Bachelor of Technology Innovation (Geoscience) (ST50)

Year offered: 2010
Admissions: Yes
CRICOS code: 070694G
Course duration (full-time): 4 years
Domestic fees (indicative): 2010: CSP $2,125 (indicative) per semester
International Fees (indicative): 2010: $11,750 (indicative) per semester
Domestic Entry: February
International Entry: February and July
Past rank cut-off: 77
Past OP cut-off: 12
Assumed knowledge: English (4, SA) and Maths B (4, SA)
Preparatory studies: For information on acquiring assumed knowledge visit http://www.studentservices.qut.edu.au/apply/ug/info/knowledge.jsp
Total credit points: 384
Standard credit points per full-time semester: 96
Course coordinator: Associate Professor Chris Collet
Campus: Gardens Point

Overview
Geoscience is the systematic study of the earth and the dynamic interactions of its systems. Geoscience incorporates a study of the materials of the earth, the natural processes acting in and upon the earth, and its history. Australia has a long history of innovation in the utilisation, recycling and conservation of natural resources and will continue to do so, thus providing for new commercial opportunities in the mining industry.

Career Outcomes
Graduates can build careers in the world of commercialisation and technology transfer of research innovation and complex emerging technologies pertaining to their specific discipline and beyond. Graduates could pursue careers in all aspects of the new product development continuum including business development officers, venture capital associates, investment analysts, commercialisation managers, technology transfer officers, intellectual property analysts, policy development officers and, of course, research scientists.

Professional Recognition
Graduates are eligible for membership of the Australasian Institute of Mining and Metallurgy (AIMM), Australian Institute of Geoscientists (AIG), and the Geological Society of Australia (GSA).

Geoscience Major Course Structure

Year 1 Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCB110</td>
<td>Science Concepts and Global Systems</td>
</tr>
<tr>
<td>SCB111</td>
<td>Chemistry 1</td>
</tr>
<tr>
<td>SCB112</td>
<td>Cellular Basis of Life</td>
</tr>
</tbody>
</table>

Plus ONE of the following four units:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAB101</td>
<td>Statistical Data Analysis 1</td>
</tr>
<tr>
<td>MAB105</td>
<td>Preparatory Mathematics</td>
</tr>
<tr>
<td>MAB120</td>
<td>Algebra and Calculus</td>
</tr>
<tr>
<td>MAB121</td>
<td>Calculus and Differential Equations</td>
</tr>
</tbody>
</table>

NOTE: Students with a Sound Achievement in Maths B and NOT wishing to major in Mathematics or Physics should enrol in MAB101
Students without a Sound Achievement (4 semesters) in Maths B should enrol in MAB105
Students with a Sound Achievement in Maths C and wishing to major in Mathematics or Physics should enrol in MAB121
Students without a Sound Achievement in Maths C and wishing to major in Mathematics or Physics should enrol in MAB120

Year 1 Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>NQB201</td>
<td>Planet Earth</td>
</tr>
<tr>
<td>NQB202</td>
<td>History of Life on Earth</td>
</tr>
<tr>
<td>SCB123</td>
<td>Physical Science Applications</td>
</tr>
<tr>
<td>SCB222</td>
<td>Exploration of the Universe</td>
</tr>
</tbody>
</table>

Year 2 Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>NQB311</td>
<td>Mineralogy</td>
</tr>
<tr>
<td>NQB314</td>
<td>Sedimentary Geology</td>
</tr>
<tr>
<td></td>
<td>Plus TWO units from the relevant options List which may include one unit from outside the Faculty</td>
</tr>
<tr>
<td>NQB302</td>
<td>Earth Surface Systems</td>
</tr>
<tr>
<td>UBD281</td>
<td>Geographic Information Systems</td>
</tr>
</tbody>
</table>

Year 2 Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>NQB411</td>
<td>Petrology of Igneous and Metamorphic Rocks</td>
</tr>
<tr>
<td>NQB412</td>
<td>Structural Geology and Field Methods</td>
</tr>
<tr>
<td></td>
<td>Plus TWO units from the relevant options List which may include one unit from outside the Faculty</td>
</tr>
<tr>
<td>NQB403</td>
<td>Soils and the Environment</td>
</tr>
<tr>
<td>NQB413</td>
<td>Stratigraphy</td>
</tr>
</tbody>
</table>
Year 3 Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSB115</td>
<td>Management</td>
</tr>
<tr>
<td>NQB502</td>
<td>Field Methods in Natural Resource Sciences</td>
</tr>
<tr>
<td>NQB513</td>
<td>Geophysics</td>
</tr>
<tr>
<td>STB551</td>
<td>Engaging with the Innovation Industry</td>
</tr>
</tbody>
</table>

Year 3 Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSB126</td>
<td>Marketing</td>
</tr>
<tr>
<td>MGB223</td>
<td>Entrepreneurship and Innovation</td>
</tr>
<tr>
<td>NQB615</td>
<td>Geochemistry</td>
</tr>
<tr>
<td>NQB612</td>
<td>Basin Analysis and Petroleum Geology</td>
</tr>
<tr>
<td>NQB613</td>
<td>Plate Tectonics</td>
</tr>
<tr>
<td>NQB614</td>
<td>Groundwater Systems</td>
</tr>
</tbody>
</table>

Year 4 Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMB240</td>
<td>Marketing Planning and Management</td>
</tr>
<tr>
<td>LWS007</td>
<td>Introduction To Intellectual Property Law</td>
</tr>
<tr>
<td>MGB324</td>
<td>Managing Business Growth</td>
</tr>
<tr>
<td>STB709-1</td>
<td>Innovation and Commercialisation Project</td>
</tr>
</tbody>
</table>

Year 4 Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSB311</td>
<td>Innovation Commercialisation Strategies</td>
</tr>
<tr>
<td>MGB225</td>
<td>Intercultural Communication and Negotiation Skills</td>
</tr>
<tr>
<td>STB709-2</td>
<td>Innovation and Commercialisation Project</td>
</tr>
<tr>
<td>STB709-3</td>
<td>Innovation and Commercialisation Project</td>
</tr>
</tbody>
</table>

**UNIT SYNOPSIS**

**AMB240 MARKETING PLANNING AND MANAGEMENT**
This unit extends the student's knowledge of the fundamental marketing concepts and theories introduced in the Faculty Core unit in Marketing, by adding further breadth and depth of knowledge of marketing and developing skills in the application of this knowledge to marketing planning and management within the business environment. Emphasis is on the role of the marketing manager at the product management level in undertaking analysis, planning, implementation and control of marketing activities.

**Prerequisites:** BSB126 or CTB126

**Credit points:** 12

**Contact hours:** 3 per week

**Campus:** Gardens Point and Caboolture

**Teaching period:** 2010 SEM-1 and 2010 SEM-2

**BSB115 MANAGEMENT**
The unit provides an introduction to the theories and practice of management and organisations. Emphasis is on the conceptual and people skills that are needed in all areas of management and in all areas of organisational life. The unit acknowledges that organisations exist in an increasingly international environment where the emphasis will be on knowledge, the ability to learn, to change and to innovate. Organisations are viewed from individual, group, corporate and external environmental perspectives.

**Antirequisites:** BSD115  
**Equivalents:** CTB115  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point and Caboolture  
**Teaching period:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**BSB126 MARKETING**
This introductory subject examines the role and importance of marketing to the contemporary organisation. Emphasis is placed on understanding the basic principles and practices of marketing such as the marketing concept, market segmentation, management information systems and consumer behaviour. The unit explores the various elements of the marketing mix, with special reference to product, price, distribution, and promotion, including advertising and public relations. By way of introduction only, key issues relating to services marketing, e-marketing and strategic marketing are also canvassed.

**Antirequisites:** BSB116  
**Equivalents:** CTB126  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point and Caboolture  
**Teaching period:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**BSB311 INNOVATION COMMERCIALISATION STRATEGIES**
Students study strategies and approaches used in industry and government organisations for the research, development and commercialisation of biotechnology innovations. The unit offers the opportunity to read widely as well as in depth about the commercialisation of molecular biology and biotechnology research. Theoretical concepts are integrated with prepared case studies prior to guest speaker seminars.

**Prerequisites:** BSB310 or MGB223  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**LWS007 INTRODUCTION TO INTELLECTUAL PROPERTY LAW**
Intellectual property protection is undoubtedly of paramount importance in the research, development and commercialisation of emerging technologies. Managers and researchers need to be aware of the different types of property that can be protected and how the property needs to be protected. There have also been significant
developments in the field of intellectual property law in recent years. The concepts taught in Introduction to Intellectual Property Law are of significant relevance to persons intending to practice in the emerging fields of science.

**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**MAB101 STATISTICAL DATA ANALYSIS 1**
Experiments, observational studies, sampling, and polls; data and variables; framework for describing and manipulating probability; independence; Binomial and Normal distributions; population parameters and sample statistics; concepts of estimation and inference; standard error; confidence intervals for means and proportions; tests of hypotheses on means and proportions (one sample and two independent samples); inference using tables of counts; modelling relationships using regression analysis; model diagnosis; use of statistical software.

**Antirequisites:** BSB123, EFB101, MAB141, MAN101  
**Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 is assumed knowledge.  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SUM-2, 2010 SEM-1 and 2010 SEM-2

**MAB105 PREPARATORY MATHEMATICS**
This unit is a substitute for Senior Mathematics B for those students who need the equivalent background for the successful study of units which assume it. It includes: basic number facts, natural numbers, integers, rational numbers, real numbers and their operations; basic algebra; functions and equations, graphs, linear functions, equations and applications; systems of linear equations; quadratic, exponential, logarithmic and trigonometric functions, properties and applications; introduction to calculus; rates of change, derivatives, rules of differentiation, second derivatives, maxima and minima and applications; integration and applications. This unit is incompatible with an exit assessment of High Achievement or better in Senior Mathematics B.

**Assumed knowledge:** Year 10 Level 6 Mathematics is assumed knowledge  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1 and 2010 SEM-2

**MAB120 ALGEBRA AND CALCULUS**
This unit introduces and reviews the elementary concepts of function, calculus, matrices and vectors with special reference to applications in science, technology and business where appropriate. Topics covered include the algebra of complex numbers, elementary functions (polynomial, trigonometric, exponential and logarithmic) and their properties, differentiation and integration methods and principles, geometric and algebraic applications of vectors and the solution of linear systems using matrices.

**Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 is assumed knowledge  
**Equivalents:** MAB100, MAB125, MAB180  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**MAB121 CALCULUS AND DIFFERENTIAL EQUATIONS**
This unit extends the areas of function and calculus introduced in MAB120 by introducing series representations for functions and more advanced methods of differentiation and integration for functions of one variable. A strong connection to real world problems is made by introducing the use of differential equations in modelling, and exploring appropriate methods of solution. Practical calculations of volumes and surface areas of solids of revolution extend your interpretations of the definite integral. Taylor and Fourier series are introduced as a means of approximating functions by sums of polynomials and periodic functions. Some more advanced methods for indefinite integrals, such as partial fraction decomposition, are also introduced.

**Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics C (or equivalent) or MAB125 or MAB180 or MAB120 is assumed knowledge  
**Equivalents:** MAB111, MAB126  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1, 2010 SEM-2 and 2010 SUM

**MGB223 ENTREPRENEURSHIP AND INNOVATION**
This unit introduces students to the nature and characteristics of entrepreneurship and innovation and explores the inter-relationship between the two within contemporary economies from managerial perspective. Learning will be directed towards developing the theoretical and applied knowledge, skills, and attitudes that will support and enhance innovation and enterprise creation activity, through the development of a business plan. The unit is designed for those individuals interested in creating a new venture or working in industries as employees of venture owners or those that serve this sector. Students will have opportunity to build a comprehensive plan of their business concept.

**Prerequisites:** BSB115 or CTB115  
**Equivalents:** CTB223  
**Credit points:** 12  
**Contact hours:** 3 per week  
**Campus:** Gardens Point and Caboolture  
**Teaching period:** 2010 SEM-1 and 2010 SEM-2

**MGB225 INTERCULTURAL COMMUNICATION AND NEGOTIATION SKILLS**
The course develops students' abilities to identify and resolve problems in cross-cultural communication or negotiation situations where cultural differences have
created misunderstandings or undesirable or unexpected outcomes. It first explores the concept of 'national culture' by considering the work of major theorists of cultural value dimensions - from Hall to Schwartz. Students are encouraged to analyse communication/negotiation process issues in terms of these value dimensions and to practise managing the process of communication/negotiation to improve their outcomes.

**Pre-requisites:** BSB115, CTB115, BSB119 or BSB124

**Equivalent:** IBB205

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**MGB324 MANAGING BUSINESS GROWTH**

This unit is designed to provide skills in the analysis, solutions and implementation of the general management issues that SME owners have to manage in their growing operations. The unit brings together the different functional aspects of managing an established SME and how they are best managed from the owner's (general manager's) point of view. It also provides opportunity to bring students into contact with real world SME owners and their venture management issues.

**Pre-requisites:** MGB223  
**Equivalent:** MGB218

**Credit points:** 12  
**Contact hours:** 3  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**NQB201 PLANET EARTH**

Earth Science impacts every aspect of modern life. Hence, the concepts of Earth Science are fundamental not only to the field of Geology, but also to Environmental Science, natural resource management, civil engineering and society at large. Planet Earth provides an introduction to Earth Science, including earth materials, geologic history, geological process at the Earth's surface, and the complex interplay between the lithosphere, atmosphere, hydrosphere and biosphere through geologic time. Thus, Planet Earth is a foundation unit for further studies in Geology and Environmental Science and also serves as a broad introduction to the world we live on.

**Equivalent:** NRB230

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**NQB202 HISTORY OF LIFE ON EARTH**

This unit provides an introduction to the history and development of life on Earth with an emphasis on fundamental biological and ecological principles as they have operated through geological time. The unit provides the student with an understanding of the processes of evolution, extinction and the changing environmental conditions through Earth's history. The unit provides the student with practical experience in fossil identification, classification and morphological interpretation. It provides the student with a "deep-time" perspective of climate and other environmental changes affecting modern ecosystems. Hence, History of Life on Earth is a foundation unit for the Earth and Environmental Sciences as well as Ecology, Biological Sciences and Education.

**Equivalent:** NRB240

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-2

**NQB302 EARTH SURFACE SYSTEMS**

Understanding long and short term climate and environmental change is now recognised as crucial to the interpretation of our biotic, geomorphic and cultural landscapes. To fully understand environment change it is important to recognise the interconnectedness between the atmosphere, hydrosphere, lithosphere, biosphere and humanity's place within these spheres over various temporal and spatial scales. Developing knowledge of past and present climate change and landscaping processes helps to predict future process pathways for natural resource management, civil engineering, risk analysis, and impact assessment in the context of both natural and anthropogenic induced change.

**Assumed knowledge:** NQB201 is assumed knowledge.

**Equivalent:** NRB301

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**NQB311 MINERALOGY**

Minerals are the building blocks of rocks which comprise the solid Earth. The study of minerals is essential for understanding the structure and composition of the earth and the detailed processes of the rock cycle. Mineralogy forms the basis for petrology (the study of the genesis of rocks) and geochemistry, and is thus essential for Geoscience. The unit may also be of interest to chemists.

**Equivalent:** NRB333

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

**NQB314 SEDIMENTARY GEOLOGY**

This unit provides students with an introduction to sedimentology; both sediments and sedimentary rocks. The unit focuses on the link between the range of features preserved in sedimentary rocks and what those features tell us about sedimentary processes, depositional environments and the burial history of the rocks. The sedimentological processes and depositional environments observed in the modern world are discussed and used as a foundation for interpreting the evidence preserved in the ancient sedimentary rock record, in turn revealing much about earth processes in geologic history.

**Assumed knowledge:** NQB201 is assumed knowledge.

**Equivalent:** NRB331

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1
NQB403 SOILS AND THE ENVIRONMENT
Soils are the most dynamic component of Earth surface processes, being the interface of the lithosphere and the atmosphere and a key system within the biosphere and the hydrosphere. It is, therefore, one of the most critical resources to consider within the context of climate change. This unit will provide you with grounding in soil science by emphasising pedological principles, their application to environmental soil analysis and management, and knowledge of ecosystem function of soils in a changing environment. The unit would provide experience in describing and classifying soils and soil materials as well as field experience in the investigation of soil processes and the assessment of resource potential and environmental hazard.

Prerequisites: NQB302 or NRB301 or (ENB272 and ENB274)  Credit points: 12  Contact hours: 4 per week  
Campus: Gardens Point  Teaching period: 2010 SEM-2

NQB411 PETROLOGY OF IGNEOUS AND METAMORPHIC ROCKS
This unit includes an introduction to the description, classification and origin of igneous and metamorphic rocks and practical development of lithologic and petrographic abilities to identify mineral assemblages, classify rocks, and interpret textures. Field and theoretical constraints on the petrogenesis of rocks are discussed in lecture. Field study is an essential component of the unit. This unit builds upon the knowledge and skills acquired in the prerequisite unit (NQB311 Mineralogy).

Prerequisites: NQB311 or NRB333  Equivalents: NRB436  Credit points: 12  Contact hours: 4 per week  
Campus: Gardens Point  Teaching period: 2010 SEM-2

NQB412 STRUCTURAL GEOLOGY AND FIELD METHODS
Structural geology, the deformation of earth materials, is one of the main elements in the core curriculum in geology. It is also essential to other subdisciplines of geology, such as foundation engineering and petroleum and mineral exploration. Geologists need to be able to describe and map structures, to understand the mechanical principles of rock deformation, and to be able to manipulate and calculate structural data.

Prerequisites: NQB314 or NRB331  Equivalents: NRB434  Credit points: 12  Contact hours: 4 per week  
Campus: Gardens Point  Teaching period: 2010 SEM-2

NQB413 STRATIGRAPHY
Sedimentary rocks that cover most of the Earth’s surface are arranged into layers that record the history of the Earth’s surface for large periods of geological time. The study of sedimentary rock layers (strata) is called stratigraphy. The types of sedimentary rocks that are preserved in particular strata are direct indications of the conditions that prevailed during their formation. The study of stratigraphy can help unravel the geological history of the area. Hence, stratigraphy is a fundamental part of the education of any geoscientist, and especially of those who wish to be involved in fossil fuel exploration and water resource management.

Prerequisites: NQB314 or NRB331  Equivalents: NRB437  Credit points: 12  Contact hours: 4 per week  
Campus: Gardens Point  Teaching period: 2010 SEM-2

NQB502 FIELD METHODS IN NATURAL RESOURCE SCIENCES
Field experience is an essential part of the professional training of geologists, environmental scientists, ecologists, and natural resource specialists in general. The theory and practice of methods to interpret, measure, map, and monitor important natural resource features and characteristics are essential to the study of geological, ecological and environmental systems. Methods of survey, mapping and interpretation are necessary skills for resource assessment, geo-exploration, environmental impact assessment, land evaluation, baseline studies, and ecological investigations. There are varying emphases on these outcomes depending on the type of field survey you undertake in this unit.

Prerequisites: (NQB321 or NQB411) and (NQB302 or NQB412)  Assumed knowledge: 36 credit points of second level science units in selected major is assumed knowledge. NQB302 and NQB403 for Env Sc, NQB321 for Ecol, NQB411 and NQB412 for Geosc  Equivalents: NRB601  Credit points: 12  Contact hours: 4 per week  
Campus: Gardens Point  Teaching period: 2010 SEM-1

NQB513 GEOPHYSICS
Geophysics is an integral branch of geology, providing many of the most useful methods of imaging the subsurface of the earth. These methodologies are useful in disciplines as diverse as plate tectonics, oil and mineral exploration, hydrogeology, environmental geology, engineering geology, and seismic hazards.

Prerequisites: (NQB201 or NRB230) and (NQB412 or NQB434)  Equivalents: NRB534  Credit points: 12  Contact hours: 4 per week  
Campus: Gardens Point  Teaching period: 2010 SEM-1

NQB612 BASIN ANALYSIS AND PETROLEUM GEOLOGY
This unit provides students with a fundamental working knowledge of sedimentary strata at regional and basin-wide scales, and enables them to solve problems in the exploration for hydrocarbons and other stratabound resources. It deals with the tectonic settings, styles of subsidence, patterns of sedimentary fill, thermal and diagenetic histories and resource distribution within sedimentary basins. Integrated lithostratigraphic, structural and sequence stratigraphic interpretation methods are taught for the analysis of sedimentary basins.
biostratigraphic, sequence stratigraphic, geophysical, and geochemical data sets are introduced as fundamental aspects of basin analysis. The unit develops an understanding of exploration and production aspects of the oil and gas industries.

**Prerequisites:** (NQB413 or NRB437) and (NQB513 or NRB534). NQB513 can be studied in the same teaching period as NQB612  
Equivalents: NRB636  
Credit points: 12  
Contact: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**NQB613 PLATE TECTONICS**  
This unit considers geological observations in the context of a unifying theory. It examines lithospheric plates, plate geometries, Earth morphology, relative and absolute plate movements, stresses of plate interactions, types of plate boundaries, and orogenesis. It also examines the development of the most important geologic theory of the 20th century.

**Prerequisites:** (NQB412 or NRB434) and (NQB314 or NRB331) and (NQB411 or NRB436) and (NQB513 or NRB534). NQB513 can be studied in the same teaching period as NQB613  
Equivalents: NRB635  
Credit points: 12  
Contact: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**NQB614 GROUNDWATER SYSTEMS**  
This unit focuses on the origin, occurrence and movement of groundwater; aquifer properties; chemistry and quality of groundwater; exploration methods for groundwater; drilling methods and well testing equipment; assessment of groundwater problems, both supply and quality; and introduction to modelling of groundwater systems. Groundwater resources of Australia are covered and current issues. Lectures are supported by desktop exercises. Students will obtain practical experience with pump tests and computer modelling. There is interaction with government and private sector hydrogeologists, and a field site visit for hands-on well testing.

**Prerequisites:** NQB302 or NRB301 or ENB383  
Equivalents: NRB633  
Credit points: 12  
Contact: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**NQB615 GEOCHEMISTRY**  
Through lecture, discussion and problem solving exercises, this unit introduces the application of geochemistry, phase equilibria, and thermodynamics to demonstrate the origin and evolution of igneous and metamorphic rocks. Problem-solving exercises synthesise field, petrographic and geochemical data to develop quantitative petrogenetic models and enhance critical thinking and written communication skills. Field study is an important component of this unit.

**Equivalents:** NRB536  
Credit points: 12  
Contact: 4 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2

**SCB110 SCIENCE CONCEPTS AND GLOBAL SYSTEMS**  
You will undertake interdisciplinary study of the physical, geological and biological concepts relating to the origins of life; from the creation of matter and planets, to the emergence of life in all its complexity, culminating in evolution of earth ecosystems. Human influences, overlaid upon earth’s complex systems, will be examined as to their type, extent, and impact. In counterpart, you will explore the breadth of philosophical developments underlying our search for knowledge; fundamental thoughts and ideas that span the last 2,500 years of human history. Ultimately, these concepts evolved through the development of a scientific method and we explore its workings in relation to the ongoing enterprise of human understanding.

Credit points: 12  
Contact: 4.5 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-1

**SCB111 CHEMISTRY 1**  
This unit covers the fundamentals of general and physical chemistry. Topics include atomic and molecular structure, introduction to chemical bonding, reaction stoichiometry, thermochemistry, gas phase chemistry, reaction kinetics, equilibrium, acids, bases, buffers, oxidation, reduction and electrochemistry. The practical program involves experiments illustrating a range of chemical reaction types including precipitation reactions, acid-base chemistry and redox chemistry using analytical experimental methods. A comprehensive tutorial program (CHELP) complements the lectures and is designed to assist students to develop the problem solving skills required for further study in chemistry and related sciences.

**Antirequisites:** SCB113  
Credit points: 12  
Contact: 4.5 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-1 and 2010 SEM-2

**SCB112 CELLULAR BASIS OF LIFE**  
A study of life processes in all five groups of living organisms (bacteria, protists, fungi, plants and animals). Traditional topics in biology are integrated with recent research advances in molecular and cellular biology to provide a comprehensive foundation for later units in the medical, biotechnological and ecological sciences. The unit begins by constructing cells from the four quantitatively important groups of biological molecules (proteins, lipids, carbohydrates and nucleic acids). Molecular and evolutionary aspects of genetics are then introduced, with the great diversity of reproductive strategies found among organisms being emphasised. Finally, bioenergetics (photosynthesis and respiration) and its relevance to environmental issues is outlined.

**Antirequisites:** LSB118  
Credit points: 12  
Contact: 4.5 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-1 and 2010 SEM-2
SCB123 PHYSICAL SCIENCE APPLICATIONS
Physics principles underpin all of the sciences and 'new technologies'. This unit adopts an investigative team-based approach to provide students with an appreciation of fundamental concepts in physical science, together with experience in the application of these concepts to a range of 'real world' problems. The unit should be taken in the first year of study as the fundamental principles introduced here will be built upon in later units in the context of each science student's major discipline area. Employers in cutting-edge industries expect science graduates to have effective strategies for problem solving, skills for collaborative work and scientific communication and research skills. This unit aims to develop these skills by applying the fundamental concepts of physical science to problems in a team environment.

Credit points: 12  
Contact hours: 4.5 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-1 and 2010 SEM-2

SCB222 EXPLORATION OF THE UNIVERSE
This unit provides an introduction to optical observational astronomy; instrumentation; celestial sphere and astronomical coordinates; observations of constellations, stars, planets, clusters and other interesting celestial objects. The theory includes: optics of telescopes; properties of light; determination of physical properties of stars; nebulae; stellar spectra and classification; historical models of the solar system; Kepler's law, gravitation; physical geology of the planets and formation of the solar system; phenomena of astronomical origin; brief introduction to stars and galaxies. This course includes practical exercises and field trips.

Credit points: 12  
Contact hours: 5 per week  
Campus: Gardens Point  
Teaching period: 2010 SEM-2