YEAR NINE

BIOLOGY AND GEOLOGY

Unit	Syllabus	Standards of leaning
1st Term		
Unit 1. **General organisation of the human body. [6h]**	The cell; types of cells; the anatomy and funcion of organelles. Transport systems across the cell membrane The organisation of the human body: cells, tissues, organs, systems. The importance of chemical compounds in organisms, including ions, acids and bases. Revision of chemical formulation and the IUPAC rules of naming inorganic compounds.	**Describe** the cell; types of cells; the anatomy and funcion of organelles. **Define** the different transport systems across the cell membrane: diffusion; osmosis; active transport; endocytosis and exocytosis. **State** the organisation of the human body: cells, tissues, organs, systems. **Discuss** the importance of chemical compounds in organisms, including ions, acids and bases. **Apply** knowledge of chemical formulation and the IUPAC rules of naming inorganic compounds.
Unit 2. **Health and illness. [5h]**	Concepts of health and illness Infectious and noninfectious diseases. Hygiene and the prevention of diseases. The immune system. Vaccines. Addictive substances: tabacco, alcohol and other drugs. Their associated problems.	**Define** the concepts of health and illness according to the WHO. **Outline** the differences between infectious and noninfectious diseases. **State** examples of infectious and noninfectious diseases. **Describe** the transmission of infectious diseases. **Demonstrate** the importance of hygiene and the prevention of diseases. **Recall** the most important methods of treating diseases: serumtherapy; drug therapy and antibiotics. **State** the concept of pathogen, antigen and antibody. **Describe** the external defences of the immune system. **Outline** the function of lymphocytes B and T as part of the internal defences of the immune system.

		Describe vaccination. **Summarise** the issue of addictive substances, including tobacco, alcohol and other drugs.
Unit 3. **Nutrition.** **[15h]**	Nutrition, food and health. Nutrients, foods and healthy eating habits. Eating disorders. The function of nutrition. The anatomy and physiology of the digestive, respiratory, circulatory and excretory systems. Common disorders and illnesses in the above systems, and possible preventions. Advice for a healthy lifestyle.	**Outline** the concepts of nutrition, food and healthy eating. **Define** the principle nutrients and **state** their functions in the human body. **Describe** the function of nutrition. **Define** digestion. **Define** food intake and balanced diet. **Design** a balanced diet. **Describe** the main characteristics of the Mediterranean diet. **Discuss** eating disorders and diseases related to eating habits. **Outline** the anatomy and physiology of the digestive, respiratory, circulatory and excretory systems. **Label** diagrams of the digestive, respiratory, circulatory and excretory systems. **Outline** the role of enzymes in digestion. **Summarise** the role each organ of the digestive system plays in digestion. **Describe** the process of inhalation and exhalation. **Explain** gas exchange in the alveoli with reference to diffusion. **Describe** how the alveoli are well-adapted to their function. **State** the composition of blood and **describe** its function. **Define** the 3 types of blood cells and **outline** their functions. **Describe** the 3 types of blood vessels and **suggest** how their structure is realted to their function. **Describe** the heart´s structure and function. **Outline** the movement of blood around

		the body and **summarise** the changes in its composition. **State** the different components of the excretory system and **explain** why they are considered part of the excretory system. **Describe** the anatomy and physiology of the kidney. **Label** diagrams of a kidney and a nephron. **Describe** the production of urine. **Describe** common disorders and illnesses in the above systems, and possible preventions. **Present** advice for a healthy lifestyle.
Unit 4. **Interaction and coordination [6h]**	Interaction with the internal and external environment. The nervous system and the endocrine system. Coordination and the nervous system. Organisation and function. The endocrine system: glands and their functions. The main disorders of the endocrine system.	**Outline** how organisms interact with their environment. **Describe** the nervous system: the locomotor system; organization and functional relationship between bones and muscles. **Describe** how information is registered, processed and delivered so the body responds. **Label** a diagrams of nerves and neurones. **Outline** the role of the spinal cord in reflex actions. **Describe** the structure and function of the different areas of the brain. **Describe** the sense organs: structure and function, care and hygiene. **State** advice for prevention of injuries. **Identify** the differences between the nervous sytem and the endocrine system. **Describe** the endocrine system: its function; glands and possible disorders. **Outline** the role of hormones in controling processes in the body. **State** examples of glands and the hormones they produce (insuline, glucagon and adrenaline).

2nd Term		
Unit 5. **Reproduction. [8h]**	Human reproduction. Anatomy and physiology of reproductive systems. Physical and psychological changes during adolescence. The menstrual cycle. Fertilization, pregnancy and childbirth Different contraceptive methods. Assisted reproduction techniques. Sexually transmitted diseases and prevention techniques. Human sexual responses. Sex and sexuality. Sexual health and hygiene.	**Define** the concept of human reproduction. **State** the differences between sexual and asexual reproduction. **Describe** the anatomy and physiology of the male and female reproductive systems. **Label** diagrams of human reproductive systems, structures within themand the gametes. **Describe** the process of gametogenesis. **Outline** physical and psychological changes during adolescence. **Summarise** the menstrual cycle and **outline** the role of the 4 main hormones. **Apply** knowledge to explain diagrams that represent the menstrual cycle. **Describe** fertilization, pregnancy, childbirth and assisted reproduction techniques. **Analyse** different contraceptive methods. **Outline** examples of sexually transmitted diseases and prevention techniques. **Define** sexual health. **Discuss** sex and sexuality.
Unit 6. **Genetics I. [12h]**	The structure of the nucleus and its functions. The cell cycle: mitosis and meiosis. Inheritance and the transmission of characteristics. The introduction and development of Mendel's Laws. Genetic problems using Punnett squares Chromosomal foundations of	**Describe** the structure of the nucleus and its functions. **Outline** the differences between chromatine and chomosomes. **Explain** the cell cycle. **Define** mitosis and meiosis. **Label** diagrams of the cell cycle and cell division. **Identify** the main stages of the cell cycle and cell division and **state** what processes are occuring in each. **State** at which stage of meiosis genetic variation is produced and **describe** the mechanisms. **Outline** the difference between diploid

	Mendel's Laws. Application of Mendel's Laws	and haploid cells; homozygous and heterozygous organisms. **Define** genotype; phenotype; allele; dominant; recessive; complete/incomplete/co-dominance. **Apply** knowledge of heredity and the inheritence of characteristics. **Describe** Mendel´s laws of inheritence. **Solve** genetic problems using Punnett squares for alleles with complete/incomplete/co-dominance; sex-linked and mono/dihybrid crosses. **Apply** Mendel´s laws to the inheritence of alleles. **Outline** factors that affect Mendel´s ratios.
Unit 7. **Genetics II. [12h]**	The nucleic acids. DNA and molecular genetics. The process of DNA replication. The concept of a gene. How genetic information is expressed. The Genetic code. Mutations. Relationship to evolution. Genetic engineering: techniques and applications.	**Draw** the nucleic acids. **Describe** the structure of DNA. **Outline** the process of DNA replication. **Define** the concept of a gene. **Explain** the genetic code and how genetic information is expressed refering to transcription and translation and the role of RNA. **Define** the concept of mutation and **discuss** its relationship with evolution. **Define** genetic engineering. **Outline** the role of enzymes in genetic engineering. **Describe** the applications of genetic engineering.
3rd Term		
Unit 8. **Evolution [10h]**	Theories of the origins of life on Earth. Theories of evolution. The fact and mechanisms of evolution. Human evolution: the process of anthropogenesis.	**Summarise** the 4 main theories of the origins of life on Earth. **Define** evolution. **Describe** the differences between the theories of Lamarck and Darwin. **Explain** Darwin´s theory of evolution. **Apply** Darwin´s 3 observations of 2 conclusions to a given example. **Describe** neo-Darwinism.

		Explain the evidence and mechanisms of evolution. **Apply** the modern theory of evolution to given examples.
Unit 9. **Ecology and the environment. [12h]**	The structure of ecosystems. Components of an ecosystem: communities and habitats. Trophic relations in foodchains and foodwebs. Habitats and ecological niches. Limiting factors and adaptations. The cycle of matter and energy. Ecological pyramids. Biochemical cycles. Impacts and evaluation of human activities on ecosystems. Overpopulation and its consequences, including: deforestation, overfishing, fires.	**Describe** the structure of ecosystems. **Define** species, population and community. **Define** the biotic and abiotic components of an ecosystem. **Explain** interspecific and intraspecific relationships. **Interpret** trophic relations in foodchains and foodwebs. **Define** habitats and ecological niches. **Explain** limiting factors and adaptations. **Explain** the cycle of matter and energy flow through ecosystems. **Define** biomass. **Analyse** ecological pyramids. **Describe** biogeochemical cycles. **Analyse** and **explain** impacts of human activities on ecosystems. **Discuss** overpopulation and its consequences, including: deforestation, overfishing, fires.
Unit 10. **Dynamic Earth. [10h]**	The origin and history of the Earth. Geological time and historical ideas on the age of the Earth. Principles and procedures that allow historical reconstruction. Geological eras and time periods. The location of important geological and biological events.	**Describe** the origin and history of the Earth. **Outline** the physical characteristics of the Earth. **Discuss** the concept of geological time and **evaluate** historical ideas on the age of the Earth. **Describe** methods that allow us to calculate the age of the Earth and its interior. **State** the location of important geological and biological events.