**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 10 SCIENCE Students:**

* Explore the biological, chemical, geological and physical evidence for different theories, such as natural selection and the Big Bang.
* Atomic theory is developed to understand relationships within the periodic table.
* Understand that motion and forces are related by applying physical laws.
* Relationships between aspects of the living, physical and chemical world are applied to systems on a local and global scale and this enables students to predict how changes will affect equilibrium within these systems.

\*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:**   * The transmission of heritable characteristics from one generation to the next involves DNA and genes– *describe DNA role in blueprint for characteristics; use models for DNA, genes & chromosomes; genetics passed by both parents via meiosis & fertilization; patterns of inheritance (dominant & recessive genes); predicting simple ratios involving gene pairs or genes that are sex-linked; mutations as changes in DNA & chromosomes & factors involved* * Theory of evolution by natural selection explains the diversity of living things & is supported by a range of scientific evidence– *processes including variation, isolation & selection; biodiversity as a function of evolution; changes & causes eg artificial selection for breeding; relate genetic characteristics to survival & reproductive rates; evidence – fossils, chemical & anatomical similarities, geographical distribution of species*   **Chemical sciences:**   * Atomic structure and properties of elements are used to organize them in the Periodic Table – *recognise elements in groups with similarities; structure of atoms in terms of electron shells; explain position in table & properties; investigate chemical activity of metals* * Different types of chemical reactions are used to produce a range of products & can occur at different rates – *how chemistry produces useful substances eg fuels, metals; medicines; predicting products of simple reactions; using word or symbol equations to represent chemical reactions; effects such as temperature on rates of chemical reactions*   **Earth and space sciences:**   * The universe contains features including galaxies, stars & solar systems & the Big Bang theory can be used to explain the origin of the universe – *identify evidence eg Hubble’s observations, detection of microwave radiation; Big Bang theory to derive age of universe; evolution of universe, galaxies & stars* * Global systems, eg carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere & atmosphere – *human affects on global systems; model cycles within biosphere; greenhouse effect; climate change effects on sea levels & biodiversity; changes to permafrost & sea ice; deep ocean currents – factors, role, effects*   **Physical sciences:**   * Energy conservation in systems explained by energy transfers & transformations– *Law of Conservation & Energy; effects on efficiency; compare energy changes eg car crashes; models to describe transfer & transformation* * The motion of objects can be detected & predicted using laws of physics – *analyse everyday motions of forces eg speed; recognize balancing forces; Newton’s second law to predict movement; Newton’s Third law to describe effect of interaction between objects* | **Nature & development of Science:**   * Scientific understanding, including models & theories, are contestable & are refined over time through a process of review by the scientific community – *role of different sources of evidence for evolution; Watson & Crick double helix model; history & impact of genetic knowledge; how development of periodic table was dependent on experimental evidence; role of science in climate change; Australian scientists eg Brian Schmidt & Penny Sackett study of universe* * Advances in scientific understanding often rely on developments in technology & this is related to scientific discoveries– *fast computers made DNA sequencing etc possible; computer modeling for climate change & atmospheric pollution; international science eg Large Hadron Collider & International Space station; how info. tech. is applied eg bioformatics & Square Kilometre Array*   **Use & influence of science:**   * People can use scientific knowledge to evaluate whether they should accept claims, explanations or predictions – *describe how science is used by media to explain or justify events or actions; use science to test claims in advertising; consider science in climate change discussions; evaluate claims of environmental footprints* * Advances in science & emerging sciences & technologies can significantly affect people’s lives, including new career opportunities– *predict future affect of nanotechnology; recognise teams of scientists in space explorations, information technology; investigate gene therapies & engineering; combination of science, engineering & technology in sustainability (transport, low-emissions energies)* * The values & needs of contemporary society can influence the focus of scientific research – *investigate technologies for carbon pollution reduction; energy transfer devices; use & control of CFCs; recognize that financial backing is required for scientific developments; consider uses of genetic testing (genetic counseling, embryo selection, carriers of genetic mutations) & use of this by individuals or organisations eg insurance companies* | **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* * Develop testable hypotheses based on prior observations, scientific knowledge & primary & secondary sources   **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 group discussions; use own findings & secondary sources to explain a scientific concept; use internet to facilitate collaboration in joint projects & discussions* |