to health. The role of diet and other lifestyle factors in maintenance of good health is considered with particular reference to the heart and circulation and to cardiovascular disease (CVD).

Topic 2: Genes and Health

This topic considers the following biological principles through the context of the genetic disease cystic fibrosis: the properties of and transport of materials, across cell membranes and gas exchange surfaces, DNA structure and replication, protein synthesis, enzymes and monohybrid inheritance through the context of the genetic disease cystic fibrosis. The topic also allows for discussion of the social and ethical issues surrounding the genetic screening for genetic conditions.

Topic 3: Voice of the Genome

This topic follows the development of multicellular organisms from single cells to complex individuals. Cell structure and ultrastructure, cell division, the importance of fertilisation, the roles of stem cells, gene expression, cell differentiation and tissue organisation are all considered within this topic, as is the role of the genotype, epigenetics and the effect of environment on phenotype.

Topic 4: Biodiversity and Natural Resources

The topic focuses on biodiversity and the wealth of natural resources used by humans. Why there are so many different species is considered first, with the concept of niche and adaptation explored. The topic looks at how all this diversity has come about through adaptation and natural selection and how this leads to evolution.

Year 2 topics:

Topic 5: On the Wild Side

This topic builds an appreciation that photosynthesis is the primary process that underpins the majority of ecosystems, and provides students with an understanding of how ecosystems work. The topic continues by looking at whether climate change will lead to extinction of species or evolution by natural selection, and looks at the evidence for climate change and its effects on plants and animals.

Topic 6: Immunity, Infection and Forensics

This topic looks at how forensic pathologists use a wide variety of analytical techniques to determine identity and the time and cause of death of an organism, including humans. It also considers how bacteria and viruses use a variety of routes into their hosts and how hosts have evolved barriers and internal mechanisms to combat infections. These protections are not always successful and many people in the world still die from infectious diseases. Students will investigate the evolutionary battles that take place between invading pathogens and their hosts. The topic ends by looking at hospital acquired infections, their prevention and control.

Topic 7: Run for your Life

This topic is centred on the physiological adaptations that enable animals and humans, particularly sports people, to undertake strenuous exercise. It explores the links between an animal's physiology and its performance. The topic summarises the biochemical requirements for respiration and looks at the links between homeostasis, muscle physiology and performance.

Topic 8: Grey Matter

Students look closely at the brain, learning how the working of the nervous system enables us to see. Brain imaging and the regions of the brain are considered. The topic also demonstrates how an understanding of brain structure and functioning is relevant to issues such as the response to stimuli, the development of vision and learning. It investigates how imbalances in brain chemicals may result in conditions such as Parkinson's disease, which can be treated with suitable drugs. Students discuss the ethical issues raised by the Human Genome Project and the risks and benefits of using genetically modified organisms.

Assessment overview

External examinations will take place at the end of year 2 and will consist of three written papers:

Paper 1: The Natural Environment and Species Survival; 2 hours 33% of total qualification

Paper 2: Energy, Exercise and Co-ordination; 2 hours 33% of total qualification

Paper 3: General and Practical Applications in Biology; 2 hours 33% of total qualification

Practical endorsement in biology – (not examined) reported separately.

Specific Entry Requirements:

5 GCSEs (Grades 9-4) including English language and mathematics with a grade 6 in biology.