**Structure of Australian SCIENCE Curriculum, F-10:**

There are **three strands** which are to be taught in an integrated way. The order & detail in which content descriptions are organized in to learning programs are decisions to be made by the teacher.

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| **Science Understanding** – content described by year level | **Science as Human Endeavour** – content described in 2 year bands – the main points are the same, with variations in the elaborating examples | **Science Inquiry Skills** – content described in 2 year bands |
| **Sub strands:**  Biological sciences  Chemical sciences  Earth and Space sciences  Physical sciences | **Sub strands:**  Nature and development of science  Use and influence of science | **Sub strands:**  Questioning and predicting  Planning and conducting  Processing and analysing data and information  Evaluating  Communicating |

**Year 9 SCIENCE Students:**

* Consider the operation of systems at a range of scales.
* Explore ways in which the human body responds to its external environment & the interdependencies between biotic & abiotic components of ecosystems.
* Are introduced to atoms as a system of protons, electron & neutrons & how this system can change through nuclear decay.
* Learn that matter can be rearranged through chemical change & that these changes are important to many systems.
* Introduced to the concept of conservation of matter & begin to develop a more sophisticated view of energy transfer.
* Apply their understanding of energy & forces to global systems such as continental movement.

\*This document intends to assist teachers in their implementation of the Australian curriculum – it is merely an attempt to understand the document at this time – it combines description and elaboration statements. Teachers are advised to consult the online documentation to clarify further detail for themselves. The ‘AusVELS’ to be released during 2011 will be the official documentation for Victorian schools.

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| **Science understanding:** | **Science as Human Endeavour:** | **Science Inquiry Skills:** |
| **Biological sciences:**   * Multi-cellular organisms rely on coordinated & interdependent internal systems to respond to changes in environment – *describe how coordinated body functions provide lie requirements; use models, flow diagrams or simulations to explain how body systems work; identify responses using nervous & endocrine systems; investigate body responses to micro-organisms; effects on humans of radiations eg X-rays, microwaves etc* * Ecosystems consist of communities of interdependent organisms & abiotic components of the environment; matter & energy flow through these systems– *exploring interactions between organisms; factors that affect population sizes; energy flow into & out of systems; how ecosystems change after events eg bushfires, drought, flood*   **Chemical sciences:**   * All matter is made of atoms which are composed of protons, neutrons & electrons; natural radioactivity arises from the decay of nuclei in atoms – *describe & model structure of atoms; compare mass & charges of protons, neutrons & electrons; describe in simple terms how alpha & beta particles & gamma radiation are released from unstable atoms* * Chemical reactions involve rearranging atoms to form new substances; during a reaction mass is not created or destroyed – *identify reactants & products in reactions; model rearrangement of atoms in reactions; write word equations for observed reactions; consider role of energy in reactions; recognise that simple equations can demonstrate the conservation of mass* * Chemical reactions (combustion & acids) are important in both living & non-living systems & involve energy transfer – *investigate reactions of acids with metals, bases & carbonates; reactions as exothermic or endothermic; role of oxygen in combustion reactions, combustion vs other oxidation reactions; comparing respiration & photosynthesis; describe how combustion products affect environments*   **Earth and space sciences:**   * The theory of plate tectonics explains global patterns of geological activity & continental movement – *major plates on a world map; model sea-floor spreading; occurrence of earthquakes & volcanic activity related to constructive & destructive plate boundaries; roles of heat energy & convection currents in movement of tectonic plates; age & stability of Australian continent & plate tectonic history*   **Physical sciences:**   * Forms of energy can be transferred in a variety of ways through different mediums– *how & why movement of energy varies according to medium of transfer; convection, conduction & radiation; energy transfer through waves – sound & light; human body receiving sound & light waves; factors affecting transfer through an electrical circuit* | **Nature & development of Science:**   * Science understanding, including models & theories, are contestable & are refined over time through a process of review by the scientific community – *historical development of models of structure of the atom; how theory of plate tectonics grew; how ideas about disease transmission have changed over time; work of Rutherford, Pierre & Marie Curie on radiation & sub-atomic particles; how models are used to predict changes in populations due to environmental changes eg flood or fire on rabbit or kangaroo numbers* * Advances in scientific understanding often rely on developments in technology & this is related to scientific discoveries– *how common properties of electromagnetic radiation relate to uses eg radar, medicine, mobile phones, microwave cooking; technologies to map continental movement; how imaging technologies have improved understanding functions of body systems*   **Use & influence of science:**   * People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions – *use science knowledge to test claims in advertising / media; describe media use of science to explain events or justify actions; evaluate claims relating to products eg fuels, indigestion tablets; impact of humans on an ecosystem from range of perspectives* * Advances in science & emerging sciences & technologies can significantly affect people’s lives, including new career opportunities– *technologies in medicine eg detection & treatment of cancer; nanotechnology in medicine eg pharmaceuticals; technology advances in Australia eg cochlear implant, bionic eye; communication methods influenced by mobile technologies; recognizing science, engineering & technology within various careers* * The values & needs of contemporary society can influence the focus of scientific research – *technologies for mobile communications; minimising pollution from industry; fuel use choices & environmental factors; Australian scientists eg Fiona Wood, Marie Stoner; safe sound levels & implications for work place & leisure; science issues for countries near plate boundaries eg Japan, NZ* | **Questioning & predicting:**   * Formulate questions or hypotheses that can be investigated scientifically – *use internet to identify problems; evaluate secondary sources; develop ideas from own or others’ to investigate further*   **Planning & conducting:**   * Plan, select & use appropriate methods (eg fieldwork & lab. experiments) to collect reliable data; assess risk & address ethical issues of methods– *combine own experiment observations with research ( primary & secondary sources); use models & simulations, including digital, to investigate situations & events* * Select & use appropriate equipment, & digital technologies, to systematically & accurately collect & record data – *explain choice of variables to be controlled, changed & measured; justify investigation that includes animals; learn scientific specific skills re scientific instruments; consider potential hazards in experiments; describe specific safety precautions; use probes & data loggers to record information*   **Processing & analyzing data & information:**   * Analyse patterns & trends in data, including relationships between variables & identifying inconsistencies – *design graphs & analyse for trends & patterns; calculate means & ranges & consider distribution sets of quantitative data; use spreadsheets & carry out mathematical analyses on data* * Use knowledge of scientific concepts to draw conclusions that are consistent with evidence– *compare conclusions with predictions & review scientific understanding; suggest more than one possible explanation of data*   **Evaluating:**   * Evaluate conclusions, including identifying sources of uncertainty & possible alternative explanations, & describe specific ways to improve quality of data – *distinguish between random & systematic errors & how they affect results* * Critically analyse validity of information in secondary resources & evaluate approaches to solve problems – *explain why suggested changes will improve accuracy; research methods used in studies reported in media; describe how scientific arguments are used to make decisions regarding personal & community issues*   **Communicating:**   * Communicate scientific ideas & information for a particular purpose, including constructing evidence-based arguments using appropriate scientific language, conventions & representations – *present results & ideas in formal reports, oral presentations, slides shows, poster presentations & contributions to groups discussions; use own findings & secondary sources to explain a scientific concept; use internet to facilitate collaboration in joint projects & discussions* |