

SCIENCES

St James College Science Department offers the following subjects in the Senior Phase of learning.

Authority Subjects **Biology** **Chemistry** **Physics**

The Authority Subjects in Science are two year courses.

Physics, Biology and Chemistry are designed for students who achieved highly in Year 10 Mathematics and Science subjects. Students may do as many as three science subjects (Biology, Chemistry, Physics), all are authority subjects.

BIOLOGY	
Pre-Requisites	Sound Achievement or better in Year Ten Science
Why Study Biology?	Biology is the study of the natural systems of the living world. It is characterised by a view of life as a unique phenomenon with fundamental unity. Living processes and systems have many interacting factors that make quantification and prediction difficult. An understanding of these processes and systems requires integration of many branches of knowledge.
What Do Students Study?	<p>Biology is concerned with the study of phenomenon of life in all its manifestations. It encompasses studies of the origin, development, functioning and evolution of living systems and the consequences of intervention in those systems. Understandings are developed in terms of concepts inherent in the principles of biology which are as follows.</p> <ul style="list-style-type: none"> • Survival of species is dependent on individuals staying alive long enough to reproduce. • At every level of organisation in the living world structure and function are interrelated. Each level of organisation in the living world has its own unique aspects and there is continual interaction of structure and function between these levels. • Continuity and change occur at all organisational levels in the living world. Changes may be cyclical or directional. The continuity of life is a balance between all the change processes.
What do Students Do?	<p>Students of Biology will participate in a wide range of activities to develop their knowledge of Biology and their ability to solve problems arising in their everyday experiences.</p> <p>The course places considerable emphasis upon practical work conducted within a laboratory and in the field. There is a minimum time commitment for field work of ten hours. Field work is integrated with the study of the key concepts to help students better understand biological phenomena. During practical activities students learn to examine collected data, suggest hypotheses that explain observations, and design and conduct experiments.</p>
How are Students Assessed?	The assessment program includes a variety of assessment techniques which are integrated with the learning experiences. The achievement level awarded each student on exit from the course is based on the fullest and latest information about student performance on the dimensions of understanding biology, investigating biology and evaluating biological issues.
How Can Parents Help?	Parents should become familiar with the school's work program for the subject. They should encourage their child to read widely in the subject and to remain abreast of recent and current biological developments. Parents should take the opportunity to meet their child's teacher to discuss progress.

This information is taken from the Queensland Studies Authority website www.qsa.qld.edu.au, accessed the 10th September 2005

CHEMISTRY	
Pre-Requisites	A minimum of sound but preferably high achievement in Junior Science and Mathematics
Why Study Chemistry?	<p>The study of Chemistry engages students and teachers in an exciting and dynamic investigation of the material universe. Chemistry provides a platform and conduit in which humankind can interact with and explore matter. This is the essence of Chemistry. Chemistry helps us to understand the links between the microscopic properties of the world and the subatomic particles and forces that account for those properties. The application of chemistry enables us to make sense of the physical world. Understanding and applying chemical concepts, models, procedures and intellectual processes aids in humankind's management of the planet's limited resources and could provide the key to our continuing survival. Chemistry can provide a uniting feature across most scientific undertakings especially where "traditional" science boundaries are becoming blurred.</p> <p>The study of Chemistry provides students with a means of enhancing their understanding of the world around them, a way of achieving useful knowledge and skills and a stepping stone for further study. It adds to and refines the development of students' scientific literacy. An understanding of chemistry is essential for many vocations.</p>
What Do Students Study?	<p>The subject matter of Chemistry is derived from the key concepts and key ideas which are progressively developed over the course of study through six to twelve units of work. The key concepts are organised under the headings of "Structure" and "Reactions".</p> <p>Structure</p> <ul style="list-style-type: none"> • All matter is composed of atoms. • Materials can be categorised and represented symbolically and their macroscopic properties can be explained and predicted from understandings about electronic structure and bonding. <p>Reactions</p> <ul style="list-style-type: none"> • Specific criteria can be used to classify chemical reactions. • Chemical reactions involve energy changes. • The mole concept and stoichiometry enable the determination of quantities in chemical processes. • Specialised qualitative and quantitative techniques are used to determine quantity, composition and type. • Chemical reactions are influenced by the conditions under which they take place and, being reversible, may reach a state of equilibrium.
What do Students Do?	<p>In selecting learning experiences, teachers have many opportunities to offer interesting activities, especially:</p> <ul style="list-style-type: none"> • researching from primary and secondary sources • accessing and using computers, including internet research • undertaking national science initiatives and competitions • developing decision-making skills • interpreting data, from wide-ranging sources including media • analysing current strategies or policies of the issue being investigated • analysing strategies and evaluating effectiveness or improvements • applying the principles of research ethics • formulating hypotheses and testing them through fieldwork, experiments, interviews and research • predicting the impact of recommendations of a science report/experiment • proposing and/or implementing strategies for improvement • solving problems • engaging in active research projects, independently and with groups and teams • participating in forum discussions and debates • sharing information mutually beneficial to the group • Advocating for change.

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How are Students Assessed?	<p>A wide range of assessment techniques are used to determine the relationships between student achievement and the exit criteria of the course (<i>Knowledge and conceptual understanding, Investigative processes, and Evaluating and concluding</i>). Assessment techniques in this syllabus are grouped under categories and may include:</p> <ul style="list-style-type: none"> • Extended Experimental Investigations — within this mandatory category, instruments are developed to investigate a hypothesis or to answer a practical research question • Supervised Assessments — within this mandatory category, instruments such as written tests are used, and conducted under supervised conditions to ensure authentication of student work • Extended Response Tasks — within this category, instruments are developed in response to a chemistry question, circumstance or issue and, while they are essentially non-experimental, they may draw on primary experimental data.
How Can Parents Help?	<p>Parents can help students by:</p> <ul style="list-style-type: none"> • providing a supportive environment in the home • discussing chemistry-related issues, such as those seen on TV documentaries, with their children • providing access to various sources of information • encouraging their children to work cooperatively within the family group • being understanding of the time commitment students may need to devote to the study of Chemistry • Offering their services (if they work in a relevant industry) as guest speakers, work placement providers for students, or demonstrators of skills applicable to particular units of work.

This information is taken from the Queensland Studies Authority website www.qsa.qld.edu.au, accessed 24th June 2008.

PHYSICS	
Pre-Requisites	<p>a) The student must select Maths B as a course of study b) Competency in Physics Extension (Year 10 semester 2 science) c) High Achievement in both Junior Science and Year 10 Mathematics.</p>
Why Study Physics?	<p>The development of understanding of physical phenomena occurs in Physics by means of methods of inquiry that have been refined over the past three hundred years. A culture of physics has emerged that values methods of precise measurement, reproducible experimentation and powerful mathematical relationships. Today, these methods continue to contribute to the development and provision of new information, ideas and theories to explain observations and experiences.</p> <p>The study of Physics provides students with a means of enhancing their understanding of the world around them, a way of achieving useful knowledge and skills and a stepping stone for further study. An understanding of Physics adds to and refines the development of students' scientific literacy.</p>
What Do Students Study?	<p>The subject matter of Physics is derived from the key concepts and key ideas which are progressively developed over the course of study through six to twelve units of work. The key concepts are organised under the headings of Forces, Energy and Motion.</p> <p>Forces</p> <ul style="list-style-type: none"> • The nature of a force. • Forces that act on objects influence their state of equilibrium. • Forces are able to influence the motion and shape of objects. • The forces that act on objects influence their internal energy.
	<p>Energy</p> <p>Energy may take different forms originating from forces between, or relative motion of, particles or objects.</p> <ul style="list-style-type: none"> • Energy is conserved. • Energy transfer processes provide us with different ways of using and dealing with energy and radiation and these have different social consequences and applications. <p>Motion</p> <ul style="list-style-type: none"> • Motion can be described in different ways. • Motion can be analysed in different ways. • Motion can be described using various models and modern theories.
How do students learn?	<p>In selecting learning experiences, teachers have many opportunities to offer interesting activities, especially:</p> <ul style="list-style-type: none"> • researching from primary and secondary sources

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How are students assessed?	<p>Schools use a wide range of assessment techniques to determine the relationships between student achievement and the exit criteria of the course (<i>Knowledge and conceptual understanding, Investigative processes, and Evaluating and concluding</i>). Assessment techniques in this syllabus are grouped under categories and may include:</p> <ul style="list-style-type: none"> • Extended Experimental Investigations — within this mandatory category, instruments are developed to investigate a hypothesis or to answer a practical research question • Supervised Assessments — within this mandatory category, instruments such as written tests are used, and conducted under supervised conditions to ensure authentication of student work <p>Extended Response Tasks — within this category, instruments are developed in response to a Physics question, circumstance or issue and while they are essentially non-experimental they may draw on primary experimental data.</p>
How can parents help?	<p>Parents can help students by:</p> <ul style="list-style-type: none"> • providing a supportive environment in the home • discussing physics issues, such as those seen on TV documentaries, with their children • providing access to various sources of information • encouraging their children to work cooperatively within the family group • being understanding of the time commitment students may need to devote to the study of Physics • Offering their services (if they work in a relevant industry) as guest speakers, work placement providers for students, or demonstrators of skills applicable to particular units of work.