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<th>Week and Date</th>
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<th>Objectives - Students should have</th>
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<tr>
<td>WEEK 1</td>
<td>Chapter 2- Chemical messengers</td>
<td><strong>Familiarization with course guidelines, assessment and class requirements</strong>&lt;br&gt;&lt;br&gt;<strong>Science Understanding</strong>&lt;br&gt;• The hypothalamus, pituitary, thyroid, parathyroid, pancreas, thymus, gonads, pineal and adrenal glands, are endocrine glands found in the human body.&lt;br&gt;• Hormones secreted from the hypothalamus, pituitary, thyroid, parathyroid, pancreas and adrenal glands are involved in homeostasis by affecting specific target organs.&lt;br&gt;• The secretions of the pituitary are controlled by the hypothalamus through transport of hormones, either via nerve cells or the vascular link between them&lt;br&gt;Hormones can be lipid-soluble and able to cross cell membranes to bind with and activate intracellular receptors or, water-soluble and able to bind with and activate receptors on cell membranes, and require secondary messengers to affect cell functioning</td>
<td>Discuss all Course requirements&lt;br&gt;&lt;br&gt;Chapter 2 Questions page 33</td>
<td><strong>EXTENDED RESPONSE One</strong>&lt;br&gt;Endocrine/ Nervous systems</td>
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<td>and WEEK 2</td>
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| WEEK 2 and WEEK 3 (Seton Swimming carnival Friday 19th February) | Chapter 3-Nerve cells and nerve impulses | **Science Understanding**  
- The reflex arc comprises of specially structured neurons, including sensory, interneuron and motor neurons, to transmit information from the receptor to the effector to respond rapidly to stimuli  
- Transmission of nerve impulses is via electro-chemical changes that occur at the generation of the impulse, the propagation of the impulse along the nerve fibre, and the transfer of the impulse across the synapse | Act 3.3 page 47 Text “The discovery of neurotransmitters”  
Chapter 3 Questions page 48 | |
| WEEK 4 | Chapter 4-Divisions of the Nervous system | **Science understanding**  
- Structure and function of the divisions of the nervous systems can be observed and compared at different levels in detecting and responding to the changes in the internal and external environments including:  
  o Central-peripheral  
  o Afferent-efferent  
  o Autonomic-somatic  
  o Sympathetic-parasympathetic  
- The nervous and endocrine systems work together to co-ordinate functions of all body systems, but differ in terms of:  
  o Speed of action  
  o Duration of action  
  o Nature and transmission of the message  
  o Specificity of message | Act 4.1 page 57 Text “An automatic reflex”  
Chapter 4 Questions page 58 | |
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| **WEEK 5**    | Chapter 5- The Central Nervous System | **Science Understanding**  
- The parts of the Central, including the brain (cerebrum, cerebellum, medulla oblongata, hypothalamus, corpus callosum) and spinal cord have specific roles in the co-ordination of body functions and are protected by the meninges and cerebro-spinal fluid.  
**Science as a Human Endeavour**  
- Cell replacement therapy has the potential to treat nervous system disorders including Alzheimer’s and Parkinson’s diseases. | Activity 5.1 page 68 “The brain”  
Chapter 5 Questions page 70 | **TEST One**  
Endocrine and Nervous systems |
| **WEEK 6** (Public holiday on Monday 7th March) | Chapter 6 – Detecting and regulating change | **Science Understanding**  
- Different receptors detect changes in the internal and external environments, including thermoreceptors, osmoreceptors, chemoreceptors and receptors for touch and pain  
- The reflex arc comprises of specially structured, including sensory, interneuron and motor neurons, to transmit information from the receptor to the effector to respond rapidly to stimuli  
- Homeostatic processes involve nerves and hormones in maintaining the body’s internal environment within tolerance limits through the control of metabolism and physiological and behavioural activities. | Act 6.1 page 80 Text “Reflexes” /STAWA  
Act 23 page 178 “Reflexes and Reac... | |
| **WEEK 7 and WEEK 8** | Chapter 1 – Science Inquiry | **Science Inquiry Skills**  
- Identify, research and construct questions for investigations; hypotheses and predictions  
- Design experiments-procedure, materials, primary and secondary data; risk assessments; ethics  
- Represent data-mean, median, range and probability; organise and analyse data-tables, graphs, diagrams, models and flow charts; uncertainty and limitations in data; make and justify conclusions.  
- Interpret confidence intervals in secondary data | AISWA Booklet “Investigating Investigations”  
Act 1.2 page 18 “Researching for Mightypharm” | |
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| WEEK 8 (Good Friday) | Chapter 7 – Homeostasis of Body Temperature and Body fluids | **Scientific understanding**  
- Thermoregulation occurs by the control of heat exchange and metabolic activity through physiological and behavioural mechanisms  

**Science Inquiry skills**  
- Conduct investigations, including the collection of data related to homeostasis | Act 7.2 page 98 “Experiments in a heated room” | SCIENCE INQUIRY  
One  
Homeostasis: Temperature Regulation |
<p>| WEEK 9 (Easter Monday/ Tuesday followed by Year 12 Retreat) | Chapter 7 – Homeostasis of Body Temperature and Body fluids (cont’d) | Continue WEEK 8 | | |
| WEEK 10             | Chapter 7 – Homeostasis of Body Temperature and Body fluids (cont’d) | Continue WEEK 8 | | |
|                     | <strong>TERM ONE HOLIDAYS</strong> | | | |</p>
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| **TERM 2 WEEK 1** (students commence on Wednesday 27<sup>th</sup> April) and WEEK 2 (Wed - Photo day Thurs and Frid - Year 12 Outdoor Ed excursion) | Chapter 7 – Homeostasis of Body Temperature and Body fluids (cont’d) | *Scientific understanding*  
Body fluid concentrations are maintained by balancing water and salts via the skin, digestive system and the kidneys, which involve the actions of ADH and aldosterone on the nephron, and the thirst reflex | STAWA Act 3 “Nephron Structure and Function” and/or STAWA Act 4 “Water balance”  
Chapter 7 Questions page 100 | **SCIENCE INQUIRY**  
Two  
Homeostasis: Second hand data exercise |
| **WEEK 3 and WEEK 4**                                                        | Chapter 8 - Homeostasis of Blood sugar and gas concs                  | *Scientific understanding*  
- Blood sugar levels are maintained by controlling of sugar uptake, its storage and release by cells and use in metabolism; these processes involve the hormones of the pancreas and adrenal glands  
- Gas concentrations are controlled by balancing the intake of oxygen and the removal of carbon dioxide via the lungs, through the actions of the medulla oblongata and the Autonomic nervous system | Act 8.1 page 114 “Breathing rate”  
Chapter 8 Questions page 116 |
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| WEEK 4 and WEEK 5 | Chapter 9- Disruptions to Homeostasis (pp 118-123) and Chapter 13 Techniques in Biotech (pp 182-186 and pp 188-189) | **Scientific Inquiry skills**  
- Synthetic hormones may be developed to control or treat endocrine dysfunction, including diabetes mellitus, hypothyroidism and hyperthyroidism, to improve the quality of life for individuals  
- Gene therapy can be used to treat a range of diseases, including diabetes mellitus  
- Hormones and vaccines are developed using recombinant DNA and associated biotechnological techniques | Act 9.1 page 125 “Regulation of blood sugar”  
Act 9.2 page 126 “Thyroid hormone”  
Act 13.2 page 190 “Restriction Enzymes” | TEST TWO  
Homeostasis  
RQ’s 1-9 and AYK’s page 1, 5, 6, 7, 9 page 134 |
| WEEK 6 | | REVISION (exams start Friday) | | |
| WEEK 7 | | EXAMS | | SEMESTER TWO EXAM |
| WEEK 8 (students back Wednesday 8th June) | | • Finish exams  
• Go through papers | | |
| WEEK 9 and WEEK 10 | Chapter 10 - Protection against invaders | **Scientific understanding**  
- Infectious diseases caused by invasion of pathogens in the form of viruses and bacteria can be transmitted from one host to another  
- Transmission of pathogens occurs by various mechanisms, including through:  
  o Direct and indirect contact  
  o Transfer of body fluids  
  o Disease-specific vectors  
  o Contaminated food and water  
- The body’s external defence mechanisms against pathogens include | Act 10.1 page 140 “Fever”  
Act 10.3 page 141 ‘Skin bacteria” | |
### Chapter 11 – Specific resistance to infection

**Features of the:**
- Skin
- Digestive and Urogenital tract
- Respiratory system
- The ear and eye
  - Pathogens that enter the body are targeted by non-specific immune responses of inflammation and fever

**Specific understanding**
- Antiviral and antibiotic drugs are used for treating infections and differ in their specificity to pathogens
- Passive immunity can be acquired as antibodies gained through the placenta, or antibody serum injections; active immunity can be acquired through exposure to the pathogen, or the use of vaccines
- Immunity is gained through the exposure to specific antigens by the production of antibodies by B lymphocytes and the provision of cell-mediated immunity by T lymphocytes; in both cases memory cells are produced

**Science Inquiry Skills**
- The use of models of disease transmission

**Science as a Human Endeavour**
- The decision to participate in immunisation programs can be influenced by the social, economic and cultural context in which it is considered.

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<th>TERM 2 HOLIDAYS</th>
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<th>EXTENDED RESPONSE Two Response to infection</th>
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| TERM 3 WEEK 1 (Students return Tuesday 19th July) | Chapter 12 Mutations and Gene Pools | **Scientific understanding**  
- Gene pools can be represented as gene pools that reflect the frequency of alleles of a particular gene; gene pools can be used to compare populations at different times or locations  
- Gene pools are dynamic, with changes in allele frequency caused by  
  o mutations  
- Mutations in Genes and chromosomes can result from errors in DNA replication, cell division or from damage caused by mutagens  
- Different genotypes produce a variety of phenotypes, which are acted on differently by factors in the environment, producing different rates of survival  
- Mutations are the ultimate source of variation introducing new alleles into a population: new alleles may be favourable or unfavourable to survival | Chapter 12 Questions page 174 | |
| WEEK 2 (Outdoor Ed camp Tues 26th July to Fri 29th July) | Chapter 14 – Evolutionary mechanisms | **Scientific understanding**  
- Gene pools are dynamic, with changes in allele frequency caused by:  
  o Differing selective pressures  
  o Random genetic drift, including the founder effect  
  o Changes in gene flow between adjoining groups  
- The incidence of genetic diseases in particular populations illustrates the effects of different factors on the dynamics of gene pools, including the incidence of Tay-Sachs disease, thalassemia and sickle-cell anaemia  
- Natural selection occurs when factors in the environment confer a selective advantage on specific phenotypes to enhance survival and | Act 14.1 page 120 “A model of genetic drift”  
Act 14.2 page 211 “Sickle cell haemoglobin”  
Act 14.3 page 211 “Modelling natural selection”  
Chapter 14 Questions page 214 | |
The mechanisms underpinning the theory of evolution by natural selection include inherited variation, struggle for existence, isolation and differential selection, producing changes to gene pools to such an extent that speciation occurs.

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| WEEK 3        | Chapter 13 Techniques in Biotech | Scientific understanding  
• Biotechnological techniques provide evidence for evolution by using PCR (to amplify minute samples of DNA to testable amounts), bacterial enzymes and gel electrophoresis to facilitate DNA sequencing of genomes | Act 13.1 page 190 “Electrophoresis simulation” | SCIENCE TEST 4  
Mutations and changes in gene pools |
| WEEK 4        | Chapter 15 Evidence for Evolution | Scientific understanding  
• Comparative studies of DNA (genomic and mitochondrial), proteins and anatomy, provide additional evidence for evolution; genomic information enables the construction of phylogenetic trees showing evolutionary relationships between groups  
Science as a Human Endeavour  
• Developments in the fields of comparative genomics, comparative biochemistry and bioinformatics have enabled identification of further evidence for evolutionary relationships, which help refine existing models and theories | Act 15.1 page 230 “Amino acid sequencing”  
Chapter 15 Questions page 230 | |
| WEEK 5 (Tues 16th August House Athletics carnival) | Chapter 16 Fossil evidence for evolution | Scientific understanding  
• The fossil record is incomplete and cannot represent the entire biodiversity of a time or a location due to many factors that affect fossil formation, the persistence of fossils and accessibility to fossilised remains  
• Sequencing a fossil record requires a combination of relative and absolute dating techniques to locate fossils onto the geological time line | Act 16.1 page 245 “Radioisotope method of dating”  
Act 16.2 page 247 “Stratigraphy” | |
Both relative dating techniques, including stratigraphy and index fossils, and absolute dating techniques, including radiocarbon dating and potassium-dating, have limitations of application.

**Science inquiry skills**
- Select, use and/or construct appropriate representations, including phylogenetic trees, to communicate conceptual understanding, solve problems and make predictions.

### Week and Date

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| WEEK 6 (Thurs 25th August Geography excursion) | Chapter 17 Primate Evolution | **Scientific understanding**
- Humans as primates are classified in the same taxonomic family as the great apes. The species within the family are differentiated by DNA nucleotide sequences, which brings about differences in:
  - Relative size of cerebral cortex
  - Mobility of the digits
  - Locomotion – adaptations to bipedalism and quadrupedalism
  - Prognathism and dentition | Act 17.2 page 266 “Mobility of the Human Thumb”
 Act 17.3 page 267 “A comparison of primate skulls”
 Chapter 17 Questions page 268 |
| WEEK 7 (Friday Seton day) and WEEK 8 | Chapter 18 Evolutionary trends in Hominids | **Scientific understanding**
- Determining relatedness and possible evolutionary pathways for hominins uses evidence from comparisons of modern humans and the great apes with fossils of:
  - Australopithecus afarensis
  - Australopithecus africanus
  - Paranthropus robustus
  - Homo habilis
  - Homo erectus
  - Homo neandethalensis
  - Homo sapiens | Act 18.1 page 283 “Cranial capacity and phylogenetic trees”
 Chapter 18 Questions page 285 |
| WEEK 9 | Chapter 20 | **Scientific understanding**
- Tool use is seen in a number of hominid species and the study of these tools provides insight into the evolution of the human cognitive abilities and lifestyles: trends are seen in the changes in manufacturing techniques and the materials used in the tool. |
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<td>TEST FIVE Hominid evolutionary trends</td>
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<td>WEEK 10 (Term finishes on Thurs)</td>
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<td>TERM 3 HOLIDAYS</td>
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<td>Go through papers</td>
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