Bachelor of Applied Science/Bachelor of Games and Interactive Entertainment (IX65)

Year offered: 2011
Admissions: Yes
CRICOS code: 063032D
Course duration (full-time): 4 years
Domestic Fees (indicative): 2011: CSP $3,300 (indicative) per semester
International Fees (indicative): 2011: $11,500 (indicative) per semester
Domestic Entry: February
International Entry: February
QTAC code: 418682
Past rank cut-off: 76
Past OP cut-off: 12
OP Guarantee: Yes
Assumed knowledge: English (4,SA), Maths B (4,SA)
Preparatory studies: For information on acquiring assumed knowledge visit http://www.qut.edu.au/assumed-knowledge
Total credit points: 384
Standard credit points per full-time semester: 48
Course coordinator: Dr Perry Hartfield (Science), Michael Docherty (Information Systems)
Discipline coordinator: Dr Perry Hartfield (Biochemistry Major); Dr Marion Bateson (Biototechnology Major); Dr John McMurtrie (Chemistry Major); Dr Ian Williamson (Ecology Major); Dr Robin Thwaites (Environmental Science Major); Dr Emad Kiriakous (Forensic Science Major); Dr Gary Hufitle (Geoscience Major); Dr Christine Knox (Microbiology Major); Dr Greg Michael (Physics Major)
Campus: Gardens Point

Career Outcomes
Knowledge of science underpins more than you might think. As a graduate of the Applied Science/Games and Interactive Entertainment double degree you may find work as a graphic/games designer. You may work on such things as making car games realistic, making people move more realistically using your knowledge of the laws of motion, or creating three-dimensional games.

Professional Recognition
Graduates will satisfy the requirements of membership in the relevant professional body for their chosen science major. See Studyfinder for details on the Bachelor of Applied Science majors. The software technologies major of the Bachelor of Games and Interactive Entertainment is accredited by the Australian Computer Society (ACS). ACS accreditation is internationally recognised by the Seoul Accord.

Cooperative Education Program
The Faculty’s Cooperative Education Program gives you the opportunity of 10-12 months paid industry placement during your course where you can integrate real experience with what you’re learning in your degree. Companies that QUT’s Coop Ed students have worked with include Energex, Boeing, CITEC, CSC Mining, Environmental Protection Agency, Dialog, UNiTAB, RACQ and many Queensland Government departments. The Coop Ed Program is available to Australian citizens and permanent residents only.

Find out more about the Cooperative Education Program.

Unit Incompatibility/Translation Information
Details on the translation and incompatibility of old and new units is located here: Undergraduate Translation Table
If you have completed the unit(s) listed under the “Translation Unit Codes” column you are not permitted to enrol in the listed new code.

Limits on grades of 3
A new policy concerning grades of 3 came into effect from 1 January 2009 (QUT MOPP C/5.2). With effect from this date grades of 3 are no longer considered a conceded or low pass but are classified as a fail grade. Any grades of 3 awarded prior to 1 January 2009 retain the conceded pass status and will be counted for graduation purposes up to the maximum number of grades of 3 permitted for your course. Grades of 3 incurred in units that commence after 1 January 2009 will not count towards your degree. Further information is available on the Student Services website

Further Information
For further information about this course, please contact the following:

Games and Interactive Entertainment Coordinator
Michael Docherty
Phone: +61 7 3138 2782
Email: enquiry.scitech@qut.edu.au

Science Coordinator
Dr Perry Hartfield
Phone: +61 7 3138 2984
Email: p.hartfield@qut.edu.au

Discipline Coordinators
## Bachelor of Applied Science (Study Area A)/Bachelor of Games and Interactive Entertain (Study Area A)

### Year 1, Semester 1
- **Applied Science Unit**
- **Applied Science Unit**

### Year 1, Semester 2
- **Introduction to Games Production**
- **Building IT Systems**
- **Industry Insights**
  - **Games & Interactive Entertainment Major Unit**

### Year 2, Semester 1
- **Industry Insights**
- **Games & Interactive Entertainment Major Unit**
- **Games & Interactive Entertainment Major Unit**

### Year 2, Semester 2
- **Applied Science Unit**
- **Applied Science Unit**
- **Games & Interactive Entertainment Major Unit**
- **Games & Interactive Entertainment Major Unit**

### Year 3, Semester 1
- **Applied Science Unit**
- **Applied Science Unit**
- **Games & Interactive Entertainment Major Unit**
- **Games & Interactive Entertainment Major Unit**

### Year 3, Semester 2
- **Applied Science Unit**
- **Applied Science Unit**
- **Games & Interactive Entertainment Major Unit**
- **Games & Interactive Entertainment Major Unit**

### Year 4, Semester 1
- **Applied Science Unit**
- **Applied Science Unit**
- **Game Project Design**
  - **Games & Interactive Entertainment Major Unit**

### Deferment
Domestic students can defer their offer in this course for one year. In exceptional circumstances up to 12 months of additional deferment may be granted.

Find out more on deferment.
**Year 4, Semester 2**  
Applied Science Unit  
INB380 Games Project  

**Course structure - Major in Biochemistry**

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<th>Year 1, Semester 1</th>
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<tbody>
<tr>
<td>SCB111 Chemistry 1</td>
<td>SCB112 Cellular Basis of Life</td>
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<tr>
<th>Year 1, Semester 2 (Life Sciences Pre-Major Strand)</th>
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<tr>
<td>SCB120 Plant and Animal Physiology</td>
<td>SCB121 Chemistry 2</td>
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| SCB110 Science Concepts and Global Systems  
| Plus either: |  |  |  |  |  |
| MAB101 Statistical Data Analysis 1 |  |  |  |  |  |
| Or |  |  |  |  |  |
| MAB105 Preparatory Mathematics |  |  |  |  |  |

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<tr>
<td>SCB122 Cell and Molecular Biology</td>
<td>SCB123 Physical Science Applications</td>
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<tr>
<td>LQB381 Biochemistry: Structure and Function</td>
<td>LQB383 Molecular and Cellular Regulation</td>
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| LQB481 Biochemical Pathways and Metabolism  
| LQB483 Molecular Biology Techniques |  |  |  |  |  |

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<td>LQB581 Functional Biochemistry</td>
<td>LQB582 Biomedical Research Technologies</td>
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<td>LQB681 Biochemical Research Skills</td>
<td>LQB682 Protein Biochemistry and Bioengineering</td>
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<tr>
<td>LQB583 Genetic Research Technology</td>
<td>LQB584 Medical Cell Biology</td>
<td>LQB585 Plant Genetic Manipulation</td>
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<td>LQB682 Protein Biochemistry and Bioengineering</td>
<td>LQB684 Medical Biotechnology</td>
<td>LQB685 Plant Microbe Interactions</td>
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**Course structure - Major in Biotechnology**

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### Course structure - Major in Chemistry

#### Year 1, Semester 2 (Chemistry Pre-Major Strand)
- SCB112 Cellular Basis of Life
- SCB121 Chemistry 2

#### Year 2, Semester 1
- MAB120 Algebra and Calculus
- SCB110 Science Concepts and Global Systems

#### Year 2, Semester 2
- SCB123 Physical Science Applications
- SCB131 Experimental Chemistry

#### Year 3, Semester 1
- PQB312 Analytical Chemistry For Scientists and Technologists
- PQB331 Structure and Bonding

#### Year 3, Semester 2
- PQB401 Reaction Kinetics, Thermodynamics and Mechanisms
- PQB442 Chemical Spectroscopy

#### Year 4, Semester 1
- PQB502 Advanced Physical Chemistry
- PQB531 Organic Mechanisms and Synthesis

#### Year 4, Semester 2
- PQB631 Advanced Inorganic Chemistry
- PQB642 Chemical Research

### Course structure - Major in Ecology

#### Year 1, Semester 2 (Ecology and Environmental Science Pre-Major Strand)
- SCB112 Cellular Basis of Life

#### Year 2, Semester 1
- SCB120 Plant and Animal Physiology
- SCB122 Cell and Molecular Biology

#### Year 2, Semester 2
- SCB110 Science Concepts and Global Systems
  
  Plus either:
  
  - MAB101 Statistical Data Analysis 1
  - MAB105 Preparatory Mathematics

#### Year 3, Semester 1
- NQB202 History of Life on Earth
- SCB123 Physical Science Applications

#### Year 3, Semester 2
- NQB302 Earth Surface Systems
- NQB321 Ecology
Course structure - Major in Forensic Science

Year 1, Semester 1

SCB111 Chemistry 1
SCB112 Cellular Basis of Life

Year 1, Semester 2 (Forensic Science Pre-Major Strand)

SCB121 Chemistry 2
SCB122 Cell and Molecular Biology

Year 2, Semester 1

SCB110 Science Concepts and Global Systems
MAB101 Statistical Data Analysis 1
MAB105 Preparatory Mathematics

Year 2, Semester 2

SCB123 Physical Science Applications
SCB131 Experimental Chemistry

Year 3, Semester 1

LQB383 Molecular and Cellular Regulation
SCB384 Forensic Sciences - From Crime Scene to Court

Year 3, Semester 2

JSB979 Forensic Scientific Evidence
PQB312 Analytical Chemistry For Scientists and Technologists

Year 4, Semester 1

PQB513 Instrumental Analysis
PQB584 Forensic Physical Evidence

Year 4, Semester 2

LQB680 Forensic DNA Profiling
PQB684 Forensic Analysis

Course structure - Major in Geoscience

Year 1, Semester 1

SCB111 Chemistry 1
SCB112 Cellular Basis of Life

Year 1, Semester 2 (Geoscience Pre-Major Strand)

NQB201 Planet Earth
SCB123 Physical Science Applications

Year 2, Semester 1

SCB110 Science Concepts and Global Systems
MAB101 Statistical Data Analysis 1
Or
MAB105 Preparatory Mathematics

Year 2, Semester 2

NQB202 History of Life on Earth
SCB222 Exploration of the Universe

Year 3, Semester 1

NQB311 Mineralogy
NQB314 Sedimentary Geology

Year 3, Semester 2

NQB411 Petrology of Igneous and Metamorphic Rocks
NQB412 Structural Geology and Field Methods

Year 4, Semester 1

NQB502 Field Methods in Natural Resource Sciences
NQB513 Geophysics

Year 4, Semester 2

NQB613 Plate Tectonics
NQB615 Geochemistry

Course structure - Major in Microbiology

Year 1, Semester 1

SCB111 Chemistry 1
SCB112 Cellular Basis of Life

Year 1, Semester 2 (Life Sciences Pre-Major Strand)
SCB120  Plant and Animal Physiology
SCB121  Chemistry 2

Year 2, Semester 1

SCB110  Science Concepts and Global Systems
Plus either:
MAB101  Statistical Data Analysis 1
Or
MAB105  Preparatory Mathematics

Year 2, Semester 2

SCB110  Science Concepts and Global Systems
SCB112  Cellular Basis of Life

Year 2, Semester 1

SCB110  Science Concepts and Global Systems
SCB112  Cellular Basis of Life

Year 2, Semester 2

SCB122  Cell and Molecular Biology
SCB123  Physical Science Applications

Year 3, Semester 1

LQB381  Biochemistry: Structure and Function
LQB386  Microbial Structure and Function

Year 3, Semester 2

LQB483  Molecular Biology Techniques
LQB486  Clinical Microbiology 1

Year 4, Semester 1

LQB586  Clinical Microbiology 2
LQB587  Applied Microbiology 1: Water, Air and Soil

Year 4, Semester 2

LQB686  Microbial Technology and Immunology
LQB687  Applied Microbiology 2: Food and Quality Assurance

Year 4, Semester 1

LQB586  Clinical Microbiology 2
LQB587  Applied Microbiology 1: Water, Air and Soil

Year 4, Semester 2

LQB686  Microbial Technology and Immunology
LQB687  Applied Microbiology 2: Food and Quality Assurance

Course structure - Major in Physics

Year 1, Semester 1

MAB121  Calculus and Differential Equations
Or
SCB111  Chemistry 1
MAB120  Algebra and Calculus
Students who have completed only Maths B are required to take MAB120. Students who have completed both Maths B and Maths C should take MAB121.

Year 1, Semester 2 (Physics Pre-Major Strand)

MAB122  Algebra and Analytic Geometry
PQB250  Mechanics and Electromagnetism

Year 2, Semester 1

MAB220  Computational Mathematics 1
Or
MAB121  Calculus and Differential Equations
PQB251  Waves and Optics

Year 3, Semester 1

MAB311  Advanced Calculus
PQB350  Thermodynamics of Solids and Gases

Year 3, Semester 2

PQB450  Energy, Fields and Radiation
PQB451  Electronics and Instrumentation

Year 4, Semester 1

PQB550  Quantum and Condensed Matter Physics
PQB551  Physical Analytical Techniques

Year 4, Semester 2

PQB650  Advanced Theoretical Physics
PQB651  Experimental Physics

Potential Careers:

UNIT SYNOPSES

INB103 INDUSTRY INSIGHTS

This unit aims to develop your awareness of the career possibilities in the ICT industry and to equip you with some of the essential skills required of an ICT professional. The unit helps you to derive a roadmap for your career; to enable you to identify the qualities, skills and interests you need to possess, to plan your career path. The unit will also
introduce you the inter-disciplinary nature of ICT careers.

**Equivalents**: ITB002  
**Credit points**: 12  
**Contact hours**: 3 per week  
**Campus**: Gardens Point  
**Teaching period**: 2011 SEM-1 and 2011 SEM-2

**INB104 BUILDING IT SYSTEMS**

Today's modern integrated technology is built on IT systems which run in a range of contexts (e.g. mobile computing, robotics, and web-based systems) using a range of technological solutions such as programming and scripting, databases, web development and network programming. This unit is an integrated introduction to information technology designed to engage, inspire and inform and will demonstrate the important role that technical system design and development plays in achieving robust operation of a large variety of technological solutions. This unit will give you substantial hands-on, practical learning experiences and will motivate you through engagement in the creative, explorative and meaningful development of technological artefacts that operate in real world contexts.

**Equivalents**: ITB001  
**Credit points**: 12  
**Contact hours**: 3 per week  
**Campus**: Gardens Point  
**Teaching period**: 2011 SEM-1 and 2011 SEM-2

**INB180 COMPUTER GAMES STUDIES**

This unit is designed to give you a clear understanding of the socio-cultural issues that affect the computer game industry. Through critical review of games and games industry literature, playing games and actively participating in classroom discussion you will develop your capacity to join in the discourse about the design, impact and future direction of computer games in our society.

**Antirequisites**: INN180, ITB750  
**Credit points**: 12  
**Contact hours**: 3 per week  
**Campus**: Gardens Point  
**Teaching period**: 2011 SEM-1

**INB181 INTRODUCTION TO GAMES PRODUCTION**

This subject will provide you with knowledge and skills in games production. By gaining an overview of the production process, you will learn how the technology and the people involved integrate into a coherent and efficient manufacturing process. By the end of this subject you will have the knowledge to conceive, create, integrate and optimise tools and personnel into a complete games production system.

**Antirequisites**: INN181  
**Credit points**: 12  
**Contact hours**: 3 per week  
**Campus**: Gardens Point  
**Teaching period**: 2011 SEM-2

Please note: this unit is only available to BGIE (Bachelor of Games and Interactive Entertainment) students. The act of designing is a common link between many disciplines such as game design, software design, animation and character design, architecture, industrial design, etc. This unit offers a broad and generic introduction to the act of designing in a discipline context free environment.

This unit is designed to expose you to a range of experiences not possible within the confines of the usual university routine. It also calls upon you to exert physical and mental efforts that may be different in degree and nature to your usual coursework. Through these opportunities this unit seeks to introduce to you the ways of thinking like a designer.

**Antirequisites**: DEB101  
**Credit points**: 12  
**Contact hours**: 4 per week  
**Campus**: Gardens Point  
**Teaching period**: 2011 SEM-1

**INB379 GAME PROJECT DESIGN**

INB379 BGIE Game Project Design (P1) extends your work on the role, design, and plan of a computer game concept. The unit covers the conceptualisation and game design stages up to the game design pitch. If the project is given a green light by the assessment panel, it may be developed later in the P2 unit.

**Prerequisites**: Completion of 144 credit points of study  
**Antirequisites**: ITB009  
**Assumed knowledge**: Completion of at least 144 credit points of IT04 units, including including all first year core units is assumed  
**Credit points**: 12  
**Contact hours**: 1 hour lecture - 2 hour supervisor meetings  
**Campus**: Gardens Point  
**Teaching period**: 2011 SEM-1 and 2011 SEM-2

**INB380 GAMES PROJECT**

This unit seeks to give you the opportunity to apply, under appropriate guidance, the knowledge and skills gained in your course to date and to execute a substantial related project. The unit also aims to allow you to develop the critical professional skills of working within a cross-disciplinary team and, through implementation of your project, develop the understanding of the role of careful planning, scope control and task management in ensuring that the project is successful.

**Prerequisites**: INB379 or INB305  
**Antirequisites**: ITB020  
**Assumed knowledge**: Students undertaking this unit must be enrolled in the Bachelor of Games and Interactive Entertainment  
**Credit points**: 24  
**Contact hours**: 3 per week  
**Campus**: Gardens Point  
**Teaching period**: 2011 SEM-1 and 2011 SEM-2

**JSB979 FORENSIC SCIENTIFIC EVIDENCE**
The word ‘forensic’ once meant anything relating to a law court. However today the term ‘forensic science’ refers to a whole new subject: it means using science to solve legal issues. As science, and the many sub-disciplines of science, are appearing in court with ever-increasing rapidity, there is a clear need for scientists to understand the foundations to the law, the ways in which law reasons, the adversarial process, and the basics to the key area of evidence law. The aim of this unit is first to provide you with an understanding of evidence law, with a particular emphasis upon the foundations to reception of scientific evidence, and the ways in which expert scientific witnesses are received in our courts. The unit aims to clarify the links between science and law, as well as to articulate the differences between these two increasingly inter-twined disciplines.

**Prerequisites:** SCB112 and (SCB121 or SCB113)  
**Antirequisites:** LSB328  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**LQB381 BIOCHEMISTRY: STRUCTURE AND FUNCTION**  
This unit extends basic organic chemistry theory to the level of the biological macromolecules. A clear understanding of the structure and function of these molecules is essential to a student’s understanding of the metabolism of living cells. Hence this biomolecular unit is a fundamental prerequisite for all advanced units in the various disciplines in the field of life sciences.  
**Prerequisites:** (SCB121 and SCB122) or (SCB111 and SCB121) or SCB113  
**Antirequisites:** LSB275 and LSB325 and LSB308  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**LQB383 MOLECULAR AND CELLULAR REGULATION**  
Molecular and Cellular Regulation is a second year unit and is a continuation and expansion of topics introduced in SCB112 Cellular Basis of Life and SCB122 Cell & Molecular Biology. Molecular and Cellular Regulation strengthens the focus on the molecular and genetic aspects of cellular processes and the consequences to the organism of failure of these basic processes. Topics taught relate to gene structure and regulation in prokaryotes and eukaryotes and the role of gene expression in the development of complex organisms. Related concepts such as cell signalling, communication, proliferation and survival are further developed in this unit.  
**Prerequisites:** SCB122 or LSB238  
**Antirequisites:** LSB468 and LSB338  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**LQB386 MICROBIAL STRUCTURE AND FUNCTION**  
Aspects of microbiology impinge upon many facets of daily life, for example, human health, genetic engineering, the food industry and the built and natural environment. The unit introduces you to and provides you with a solid foundation in the basic microbiology required for progression to advanced studies in Microbiology. This unit provides knowledge about safe handling and study of micro-organisms that is also very important in many other disciplines, because micro-organisms are used as models and tools in a wide range of study areas.  
**Prerequisites:** SCB112 and (SCB121 or SCB113)  
**Antirequisites:** LSB328  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**LQB481 BIOCHEMICAL PATHWAYS AND METABOLISM**  
The study of biochemistry and cell biology, along with molecular biology, provides students with the knowledge required for the proper understanding of the structure and function of living organisms at the molecular level. As such, this unit extends the studies begun in the unit LQB381 Biochemistry into the metabolic processes occurring in living cells, and provides students with a basis for further studies in biochemistry as well as support for other units in the third year of the course.  
**Prerequisites:** LQB381 or LSB308  
**Corequisites:** PUB405  
**Antirequisites:** LSB275, LSB325, LSB408  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**LQB483 MOLECULAR BIOLOGY TECHNIQUES**  
Molecular biology and recombinant DNA technologies have important roles in many areas within the life sciences, including medicine, agriculture, cell biology, environmental science and forensics. Through close alignment of theoretical concepts and practical skills, this lab-based unit expands on molecular themes introduced in earlier cell and molecular biology units to develop expertise in modern recombinant DNA techniques and an understanding of strategies used to identify and manipulate genes. The close relationship between theory and practice in this unit is designed to develop competence, independence and critical thinking that will provide students with a solid foundation for advanced molecular biology studies presented in several third level units.  
**Prerequisites:** LSB238 or SCB122  
**Antirequisites:** LSB468, LSN468, LSN483  
**Assumed knowledge:** LQB383 is recommended prior study  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**LQB484 INTRODUCTION TO GENOMICS AND BIOINFORMATICS**  
The completion of the Human Genome project, along with similar projects on other organisms of a prokaryote and eukaryote nature, marked the beginning of a major revolution in fundamental biology that changed our
having a significant impact in many areas of the life sciences. The true potential for this ultimately relies on the ability to link genes and their function. There are many strategies, both targeted and global, which facilitate an understanding of gene and genome structure function relationships. These strategies rely on integrated technologies based on molecular genetics, molecular biology and genetic engineering. The identification of function leads then to unlimited potential for detection and manipulation of these genes in human, animal and plant systems.

Prerequisites: LQB483  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

LQB584 MEDICAL CELL BIOLOGY
This unit builds and extends the understanding of basic theoretical and practical aspects of molecular cell biology developed in previous cell and molecular biology units. Medical Cell Biology develops and extends the context of the cellular environment and its central role within the organism providing all of the biological functions required by the organism to survive, defend and protect itself from disease and trauma. An understanding of cell biology theory and molecular mechanisms of animal development and disease is essential for introduction to higher level units in medical biotechnology.

Prerequisites: LQB383 or LSB338  Antirequisites: LSB449, LSB503, LSN584  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

LQB585 PLANT GENETIC MANIPULATION
The potential of plant biotechnology can only be recognised as a result of the significant advances being made in technologies enabling the genetic manipulation of plants. Familiarity with the strategies, techniques and breadth of applications is essential as a basis for anyone planning a career in plant biotechnology. The unit is designed with a significant emphasis on achieving technical expertise in plant genetic manipulation and control of gene expression.

Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

LQB586 CLINICAL MICROBIOLOGY 2
Clinical microbiology laboratories throughout the world are recognising the need to maximise their diagnostic capabilities for accurate and early detection and management of medically-important parasitic, fungal and bacterial diseases of humans. This unit emphasises a strong commitment to professional practice by: (i) providing you with a comprehensive, in-depth knowledge and understanding of infectious disease states and their etiology, (ii) developing high level generic and specific laboratory-based skills in diagnostic microbiology and (iii) developing and refining critical thinking skills so that
experimental results may be observed and recorded intelligently and reported with a high degree of confidence in their validity and rigor. 

**Prerequisites:** LQB486  **Antirequisites:** LSB547 and LSB647  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1

**LQB587 APPLIED MICROBIOLOGY 1: WATER, AIR AND SOIL**

Issues relating to microbial populations within the environment are of great interest and relevance to the community, and also to scientists. Building on the foundation of basic microbiology, in this advanced level unit you will gain a strong understanding of the nature of microbial populations in water, air and soil, and their importance to the human population. This unit is issues-based, encouraging a problem solving approach as you investigate/study microbial pollution, bioremediation, biogeochemical cycles and a healthy environment. You will gain knowledge and skills in analysis and interpretation of water, air and soil populations, which will permit you to investigate real-world problems.  

**Prerequisites:** LQB386, LSB328, or LSB492  **Antirequisites:** LSB528  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 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, MAB233  **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:** 2011 SUM-2, 2011 SEM-1 and 2011 SEM-2

**MAB105 PREPARATORY MATHEMATICS**

This unit is intended to cater for the needs of students whose background in mathematics is either weak or does not reach the equivalent of Senior Mathematics B. It is intended to provide the concepts and skills needed for successful study of those units within the university which assume a background equivalent to Senior Mathematics B. This unit is incompatible with a grade of High Achievement in Senior Mathematics B. The aim of this unit is to develop your mathematical skills in and understanding of algebra, functions and graphing, differential and integral calculus of one variable and to interpret and solve simple, real world problems using these skills.  

**Assumed knowledge:** Year 10 Level 6 Mathematics is assumed knowledge  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1 and 2011 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.  

**Antirequisites:** MAN120  **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:** 2011 SEM-1, 2011 SEM-2 and 2011 SUM

**MAB121 CALCULUS AND DIFFERENTIAL EQUATIONS**

Building upon the foundations established in MAB120 or Senior Maths C, this unit addresses the significant role of mathematical modelling using differential equations for the description and resolution of simple and complex problems relevant to real world situations. The formulation and solution of such problems is supported by appropriate advanced mathematical concepts used for function approximation, differentiation and integration. Undertaking this unit will allow you to develop your problem solving skills, especially in the context of advanced mathematical techniques applied to ordinary differential equations used to model real world problems. You will also gain a deeper understanding of the concepts of the derivative and the integral, and how these may be used in applied contexts.  

**Antirequisites:** MAN121  **Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics C (or equivalent) or MAB120 or MAB100 or MAB125  **Equivalents:** MAB111, MAB126, MAB131, MAB182  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1, 2011 SEM-2 and 2011 SUM

**MAB122 ALGEBRA AND ANALYTIC GEOMETRY**

Building upon the foundations established in MAB120 or Senior Maths C, this unit addresses the significant role of mathematical modelling using vectors, matrices and multivariable calculus for the description and resolution of
simple and complex problems relevant in the real world. The formulation and solution of such problems is supported by appropriate advanced mathematical concepts used for function approximation, differentiation and integration. Undertaking this unit will allow you to develop your problem solving skills, especially in the context of advanced mathematical techniques applied to vectors, matrices and multivariable functions used to model real world problems.

**Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics C (or equivalent) or MAB120 or MAB100 or MAB125  
**Equivalents:** MAB112, MAB127, MAB132  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1, 2011 SEM-2 and 2011 SUM

**MAB220 COMPUTATIONAL MATHEMATICS 1**

Many real world problems are not solvable analytically, meaning that it is necessary to develop computational methods that can be used to solve these problems. Additionally, to be able to apply these methods to large problems, they must be implemented as algorithms in a computer language such as MATLAB. This unit addresses both the theoretical development of computational methods and their implementation in MATLAB. The aim of this unit is to provide you with the introductory concepts, computational techniques and programming skills that will allow you to solve many real world problems. It is also designed to prepare you for study in the advanced units in computational mathematics.

**Antirequisites:** MAN220  
**Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 and corequisite MAB120 or MAB125 or MAB100 or MAB180 if you don’t have Senior Mathematics C is assumed knowledge  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1 and 2011 SEM-2

**MAB311 ADVANCED CALCULUS**

This unit includes the following: polar coordinates; parametric equations; conic sections; quadric surfaces; vector-valued functions; Fourier series; functions of several variables; graphs; partial derivatives; total derivatives; extrema; Lagrange multipliers; Taylor series for multivariable functions; double and triple integrals; Green's theorems; line and surface integrals; divergence theorem; Stoke's theorem; applications.  
**Prerequisites:** (MAB111 or MAB121) and (MAB112 or MAB122)  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 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.

**Equivalents:** NRB230  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**NQB202 HISTORY OF LIFE ON EARTH**

This unit aims to provide you with an understanding of the processes of evolution and the changing environmental conditions through time that influenced the patterns of the evolution of life on this planet. The unit will provide you with practical experience in fossil plant and animal identification, classification and morphological interpretation. It will also enable you to apply palaeontological information to interpret the evolutionary history of higher taxa and the changing ancient depositional environments through time.

**Equivalents:** NRB240  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 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.  
**Equivalents:** NRB301  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 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.

**Equivalents:** NRB333  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1
period: 2011 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.
Equivalents: NRB331 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 SEM-1

NQB321 ECOLOGY
Ecology is the study of the factors that influence the distribution and abundance of organisms. Ecology deals with basic properties of individuals and the emergent properties of collections of individuals that form populations and the dynamics of these populations and their interactions with populations of other species. An understanding of basic ecological principles is central to managing species and ecosystems. This unit provides a broad theoretical background in the major concepts of plant and animal ecology. It serves the dual role of providing a thorough grounding in ecology for students from all faculties; and laying the conceptual foundation for later subjects in the ecology and environmental science.
Prerequisites: SCB110 or SCB112 Equivalents: NRB311 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 SEM-1

NQB403 SOILS AND THE ENVIRONMENT
This unit will provide you with grounding in soil science (pedology) by emphasising pedological principles, their application to environmental soil analysis and management, and knowledge of ecosystem function of soil in a changing environment. This one of the most critical resources to consider within the context of climate change and is an essential component of environmental scientific studies. It also compliments and provides a basis for further biogeoscientific studies in the SC01 degree. Your knowledge of past and present soil processes will help you to predict process pathways and outcomes for the purposes of environmental planning and management, risk analysis, and impact assessment involving soils. It also contributes to your understanding of field survey and interpretation of soil phenomena in ecological, geological and environmental contexts.
Prerequisites: NQB302 or NR301 or (ENB272 and ENB274) Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 SEM-2

NQB411 PETROLOGY OF IGNEOUS AND METAMORPHIC ROCKS
Igneous and metamorphic rocks compose the bulk of the Earth. Understanding what these rocks are and how they form is an essential part of the study of geology and is fundamental to a wide range of higher level units. This unit builds upon the knowledge and skills acquired in the prerequisite unit (NQB311 Mineralogy) by focusing on the description, classification and origins of igneous and metamorphic rocks. This unit aims to allow you to develop the theoretical and practical skills necessary to describe, classify and interpret igneous and metamorphic rocks.
Prerequisites: NQB311 or NRB333 Equivalents: NRB436 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 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. This unit fosters the skill of critical three- and four-dimensional analysis that usually sets geoscientists apart from other scientists and technologists.
Prerequisites: NQB314 or NRB333 Equivalents: NRB434 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 SEM-2

NQB421 EXPERIMENTAL DESIGN
This unit deals with the theory and practice of experimental design and the quantitative approaches used for the investigation of ecological and environmental questions discussed in the prerequisite unit Ecology and developed in subsequent units in the ecology and environmental science majors.
The aims of this unit are to to provide an introduction to the logic of experimentation and experimental design; build a practical extension on the theoretical basis of statistics obtained in other units using experimental situations commonly met in ecology and environmental science; and apply methods used to quantify the ecological attributes of populations and communities in experimental field situations.
Prerequisites: MAB101 or MAB104 or MAB105, and NQB321 or NRB311 Equivalents: NRB412 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 SEM-2
NQB422 GENETICS AND EVOLUTION
A detailed understanding of the principles of genetics is required to fully comprehend modern developments in ecology and evolutionary theory. These principles will be taken forward to develop a clear understanding of the mechanisms and processes that drive evolution in natural populations. The unit provides the foundation for further studies in population and conservation biology. The aim of the unit is to provide a detailed understanding of the principles of genetics and their application to studies of evolution and ecology.
Prerequisites: SCB112  Equivalents: NRB410   Credit points: 12   Contact hours: 4 per week   Campus: Gardens Point   Teaching period: 2011 SEM-1

NQB501 ENVIRONMENTAL MODELLING
The capacity for management of complex environmental problems such as climate change, now and in the future, will rely on the capacity of environmental managers to create, interpret and critically analyse models of environmental systems. Mathematical model building promotes the capacity to understand the interdependent relationships that characterise environmental systems and also provides a quantitative foundation for informed environmental management.
Prerequisites: NQB412 or NQB421  Assumed knowledge: 48 credit points of second level science units is assumed knowledge.  Equivalents: NRB500   Credit points: 12   Contact hours: 4 per week   Campus: Gardens Point   Teaching period: 2011 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: 2011 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. The aim of the unit is to provide you with the core knowledge and skills of geophysical measurements, processing of data, and geological interpretation of geophysical data.
Prerequisites: (NQB201 or NRB230) and (NQB412 or NRB434)  Equivalents: NRB534   Credit points: 12   Contact hours: 4 per week   Campus: Gardens Point   Teaching period: 2011 SEM-2

NQB521 POPULATION GENETICS AND MOLECULAR ECOLOGY
This unit is an extension of NQB422 Genetics and Evolution. Topics include the genetic structure of populations and processes of evolutionary change; natural selection, inbreeding and adaptation, species and speciation theory; ecological genetics; the genetics of behaviour.
Prerequisites: NQB422  Antirequisites: NRB510   Credit points: 12   Contact hours: 4 per week   Campus: Gardens Point   Teaching period: 2011 SEM-1

NQB523 POPULATION MANAGEMENT
This unit develops the theoretical treatment of populations as a unit of study and integrates the content of previous ecology units into approaches for the management of biological populations. The unit focuses on those interactions that are most relevant to pest control, but the unit is also of fundamental importance to harvesting and conservation biology.
Prerequisites: NQB321, NQB421  Antirequisites: NRB511   Credit points: 12   Contact hours: 4 per week   Campus: Gardens Point   Teaching period: 2011 SEM-1

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 hours: 4 per week   Campus: Gardens Point   Teaching period: 2011 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 hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

PQB250 MECHANICS AND ELECTROMAGNETISM
The experimental means by which we have arrived at our modern understanding of the universe is central to the scientific philosophy. Students of physics and physics related areas need to possess skills in quantitative handling, processing, communication and evaluation of data. Higher level studies in specialised areas of Physics require a familiarity with a range of fundamental topics in Physics and an ability to apply critical thinking and advanced mathematical techniques to the analysis and solution of Physical problems. This first-level unit lays the foundation for these higher level studies by introducing the fundamental topic areas of mechanics and electromagnetism.

Assumed knowledge: Senior Maths B is assumed knowledge.  Credit points: 12  Contact hours: 4.5 hours per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

PQB251 WAVES AND OPTICS
Wave phenomena are used to describe and explain many of the physical processes in the universe. Sound and light are the most commonly experienced of these and have far-reaching human applications, including their use as experimental tools for science. The study of wave phenomena has led to the development of quantum mechanics, a cornerstone of modern scientific thought. This first-level unit lays the foundation for discussion of wave phenomena in higher level studies, but will also be relevant to those not considering progressing to a Physics major but wishing to understand more of the Physical world in which we live.

Assumed knowledge: Senior Maths B is assumed knowledge.  Credit points: 12  Contact hours: 4.5 hours per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

PQB312 ANALYTICAL CHEMISTRY FOR SCIENTISTS AND TECHNOLOGISTS
This unit addresses three vital theoretical and practical elements of analytical chemistry: quality assurance in a chemical laboratory; principles of chemical sampling; common instrumental techniques. It is a generic unit designed to address the needs and skills of students enrolled in the Chemistry major as well as other majors such as Forensic Science and double degrees in with the Chemistry major. The unit builds on the analytical chemistry concepts introduced in SCB131 Experimental Chemistry. The aim of this unit is to provide students with principles of analytical chemistry, including some common instrumental techniques, which are firmly linked to the theory and practice of the discipline in a modern, working laboratory.

Prerequisites: SCB131  Equivalents: PCB414  Credit points: 12  Contact hours: 4.5 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1 and 2011 SEM-2

PQB331 STRUCTURE AND BONDING
This unit provides detailed coverage of the theories of bonding in organic, inorganic and coordination compounds including orbital hybridisation valence bond theory, coordination theory and crystal field theory. The cause and effect relationships between bonding and structure are developed leading to an understanding of structural variability, chirality, and other modes of isomerism for a broad range of chemical compounds. An introduction to molecular symmetry, which is central to the study of molecular geometry and shape, also provides the background for later studies in spectroscopy. Lectures are complemented by 7 laboratory experiments and 4 hands-on style workshops.

Prerequisites: SCB121 and SCB131  Antirequisites: PCB334, PCB354  Credit points: 12  Contact hours: 4.5 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

PQB350 THERMODYNAMICS OF SOLIDS AND GASES
This unit provides students with an overview of the basic thermodynamic principles that describe how heat and other forms of energy are transported through matter in its solid and gaseous states. Through integrated lecture and practical classes, it provides students with a foundation for more advanced studies later in areas such as condensed matter physics and quantum mechanics. The three areas of study in this unit; thermodynamics, solid state physics and statistical physics; are essential core topics if students are considering postgraduate study in the physical sciences or professional employment as a physicist.

Prerequisites: (PQB250 or PCB250), and (MAB111 or MAB120 or MAB121)  Corequisites: MAB311  Assumed knowledge: Students should enrol in MAB311 in the same semester if not already completed  Equivalents: PCB562  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

PQB401 REACTION KINETICS, THERMODYNAMICS AND MECHANISMS
Physical Chemistry is a discipline of chemistry in which the influences of physical factors on chemical reactions are described and quantified. The fundamental factors that govern the extents (equilibria) and rates (kinetics) of chemical reactions are usually the realm of Physical Chemistry. This unit illustrates this basic science with applications of these principles to actual reaction types that are expounded as case studies of the principles underlying the Chemistry. In addition, all students of chemistry need an understanding of the concepts of acids and bases in their widest sense. This unit provides the tools that chemists use to understand how and why molecules react. The aim of this unit is to demonstrate how reactions and their equilibria and rates can be described and quantified, and to understand by studying key examples, the fundamental factors that govern the outcomes of chemical reactions.

**Prerequisites:** PQB331  
**Antirequisites:** PCB354, PCB405  
**Credit points:** 12  
**Contact hours:** 4.5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**PQB442 CHEMICAL SPECTROSCOPY**
Spectroscopic techniques are now widespread in scientific laboratories. An appreciation of both the principles and practice of spectroscopy is essential for those contemplating a career in chemistry. The use of spectroscopic methods to elucidate molecular structure provides an excellent vehicle for training in the scientific method, particularly the logical application of experimental data to deduce the solution to a complex problem. Whilst the fundamental theoretical concepts will be dealt with in the early part of the unit, later emphasis will be on developing practical skills in problem solving, a skill of value to all fields of scientific and technological endeavour.

**Prerequisites:** PQB331  
**Equivalents:** PCB444  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**PQB450 ENERGY, FIELDS AND RADIATION**
The common theme of the topics covered in this unit is fields, the energy contained in these fields and the transfer of this energy. This theme is addressed in the specific topics of classical mechanics, electromagnetism and radiation physics. The classical mechanics and electromagnetism components build on material presented in introductory units and apply this to complex real world problems. The unit is designed to prepare students for more advanced studies in these areas but the unit will also provide a useful background for students undertaking a major in Physics or preparing for a career in secondary education.

**Prerequisites:** PQB250 or PCB250, and MAB311  
**Equivalents:** PCB362  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**PQB451 ELECTRONICS AND INSTRUMENTATION**
Instrumentation plays an increasingly important role in the life of a scientist. This unit is designed to give the student a working knowledge in instrumentations and the principles of circuit theory and electronics that underlie instrumentation. It is offered at this stage of the program since it relies on work developed in the earlier advanced-level units and provides a basis for experimental work in later units.

**Prerequisites:** PQB250 or PCB250  
**Antirequisites:** PCB361, PCB460  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**PQB502 ADVANCED PHYSICAL CHEMISTRY**
A Chemistry graduate in today's highly technological world requires knowledge of the principles that govern the behaviour of solids, liquids, gases, and mixtures thereof. This leads to an appreciation of how fundamental physical chemical principles determine the bulk properties of materials and how the chemical nature of interfaces govern chemical reactions in many important applications. This unit is placed appropriately in fifth semester, following the second year units that provide the basic principles, language and tools of chemistry.

**Prerequisites:** PQB401  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**PQB513 INSTRUMENTAL ANALYSIS**
TBA

**Prerequisites:** PQB312 or PCB414  
**Equivalents:** PCB514  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**PQB531 ORGANIC MECHANISMS AND SYNTHESIS**
This unit deals with organic reaction mechanisms and their application in organic synthesis. Topics in mechanisms include: structural and electronic effects that govern reactivity of organic molecules; major classes of mechanisms including elimination reactions, nucleophilic additions to carbonyl compounds, nucleophilic acyl substitution, electrophilic addition to alkenes and electrophilic substitution of aromatics. Topics in synthesis include the principles of organic synthesis design using the retrosynthetic approach; carbon-carbon bond formation to build the major functional group classes; and the use of protecting and activating groups.

**Prerequisites:** PQB401, PQB442  
**Antirequisites:** PCB554  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**PQB550 QUANTUM AND CONDENSED MATTER PHYSICS**
TBA
Prerequisites: PQB350 and (MAB134 or MAB311)
Equivalents: PCB561 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 SEM-1

PQB551 PHYSICAL ANALYTICAL TECHNIQUES
Modern methods of physical analysis are an important tool for the physical scientist. This unit provides an introduction to the physical principles and applications in three fields of analysis: X-ray diffraction, analytical electron microscopy and physical spectroscopy. Each of these topics encompasses a variety of measurement techniques. The methodologies presented have wide application in a number of areas of science and technology including nanotechnology and materials research and development. Lectures are supplemented by laboratory practicals to enable students to gain familiarity and experience with the instrumentation.

Prerequisites: (PQB350 or PCB462) and (MAB112 or MAB122) Equivalents: PCB562 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 SEM-1

PQB584 FORENSIC PHYSICAL EVIDENCE
This unit provides a theoretical and practical framework to introduce you to the physical evidence processing techniques of questioned documents and computer forensics and the forensic examination techniques of optical and electron microscopy. The unit will also discuss the physical and chemical structure of some common types of physical evidence (fibres, fabrics & searance, soils and physical fits) and the analytical methods used for their analysis. It is placed appropriately in the fifth semester of the course to coincide with and complement the Instrumental Analysis unit PQB513 which the core knowledge for the instrumental techniques used within the forensic analysis of various types of physical evidence.

Prerequisites: PQB312, SCB384 Antirequisites: PCB584 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 SEM-1

SCB111 CHEMISTRY 1
Chemistry is the central science. It affects society as well as the individual. It is the language and principal tool of the physical sciences, the biological sciences, the health sciences and the agricultural and earth sciences. A basic knowledge of chemistry is essential to all students in these areas. Knowledge of chemistry allows a better understanding of the human body and of the environment in which we live. The aim of this unit is to introduce you to the basic concepts of general, inorganic, analytical and physical chemistry.

Antirequisites: SCB113 Credit points: 12 Contact hours: 4.5 per week Campus: Gardens Point Teaching period: 2011 SEM-1 and 2011 SEM-2

SCB112 CELLULAR BASIS OF LIFE
Scientists from all disciplines need an appreciation and a broad overview of the characteristics and functioning of the five groups of living organisms (bacteria, protists, fungi, plants and animals), and their interactions with the inanimate world. SCB112 Cellular Basis of Life is a first semester unit that is essential for many students undertaking courses requiring biological knowledge. Through integrated lecture and laboratory classes, this unit provides you with a foundation for later more advanced studies in your course or major (eg such as medical science, biomedical science, pharmacy, optometry, biochemistry, biotechnology, microbiology, geosciences, ecology, business and education among others). The aim of this unit is to introduce you to the wide diversity of living organisms while emphasising the unity of life processes at the cellular, biochemical and biophysical levels.

Antirequisites: LOB182, LSB118 Credit points: 12 Contact hours: 4 per week Campus: Gardens Point Teaching period: 2011 SEM-1 and 2011 SEM-2

SCB120 PLANT AND ANIMAL PHYSIOLOGY
Regardless of which area of biology you decide to specialise in, you will need to understand the complex interactions between cells, tissues, organs and organ systems that comprise multi-cellular organisms. Although many living processes can be explained at the levels of biochemistry, biophysics and cell biology, a true understanding of complex, multicellular organisms requires integration of knowledge drawn from all of these areas, combined with the more complex physiological and structural levels you will learn about in this unit. The knowledge gained in this and other first level units provides you with the conceptual framework necessary to understand processes occurring from the cellular to the whole organism.
level and to higher levels of organisation. **Prerequisites:** SCB112  **Equivalents:** NRB270  **Credit points:** 12  **Contact hours:** 4.5 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-2  

**SCB121 CHEMISTRY 2**  
Chemistry is the central science. This is a unit of fundamental importance as it covers the background and general principles that underpin understanding in many science and health related disciplines. In this unit you will be introduced to fundamental aspects of chemistry including the nature of matter, atoms, molecules and ions. From this basis you will develop an understanding of the electronic structure of atoms, chemical bonding and molecular structure as well as the fundamentals of organic chemistry (often described as the chemistry of life). The aims of this unit are to generate an understanding of the importance of chemical bonding and molecular structure and how these factors affect the properties of organic and bioinorganic molecules; and to allow recognition of, and provide an understanding of, the nature of organic functional groups and their respective reactivity.  
**Prerequisites:** (SCB111 or PCB142). SCB111 can be studied in the same teaching period.  **Antirequisites:** PQB105 and SCB113  **Credit points:** 12  **Contact hours:** 4.5 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-1 and 2011 SEM-2  

**SCB122 CELL AND MOLECULAR BIOLOGY**  
SCB122 Cell and Molecular Biology 1 equips students with a comprehensive understanding of the molecular basis of the cell. This unit expands on the basic principles and concepts relating to cell structure, function, perpetuation and specialisation introduced in SCB112 and introduces students to fundamental molecular mechanisms central to the organisation of the cell. Students will be shown how macromolecular interactions are crucial to information flow and heredity. Students are taught the relationships between chromosomes, genes and cellular function and ultimately how these may determine an organism’s phenotype. This unit underpins cell biology and molecular biology units that are offered in second year Life Science units. SCB122 is also ideal for interfaculty students (eg Education, Business, Arts) who will undertake no further life science studies.  
**Prerequisites:** SCB112. SCB112 can be studied in the same teaching period.  **Antirequisites:** LSB238  **Credit points:** 12  **Contact hours:** 4.5 per week  **Campus:** Gardens Point  **Teaching period:** 2011 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:** 2011 SEM-2  

**SCB131 EXPERIMENTAL CHEMISTRY**  
Chemistry is the central science. A detailed study of chemistry and related disciplines requires the development of practical laboratory skills for synthesis and chemical analysis. This unit is designed specifically to develop these aspects of chemistry. This unit is a laboratory-based unit which is designed for students who intend to continue with experimental science units. The lectures complement the weekly practical sessions and teach the theory required to interpret experimental results. The aim of this unit is to develop a broad knowledge of, and the practical skills required for, scientific experiments in chemistry. The skills acquired in this unit are transferable to other practical sciences including medical science, biochemistry, molecular biology and pharmacy.  
**Prerequisites:** SCB113 or PQB105 or (SCB111 and SCB112). SCB112 can be concurrently enrolled with SCB131  **Credit points:** 12  **Campus:** Gardens Point  **Teaching period:** 2011 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:** 2011 SEM-2  

**SCB384 FORENSIC SCIENCES - FROM CRIME SCENE TO COURT**  
This unit provides an introduction to two fundamental areas in forensic science, crime scenes and justice. Mock crime scenes involving real life scenarios are used to provide hands-on training on crime scene management and
examination protocols. The principles for forensic examination of crime scenes involving fire, explosion, murder, etc, are introduced through lectures, workshops and practical exercises. Also an overview of the techniques used in forensic photography, fingerprinting as well as Legal procedures at court is presented. This unit is provided by professional forensic practitioners with practical real life experience being transferred to new generations. This head start provides a unique advantage for a strong career in forensics.

Credit points: 12  
Contact hours: 4.5 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1