Bachelor of Applied Science/Bachelor of Education (Primary) (IX14)

Year offered: 2011
Admissions: Yes
CRICOS code: 037540M
Course duration (full-time): 4 years
Domestic Fees (indicative): 2011: CSP $3,299 (indicative) per semester
International Fees (indicative): 2011: $11,500 (indicative) per semester
Domestic Entry: February
International Entry: February
QTAC code: 409142
Past rank cut-off: 76
Past OP cut-off: 12
OP Guarantee: Yes
Assumed knowledge: English (4, SA) and 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 and Technology). For Education contact Student Affairs 07 3138 3947, or educationenq@qut.edu.au.
Discipline coordinator: Education Course Coordinator Dr Mary Ryan. Science Discipline Coordinators: Dr Perry Hartfield (Biochemistry Major); Dr Marion Bateson (Biotechnology Major); Dr John McMurtrie (Chemistry Major); Dr Ian Williamson (Ecology Major); Dr Robin Thwaites (Environmental Science Major); Dr Gary Hufitle (Geoscience Major); Dr Scott McCue (Mathematics Major); Dr Christine Knox (Microbiology Major); Dr Greg Michael (Physics Major)
Campus: Gardens Point and Kelvin Grove

Course Overview
This double degree enables you to work as a science professional or pursue a career in scientific research. Alternatively, the Bachelor of Education (Primary) will prepare you to teach at all levels of primary school. You may also complete a discipline and content studies major in one of the key learning areas of the Queensland school curriculum.

Professional Recognition
This course meets the requirements for registration as a teacher in Queensland. It is recognised nationally and internationally, however additional requirements may be needed for some locations.

Graduates will also satisfy the requirements for membership of the relevant professional body for their chosen science major. See Studyfinder for details on the Bachelor of Applied Science majors.

Other Course Requirements
Blue Card
Student teachers must be issued with a blue card prior to having contact with children. For more information and an application form visit Blue Card.

Literacy
Students must meet the Queensland College of Teachers' literacy standards by the end of Year 3. For more information please visit Studyfinder.

Course Design
Graduates from this double degree will have a science degree with the same core support and choice of major study areas as the graduates from the Bachelor of Applied Science (SC01) program. Education studies will comprise the co-major component. Field Studies units will be taken in Queensland schools.

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.

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:

Science Coordinator
Dr Perry Hartfield
Phone: +61 7 3138 2984
**Course structure**

**PLEASE NOTE THAT SOME COURSEWORK UNITS CANNOT BE STUDIED IN THE SAME SEMESTER AS A FIELD STUDIES UNIT.** If students do not follow the standard course progression (eg due to a fail grade, or non enrolment in units), time will be added onto the course duration, and you should contact Student Affairs for progression advice, nm.kyle@qut.edu.au.

All other course requirements must have been successfully completed before commencing EDB024 and EDB025 in your final semester of study. This is a University and Queensland College of Teachers requirement.

Students must have a valid Bluecard to be eligible for Field Studies units.

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Science Major Unit

Year 3, Semester 2
- CLB006  Teaching Reading and Writing
- EDB003  Teaching and Learning Studies 3: Practising Education
- EDB022  Primary Field Studies 2: Practising Education in the Field
  Designated Unit: EDB022
- HMB300  Teaching Primary HPE

Year 4, Semester 1
- EDB004  Teaching and Learning Studies 4: Inclusive Education
- EDB023  Primary Field Studies 3: Inclusive Educational Practices
- KKB202  Teaching Primary Dance and Drama
  Designated Unit: EDB023
- MDB006  Teaching Primary Science

Year 4, 6TP4 (unit is run between 4 July and 20 August - see individual class timetable)
- EDB005  Teaching and Learning Studies 5: Professional Work of Teachers
- MDB004  Teaching Primary ICT

Year 2, Semester 1
- SCB120  Plant and Animal Physiology
- SCB121  Chemistry 2
- SCB122  Cell and Molecular Biology

Year 2, Semester 2
- LQB381  Biochemistry: Structure and Function
- LQB383  Molecular and Cellular Regulation
- LQB386  Microbial Structure and Function

Year 3, Semester 1
- LQB481  Biochemical Pathways and Metabolism
- LQB483  Molecular Biology Techniques
- LQB681  Biochemical Research Skills

Year 3, Semester 2
- LQB581  Functional Biochemistry
- LQB582  Biomedical Research Technologies
- LQB583  Genetic Research Technology

Science Elective

Course structure - Major in Biochemistry

Year 1, Semester 1
- SCB111  Chemistry 1
- SCB112  Cellular Basis of Life
  Plus either
- MAB101  Statistical Data Analysis 1
  Or
- MAB105  Preparatory Mathematics

Year 1, Semester 2
- SCB120  Plant and Animal Physiology
- SCB121  Chemistry 2
- SCB122  Cell and Molecular Biology

Year 2, Semester 1
- LQB381  Biochemistry: Structure and Function
- LQB383  Molecular and Cellular Regulation
- LQB386  Microbial Structure and Function

Year 2, Semester 2
- LQB483  Molecular Biology Techniques
- LQB484  Introduction to Genomics and Bioinformatics
  Plus select ONE unit from the following:
- LQB481  Biochemical Pathways and Metabolism
LQB486  Clinical Microbiology 1  
LQB489  Plant Physiology and Cell Biology  

Year 3, Semester 1  
LQB582  Biomedical Research Technologies  
LQB583  Genetic Research Technology  
LQB584  Medical Cell Biology  
LQB585  Plant Genetic Manipulation  

Course structure - Major in Chemistry  

Year 1, Semester 1  
SCB111  Chemistry 1  
SCB112  Cellular Basis of Life  
MAB101  Statistical Data Analysis 1  
MAB105  Preparatory Mathematics  

Year 1, Semester 2  
MAB120  Algebra and Calculus  
SCB121  Chemistry 2  
SCB131  Experimental Chemistry  

Year 2, Semester 1  
PQB312  Analytical Chemistry For Scientists and Technologists  
PQB313  Analytical Chemistry For Industry  
PQB331  Structure and Bonding  

Year 2, Semester 2  
PQB401  Reaction Kinetics, Thermodynamics and Mechanisms  
PQB442  Chemical Spectroscopy  
PQB631  Advanced Inorganic Chemistry  

Year 3, Semester 1  
PQB502  Advanced Physical Chemistry  
PQB513  Instrumental Analysis  
PQB525  Unit Operations  
PQB531  Organic Mechanisms and Synthesis  

Course structure - Major in Ecology  

Year 1, Semester 1  
SCB110  Science Concepts and Global Systems  
SCB112  Cellular Basis of Life  
MAB101  Statistical Data Analysis 1  
MAB105  Preparatory Mathematics  

Year 1, Semester 2  
NQB202  History of Life on Earth  
NQB422  Genetics and Evolution  
SCB120  Plant and Animal Physiology  

Year 2, Semester 1  
NQB321  Ecology  
SCB111  Chemistry 1  
NQB322  Invertebrate Biology  
NQB323  Plant Biology  

Year 2, Semester 2  
NQB421  Experimental Design  
NQB622  Conservation Biology  
Science Elective  

Year 3, Semester 1  
NQB502  Field Methods in Natural Resource Sciences  
NQB521  Population Genetics and Molecular Ecology  
NQB523  Population Management  
Science Elective  

Course structure - Major in Environmental Science  

Year 1, Semester 1  
SCB110  Science Concepts and Global Systems  
SCB112  Cellular Basis of Life  
MAB101  Statistical Data Analysis 1  
MAB105  Preparatory Mathematics  

Year 1, Semester 2  

Course structure - Major in Geoscience

Year 2, Semester 1
NQB302 Earth Surface Systems
NQB321 Ecology
SCB111 Chemistry 1

Year 2, Semester 2
NQB301 Environmental Modelling
NQB501 Field Methods in Natural Resource Sciences
NQB502 Field Methods in Natural Resource Sciences
NQB503 Spatial Analysis of Environmental Systems
Science Elective

Course structure - Major in Mathematics (WITH Maths C)

Year 1, Semester 1
MAB101 Statistical Data Analysis 1
MAB121 Calculus and Differential Equations
SCB110 Science Concepts and Global Systems

Year 1, Semester 2
MAB122 Algebra and Analytic Geometry
MAB210 Statistical Modelling 1
SCB111 Chemistry 1

Year 2, Semester 1
MAB220 Computational Mathematics 1
MAB311 Advanced Calculus
MAB315 Operations Research 2

Year 2, Semester 2
MAB313 Mathematics of Finance
MAB413 Differential Equations
MAB414 Applied Statistics 2
MAB422 Mathematical Modelling
MAB461 Discrete Mathematics
MAB480 Introduction to Scientific Computation

Year 3, Semester 1
SCB112 Cellular Basis of Life
Plus select THREE units from the following:
MAB521 Applied Mathematics 3
MAB525 Operations Research 3A
MAB533 Statistical Techniques
MAB672 Advanced Mathematical Modelling
## Course structure - Major in Mathematics (WITHOUT Maths C)

### Year 1, Semester 1
- MAB101 | Statistical Data Analysis 1
- MAB120 | Algebra and Calculus
- SCB110 | Science Concepts and Global Systems

### Year 1, Semester 2
- MAB121 | Calculus and Differential Equations
- MAB122 | Algebra and Analytic Geometry
- MAB210 | Statistical Modelling 1

### Year 2, Semester 1
- MAB220 | Computational Mathematics 1
- MAB311 | Advanced Calculus
- MAB315 | Operations Research 2

### Year 2, Semester 2
- MAB625 | Operations Research 3B
  - Plus either
- MAB414 | Applied Statistics 2
  - Or
- MAB422 | Mathematical Modelling
  - Plus select ONE unit from the following:
    - MAB313 | Mathematics of Finance
    - MAB413 | Differential Equations
    - MAB414 | Applied Statistics 2
    - MAB422 | Mathematical Modelling
    - MAB461 | Discrete Mathematics
    - MAB480 | Introduction to Scientific Computation

### Year 3, Semester 1
- Select ONE unit from the following:
  - SCB111 | Chemistry 1
  - SCB112 | Cellular Basis of Life
  - Plus either
  - MAB101 | Statistical Data Analysis 1
  - Or
  - MAB105 | Preparatory Mathematics

## Course structure - Major in Microbiology

### Year 1, Semester 1
- SCB111 | Chemistry 1
- SCB112 | Cellular Basis of Life
  - Plus either
- MAB101 | Statistical Data Analysis 1
  - Or
- MAB105 | Preparatory Mathematics

### Year 1, Semester 2
- SCB120 | Plant and Animal Physiology
- SCB121 | Chemistry 2
- SCB122 | Cell and Molecular Biology

### Year 2, Semester 1
- LQB381 | Biochemistry: Structure and Function
- LQB383 | Molecular and Cellular Regulation
- LQB386 | Microbial Structure and Function

### Year 2, Semester 2
- LQB483 | Molecular Biology Techniques
- LQB486 | Clinical Microbiology 1
- LQB687 | Applied Microbiology 2: Food and Quality Assurance

### Year 3, Semester 1
- LQB586 | Clinical Microbiology 2
- LQB587 | Applied Microbiology 1: Water, Air and Soil
  - Plus either
- LQB582 | Biomedical Research Technologies
  - Or
- LQB583 | Genetic Research Technology
  - Science Elective

## Course structure - Major in Physics

### Year 1, Semester 1
- SCB110 | Science Concepts and Global Systems
- SCB111 | Chemistry 1
  - Plus either
- MAB120 | Algebra and Calculus
  - Or
- MAB121 | Calculus and Differential Equations
  - NOTE: Students without Senior Mathematics C must take MAB120 in Semester 1 and MAB121 in Semester 2
MAB122  Algebra and Analytic Geometry  
PQB250  Mechanics and Electromagnetism  
Plus either  
MAB121  Calculus and Differential Equations  
Or  
PQB251  Waves and Optics  

Year 2, Semester 1  
MAB311  Advanced Calculus  
PQB350  Thermodynamics of Solids and Gases  
SCB112  Cellular Basis of Life  

Year 2, Semester 2  
PQB450  Energy, Fields and Radiation  
PQB451  Electronics and Instrumentation  
PQB661  Lasers and Photonics  

Year 3, Semester 1  
PQB550  Quantum and Condensed Matter Physics  
PQB551  Physical Analytical Techniques  
PQB651  Experimental Physics  
Science elective for Physics major (See list)  

Course structure - Science Elective for Physics Major  

Students must select units that they have not already taken, and for which they have the appropriate prerequisites:  

MAB101  Statistical Data Analysis 1  
MAB220  Computational Mathematics 1  
MAB312  Linear Algebra  
NQB311  Mineralogy  
NQB322  Invertebrate Biology  
NQB323  Plant Biology  
PCB593  Digital Image Processing  
PQB360  Global Energy Balance and Climate Change  
SCB121  Chemistry 2  

Potential Careers:  

UNIT SYNOPSES  

CLB006 TEACHING READING AND WRITING  
New basics emerge in literacy education. The privileged status of print as the almost exclusive basis to literacy has diminished. Postmodern media culture is powerful and pervasive, and knowledge communication today is as much through multimedia as it is through the single medium of print. This unit acknowledges that children now form their early concepts about literacy from textual environments that are considerably more complex than for those of their predecessors. Contemporary language and literacy education must base its practices on texts from a range of technologies, involving different media, and in recognition of diverse contexts and social purposes for communicating.  

Credit points: 12  
Campus: Kelvin Grove and Caboolture  
Teaching period: 2011 SEM-2  

CLB008 TEACHING PRIMARY SOSE  
This unit focuses on recent developments within the social education curriculum area with particular reference to Studies of Society and Environment (SOSE), a national key learning area and explores teaching and learning approaches in SOSE. Understanding the processes of curriculum development and being able to interpret curriculum documents and their implications for classroom practice are essential professional skills. Students will investigate SOSE as a curriculum area and to consider ways of translating syllabus requirements into worthwhile teaching and learning activities. Students will critically reflect upon both the theory and the practical suggestions throughout the unit and to consider how effective teaching can be achieved.  

Prerequisites: CLB005 (can be enrolled in the same teaching period)  
Credit points: 12  
Campus: Kelvin Grove and Caboolture  
Teaching period: 2011 6TP4 and 2011 SEM-2  

EDB002 TEACHING AND LEARNING STUDIES 2: DEVELOPMENT AND LEARNING  
This unit has the dual purposes of promoting your own personal and professional development as life long, creative, autonomous learners, capable of reflection and high level thinking, and of enabling you, as educators, to promote similar development in your learners. Pursuit of these aims will involve an exploration of human development, from personal and interpersonal perspectives, with sensitivity to socio-cultural contexts, and with a
particular focus on the theory, research and practice which informs educators about how learners construct knowledge and become creative, self-motivated thinkers and problem solvers.

**Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Kelvin Grove and Caboolture  **Teaching period:** 2011 SEM-1

**EDB003 TEACHING AND LEARNING STUDIES 3: PRACTISING EDUCATION**

Education is a social and cultural activity. This unit provides a sociological and cultural studies framework that provides an insightful explanation of how education in its various sites is constructed and organised. The unit includes a socio-cultural analysis of an educational site which will be undertaken in conjunction with the Field Studies unit.

**Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Internet, Kelvin Grove and Caboolture  **Teaching period:** 2011 SEM-2

**EDB004 TEACHING AND LEARNING STUDIES 4: INCLUSIVE EDUCATION**

This unit aims to develop students' understanding and appreciation of the contributions that diversity, belonging and trust make towards a quality learning environment for all learners. Students will learn to engage in teaching a broad range of students in diverse and inclusive ways utilising pedagogies and curriculum practices that enhance learning for all students and generate inclusive cultures within the school and classroom settings. Desired outcomes are achieved through descriptive, interpretative, analytic and expressive processes to share learning with fellow students and staff.

**Credit points:** 12  **Campus:** Kelvin Grove, External and Caboolture  **Teaching period:** 2011 SEM-1

**EDB005 TEACHING AND LEARNING STUDIES 5: PROFESSIONAL WORK OF TEACHERS**

Students will share the responsibility for shaping their beginning career learnings through a process of professional induction with a number of key significant stakeholders. The process will be proactive, collaborative and self determined and students will need to become professionally responsible for developing a professional development program that best accommodates their needs at the close of the teacher education program.

**Prerequisites:** EDB033, EDB023, or EDB013  **Credit points:** 12  **Campus:** Internet, Kelvin Grove, External and Caboolture  **Teaching period:** 2011 6TP4

**EDB021 PRIMARY FIELD STUDIES 1: DEVELOPMENT AND LEARNING IN THE FIELD**

Designated Unit.

This unit focuses on students' professional development as an educator, and reinforces the twin themes of teacher as researcher, and teacher as reflective practitioner. It provides the first set of teaching experiences, in a graduated sequence over the course of the BEd. Students develop the ability to plan, implement and evaluate effective teaching/learning programs. This requires an understanding of learner needs, curriculum knowledge, procedures for creating supportive classroom environments, and sensitivity to socio-cultural contexts.

**Credit points:** 12  **Contact hours:** 3 per week  **Campus:** Kelvin Grove and Caboolture  **Teaching period:** 2011 SEM-1 and 2011 SEM-2

**EDB022 PRIMARY FIELD STUDIES 2: PRACTISING EDUCATION IN THE FIELD**

Designated Unit.

Through critical examination of the socio-cultural dimensions of these sites, this unit aims to utilise aspects of social enquiry to analyse the practice of teaching as a social and cultural activity. At the same time, the unit aims to develop students' pedagogical and curriculum skills as a teacher.

**Prerequisites:** EDB021, CLB006 and MDB002  **Credit points:** 12  **Campus:** Internet, Kelvin Grove and Caboolture  **Teaching period:** 2011 SEM-2

**EDB023 PRIMARY FIELD STUDIES 3: INCLUSIVE EDUCATIONAL PRACTICES**

Designated Unit.

As a final year teacher education student you will actively engage with the challenges and practices of inclusive education in the classroom and the broader educational setting. This field experience is designed for students to engage in teaching, learning and assessment practices in their field, interacting with individual students, small groups of students and whole class situations. Students will be required to design, implement and evaluate differentiated teaching strategies, programs and assessment tasks in inclusive and critically reflective ways and in a manner that is responsive to the diverse nature of the students in classes.

**Prerequisites:** EDB022  **Credit points:** 12  **Campus:** Internet, Kelvin Grove and External  **Teaching period:** 2011 SEM-1 and 2011 SEM-2

**EDB024 PRIMARY FIELD STUDIES 4: PROFESSIONAL WORK OF TEACHERS - INDUCTION INTO THE FIELD**

Designated Unit.

Learners remain central to the work of teams and must be recognised as culturally and socially diverse as well as intellectually diverse. Within these constructs the graduating teachers are required to provide a range of educational opportunities that facilitate high quality and meaningful learning engagement for all students across differing educational contexts and sectors. This unit is designed to fully immerse the pre-service teacher into the field with a
view to scaffolding their repositioning as autonomous, critically reflective, inclusive professional teachers on completion.

**Prerequisites:** EDB023, EDB004  
**Credit points:** 12  
**Campus:** Internet, Kelvin Grove, External and Caboolture  
**Teaching period:** 2011 5TP2 and 2011 SEM-2

**EDB025 INTERNSHIP (PRIMARY)**  
Designated Unit.  
This unit aims to induct you into the professional work of teachers. The aim of this unit is for you to apply the knowledge, skills and understandings of teaching and learning that you have acquired throughout the course in an extended time in the workplace.

**Prerequisites:** EDB024 (Can be enrolled in same teaching period)  
**Assumed knowledge:** Completion of all units in your course is assumed knowledge.  
**Credit points:** 12  
**Campus:** Internet, Kelvin Grove, External and Caboolture  
**Teaching period:** 2011 5TP3 and 2011 SEM-2

**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 LSB328  
**Antirequisites:** LSB468 and LSB338  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**HMB300 TEACHING PRIMARY HPE**  
This unit provides students with knowledge of how to integrate Health and physical education within the other key learning areas. Students learn the connection between physical activity and health and its role in meeting the developmental needs of children. Additionally, they participate in a range of learning experiences appropriate to the developmental needs of children and acquire the skills necessary to safely deliver student learning in an open environment. Topics include principles of the health and physical education years 1-10 syllabus; motor skill development and ability related expectations for teaching HPE; planning for quality instruction and linking physical activity with health; planning and teaching HPE; classroom management and safety issues.

**Credit points:** 12  
**Campus:** Kelvin Grove and Caboolture  
**Teaching period:** 2011 SEM-2

**KKB202 TEACHING PRIMARY DANCE AND DRAMA**  
Through both practical and theoretical contexts, you are introduced to curriculum planning and teaching in primary Dance and Drama using The Arts years 1 to 10 Syllabus (Queensland Studies Authority, 2002).

**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Kelvin Grove and Caboolture  
**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-2

**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: LQB238 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 understanding of the natural world. To understand how information on genome structure-function relationships (i.e. bioinformatics) is being used in areas such as gene discovery, disease diagnosis and drug development, students need to understand how the information content of DNA and proteins is extracted and analysed. This unit introduces students to the approaches to database mining and genome exploration.

Prerequisites: LQB383 or LQB338 or LSN101 and LSN102
Antirequisites: LSB537, LSB619, LSB469
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2011 SEM-2

LQB486 CLINICAL MICROBIOLOGY 1
Micro-organisms are very important as pathogens of humans and animals, and their accurate clinical diagnosis is essential for appropriate treatment and management of infections. This unit builds upon the foundational topics in microbiology that you learned in LQB386 (Microbial Structure and Function) and starts preparing you for a career in a microbiology laboratory in clinical practice, industry or research. The unit will advance your knowledge and skills in classical methods of isolation and identification of bacteria in clinical specimens and introduce aspects of microbial pathogenesis and antibiotic sensitivity. The unit will provide you with an understanding of clinically important viruses, and will commence your training in diagnostic parasitology.

Prerequisites: LQB386 or LSB328
Antirequisites: LSB435, LSB547
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2011 SEM-2

LQB489 PLANT PHYSIOLOGY AND CELL BIOLOGY
Plants are a vital resource providing food, medicines, fibre and fuel. The utilisation and manipulation of plants requires an understanding of growth and development on a molecular, cellular and whole plant basis. This is an intermediate-level unit covering the principles of plant cell biology and physiology to provide a platform for more advanced studies in plant biology and biotechnology. It integrates the fundamentals of plant physiology, biochemistry and molecular biology in such a way to enable students to understand how plants grow, develop and interact with their environment, and will also be valuable for lifelong appreciation of the potential of agriculture and its contribution to humanity. The aim of this unit is to provide you with an understanding of plant function from the cell to the whole plant, skills in measuring and monitoring these processes and an appreciation of how they are influenced by the environment.

Prerequisites: SCB120 or SCB122 or NRB270 or LSB238
Antirequisites: LSB397, LSB497
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2011 SEM-2

LQB581 FUNCTIONAL BIOCHEMISTRY
This unit will study advanced biochemical concepts with a focus on metabolism, signalling pathways, systems and networks that coordinate and regulate the functional behaviour of cells and tissues.

Prerequisites: (LQB381 or LSB308) and (LQB383 or LSB338)
Antirequisites: LSB508
Credit points: 12
Contact hours: 5 per week
Campus: Gardens Point
Teaching period: 2011 SEM-1

LQB582 BIOMEDICAL RESEARCH TECHNOLOGIES
This unit will study the technical principles and practical techniques that are essential for advancing research and development in biochemistry and biotechnology.

Prerequisites: LQB381 or LSB308
Antirequisites: LSB527
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2011 SEM-1

LQB583 GENETIC RESEARCH TECHNOLOGY
The tools available for the discovery and manipulation of new genes are increasing exponentially and, in turn, this is 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 LQB338  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

LQB681 BIOCHEMICAL RESEARCH SKILLS
In the real world, the design and completion of successful research and/or business projects demand that individuals gather information, solve problems, work effectively as a team and the challenges that they face.

Prerequisites: LSB381 or LSB308  Equivalents: LSB607  Credit points: 12  Contact hours: 5 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

LQB687 APPLIED MICROBIOLOGY 2: FOOD AND QUALITY ASSURANCE
Food microbiology and quality assurance constitute potential areas of employment for graduates. Many aspects of these disciplines are important in public health and operational management. Understanding fundamental concepts and their correct application are critical for food safety and management of both food-, and non-food-based operations. This unit with content in applied food microbiology and quality systems, builds on the introduction to food microbiology provided in earlier units. The aim of this unit is to gain advanced knowledge and expertise in food microbiology and fundamental quality assurance principles suitable for application in food and other (bio)technology-
based industries. 

**Prerequisites:** LQB386 or LSB328  
**Assumed knowledge:** Completion of 72 credit points of second level science units is assumed knowledge  
**Equivalents:** LQB628  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**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 SUM-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 to 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

**MAB210 STATISTICAL MODELLING 1**  
This unit is intended for all mathematics degree students, all double degree students with mathematics, secondary education students with mathematics as a teaching area, and quantitatively-oriented students in other courses,
particularly in Science, Information Technology, Engineering and areas of Business. The unit will provide you with fundamental skills and operational knowledge for all further study in statistics, and highly relevant foundations for other areas of mathematics such as mathematical modelling and operations research. The unit will also help you develop fundamental problem-solving skills in statistics and mathematics.

**Prerequisites:** MAB121 or MAB122  
**Antirequisites:** MAN210  
**Assumed knowledge:** Grade of Sound Achievement in Senior Mathematics C (or equivalent) or MAB120 is assumed knowledge. Students are advised to enrol in either MAB121 or MAB122 in the same semester if not previously completed.  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1 and 2011 SEM-2

**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

**MAB312 LINEAR ALGEBRA**

This unit covers the following broad topics from linear algebra: matrix analysis; eigenvalues and eigenvectors; vector spaces; inner product spaces.

**Prerequisites:** (MAB111 or MAB121) and (MAB112 or MAB122)  
**Antirequisites:** MAN312  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**MAB313 MATHEMATICS OF FINANCE**

Finance provides one of the significant areas for the application of mathematics. Understanding the fundamental principles involved will enhance your general preparation for life and provide an essential tool for those of you who intend to pursue further studies or careers in the financial area. The aim of this unit is to provide you with an introduction to the methods used in obtaining relevant solutions to financial and business problems.

**Prerequisites:** MAB111 or MAB121 (which can be concurrently enrolled)  
**Antirequisites:** MAN313  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**MAB315 OPERATIONS RESEARCH 2**

This unit introduces the essential features of operations research methods. It develops a number of basic mathematical techniques to solve generic problems and the theoretical foundations of these techniques. Students should develop the ability to apply various operations research methods, algorithms and techniques in the solution of practical problems. Students will also look at the applications of operations research techniques to real-world problems.

**Prerequisites:** MAB210 and (MAB112 or MAB122)  
**Antirequisites:** MAN315  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**MAB413 DIFFERENTIAL EQUATIONS**

Differential Equations are among the most important aspects of the theoretical developments of any branch of science. It is often the case that the formulation of mathematical models of real world problems leads to an equation in which a function and its derivatives play a major role. Such equations are examples of differential equations. This unit builds on studies of differential equations in first year and provides a framework for studying partial differential equations and other aspects of applied mathematics in later semesters.

**Prerequisites:** MAB311 or MAB312  
**Antirequisites:** MAN413  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**MAB414 APPLIED STATISTICS 2**

This unit includes: Simple linear regression (revision), multiple linear regression, making inferences from regressions, choosing a model, checking model
assumptions, general linear models - analysis of covariance, ANOVA revisited, designing experiments, issues in designing experiments, analysing experimental results, further experimental designs, assumptions, and how to cope if they aren't met, simulations.

**Prerequisites:** MAB101  
**Assumed knowledge:** MAB112 is recommended prior study  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**MAB422 MATHEMATICAL MODELLING**

In this unit you will develop skills in the formulation and interpretation of mathematical models of 'real-world' problems drawn from the literature, the media and the lecturer's own research areas. You will also develop and extend your skills in the use of mathematical software to investigate solutions of some of these models. By emphasising the need to write clear mathematical arguments and to explain in logical and clear English the conclusions drawn from the mathematical models developed in the unit, you will also develop your written communication skills.

**Prerequisites:** MAB121  
**Antirequisites:** MAN422  
**Assumed knowledge:** MAB220 is recommended for prior/concurrent study for exposure to MATLAB  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**MAB461 DISCRETE MATHEMATICS**

Discrete mathematics is playing an ever increasingly important role in society. We live in an electronic age where information security is of paramount importance, and it is discrete mathematics in the main that provides this security. In addition, many real world systems are discrete in nature and therefore lend themselves to a discrete analysis. These methods are therefore vital to the professional mathematician and useful to those with an interest in mathematics. This second level unit will provide you with an introduction to discrete and combinatorial mathematics, and give you a mathematical perspective that is different from the traditional coverage in other mathematics units. It will also provide you with valuable methods to apply in other areas of science and computer science.

**Prerequisites:** MAB112 or MAB122  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

**MAB480 INTRODUCTION TO SCIENTIFIC COMPUTATION**

This unit teaches students how to implement a mathematical algorithm in a modern scientific computing environment (eg Matlab). A case-study approach is used with an emphasis on writing efficient code. Also an overview of other software packages used in mathematics will be given.

**Antirequisites:** ITB849  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point

**MAB521 APPLIED MATHEMATICS 3**

This unit includes: partial differential equations such as the wave, heat and Laplace equations; special functions (gamma, delta, Bessel and error functions, Legendre polynomials); vector analysis and applications (vector algebra, vector calculus, fields, grad, div, curl, line and surface integrals, divergence theorem, Stoke's theorem, applications); functions of a complex variable (analytic functions, contour integrals, Laurent series, residues).

**Prerequisites:** MAB311  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**MAB525 OPERATIONS RESEARCH 3A**

This unit develops problem-solving skills and sharpens analytical skills. This unit introduces the technical issues involved in applying operations research principles, methods and algorithms in the solution of real-world problems.

**Prerequisites:** MAB315  
**Antirequisites:** MAN525  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**MAB533 STATISTICAL TECHNIQUES**

This unit builds on your knowledge and skills of statistical techniques and aims to provide you with an understanding and a working knowledge of some more specialised statistical techniques and their applications. Topics covered include quality management concepts and tools for statistical process control, modelling and analysis of reliability (for inanimate objects) and survival (for living entities), and multivariate techniques such as principal components analysis, discriminant analysis and cluster analysis.

**Prerequisites:** MAB210 and MAB414  
**Antirequisites:** MAB523  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**MAB625 OPERATIONS RESEARCH 3B**

Operations research techniques are used in most industries that are concerned with the application of scientific methods in decision making, especially the allocation of resources. There is thus a need for graduate students who can make decisions on the most appropriate technology to solve a particular problem and implement it. This unit will build on the foundation of previous Operations Research units to develop knowledge and skills in using advanced techniques, tools and methods.

**Prerequisites:** MAB315  
**Equivalents:** MAN625  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

Published on: 13 June 2012

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MAB672 ADVANCED MATHEMATICAL MODELLING
Models are developed beginning with the description of 'real world' problems. Emphasis is on the mathematical modelling and not on the development of new mathematical techniques. The unit includes: mathematical modelling; model formulation; dimensional analysis and re-scaling; curves of pursuit; bungy jumping; modelling with systems of ordinary differential equations; phase plane methods for analysing systems of ODEs; bacterial growth in a chemostat; predator-prey models with harvesting; limit cycles; oscillations and excitable media; modelling with partial differential equations; motion of a continuum; continuity; traffic flow; aggregation of slime mould amoebae; momentum; ideal gas dynamics; quasi-linear PDEs. 
Prerequisites: MAB422 Antirequisites: MAN672  
Assumed knowledge: MAB311. Also recommend: MAB413  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1

MDB120 MATHEMATICS CURRICULUM AND PEDAGOGIES
This unit provides content knowledge and pedagogical strategies to promote the mathematical development (both cognitive and social) of students' future pupils.  
Credit points: 12  
Campus: Kelvin Grove  
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
Queensland University of Technology
Brisbane Australia

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. 
Equivalecnts: NRB370    Credit points: 12    Contact hours: 4 per week    Campus: Gardens Point    Teaching 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.
Equivalecnts: 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

NQB322 INVERTEBRATE BIOLOGY
Anyone pursuing a career as an ecologist, environmental biologist, or teacher needs to be familiar with invertebrates, including their diversity and how they function. Because approximately 90% of all invertebrates are arthropods, this unit focuses on this dominant phylum, which includes all the animals with jointed exoskeletons (the insects, prawns and crabs, spiders, millipedes and more). The aim is to provide you with an overview of arthropod diversity, structure and function, as a basis for exploring the role of arthropods in natural and human-modified systems.
Equivalecnts: NRB370    Credit points: 12    Contact hours: 4 per week    Campus: Gardens Point    Teaching period: 2011 SEM-1

NQB323 PLANT BIOLOGY
This unit will provide an understanding and appreciation of plants by taking an evolutionary approach to the study of major plant groups. Content includes life cycles, morphology, adaptations for survival in varied environments, economic and ecological aspects of various groups as they relate to humans, phylogeny and diversity of major groups. This unit will encourage carefult observation, curiosity and thinking about plants. The practicals will provide an opportunity to observe and understand form, function and diversity and will emphasise development of skills in plant systematics and identification, with special emphasis on Australian flora.
Prerequisites: SCB112    Equivalents: NRB371    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 NRB301 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 NRB331  
**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 NRB331  
**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 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-2

**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-1

**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 NQB421)  
**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

**NQB503 SPATIAL ANALYSIS OF ENVIRONMENTAL SYSTEMS**
TBA  
**Equivalents:** NRB501  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1

**NQB512 ECONOMIC GEOLOGY**
The unit is divided up into two 6 week modules. The first module concentrates on the formation of coal deposits, the geology of Australian coal basins, formation and exploitation
of coal seam gas and coal resource evaluation. The second module concentrates on the formation and preservation of economic mineral deposits. **Prerequisites:** NQB411, NQB413  **Antirequisites:** NRB535  **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

**NQB601 SUSTAINABLE ENVIRONMENTAL MANAGEMENT**

This unit provides background and details on global sustainable management issues and practices with a focus on Australia. It is therefore an important unit of study for any graduate wishing to pursue a career in environmental science who shares an abiding interest in the state and sustainable management of our planet. The unit complements other advanced units dealing with environmental science and its practice. The aim of this unit is to gain deeper understanding of a variety of current issues in environmental management; their multi-disciplinary nature, the science behind them, and the ways of achieving sustainable environmental management in scientific and practicable ways. **Assumed knowledge:** 48 credit points of second level science units is assumed knowledge.  **Equivalents:** NRB600  **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

**NQB622 CONSERVATION BIOLOGY**

Conservation Biology is the application of ecological theory and principles to the problem of the maintenance of viable populations of rare, threatened or endangered species, or ecological systems. The unit integrates ecological and genetic material covered in earlier units to provide an understanding of factors that enable the maintenance or enhancement of populations. The unit examines biodiversity and its determinants, the process of extinction, population viability analysis and the diagnosis and treatment of population declines, habitat fragmentation, metapopulation processes and the design of natural reserves, and conservation genetics. **Prerequisites:** NQB321 or NRB311, and NQB422 or NRB410  **Equivalents:** NRB611  **Credit points:** 12  **Contact hours:** 4 per week  **Campus:** Gardens Point  **Teaching period:** 2011 SEM-2

**PCB593 DIGITAL IMAGE PROCESSING**

This unit provides students with a basic understanding of the computer techniques used in image processing and reconstruction. Specific areas of study include the following: the structure of a digital image; image display techniques; grey scale palettes and look-up tables; Fourier transform theory; convolution theory; image processing hardware; image processing techniques, eg analysis, enhancement and restoration; spatial filtering; Fourier space filtering; methods of image reconstruction; 3D volume and surface rendering; applications of image processing in medicine, astronomy and remote sensing, etc.
Prerequisites: PCB375-2 or PCB496 or PQB250  
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

PQB313 ANALYTICAL CHEMISTRY FOR INDUSTRY
A modern chemist working in industry requires a thorough understanding of the fundamentals of analytical chemistry on which applications in sophisticated, state-of-the-art instrumental methods are based. This unit provides students with a grounding in the classical qualitative and quantitative gravimetric and wet analysis, together with common spectrophotometric and electrochemical methods of analysis. Through the practical program in this unit, students will be able to learn the connections between the theoretical aspects of analytical chemistry and the work in the laboratory. The chemistry behind some applications of these methods is also discussed, eg water, fertilisers, foods, minerals, metals, etc.

Prerequisites: SCB131  
Equivalents: PCB314  
Credit points: 12  
Contact hours: 4.5 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1

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

**PQB360 GLOBAL ENERGY BALANCE AND CLIMATE CHANGE**

Modern societies are becoming increasingly aware of potential environmental problems associated with conventional energy production technologies. Application of alternative technologies is therefore increasing, with ambitious targets and plans to support research and development for reducing energy related environmental consequences. This unit is designed to offer science and engineering students an opportunity to gain awareness about the expanding field of alternative energy technologies and to understand relationships between use of energy and its impact on local and global environment.  
**Prerequisites:** MAB121 and MAB122  
**Equivalents:**  
PCB563  
**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:** QB331  
**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:** QB331  
**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, and 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 comajor in Physics or preparing for a career in secondary education.  
**Prerequisites:** QB250 or QB250, 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 instrumentation 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:** QB250 or QB250  
**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:** QB401  
**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

### PQB525 UNIT OPERATIONS
Having gained an understanding of mass and energy balances in PQB423 you will be able to appreciate the principles underlying the design and operation of the many individual processes, or unit operations, that together make up a large part of any full-scale industrial process. It is vital that Chemists involved in Chemical Technology understand how unit operations work so that they can interact effectively with unit operators and process engineers. An additional role of this unit is to build a knowledge base for the subsequent development of generic skills in Chemical Technology through a problem-solving exercise involving an authentic industrial process in PQB623.  
**Prerequisites:** PQB423  
**Equivalents:** PCB524  
**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

### PQB631 ADVANCED INORGANIC CHEMISTRY
Major topics covered are as follows: organometallic chemistry, including metal-carbon bonding, main group and transition metal organometallics and applications of organometallic compounds in synthetic chemistry; bioinorganic chemistry; physical methods of structure determination, such as single crystal X-ray diffraction; chemical applications of group theory.  
**Prerequisites:** PQB331  
**Equivalents:** PCB634  
**Credit points:** 12  
**Contact hours:** 5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-2

### PQB651 EXPERIMENTAL PHYSICS
This unit represents the culmination of the students experiences in undergraduate experimental work. The unit is offered in the final year of study to take advantage of and integrate the skills acquired in previous units. The student is given the opportunity to select three experiments to be undertaken from a series of extended experiments in the areas of physics research undertaken at QUT.  
**Prerequisites:** PQB451 or PCB460  
**Equivalents:** PCB661  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 SEM-1 and 2011 SEM-2

### PQB661 LASERS AND PHOTONICS
Laser and photonic technologies are rapidly maturing areas responsible for creating new industries and employment opportunities for scientists and engineers in the areas of information technology, manufacturing, sensing and health. In particular, the vast global optical communications industry has dramatically increased information transport rates through the development of new laser sources and photonic devices. At the heart of all advances in photonics is a greater understanding of light-matter interactions and the processes used to fabricate devices. This unit is offered to science and engineering students who seek to understand the physical principles underpinning lasers and photonic devices and their use in a range of optical technologies.  
**Prerequisites:** (PQB251 or PCB260 or EEB340 or ENB242 or ENB343) and (MAB311 or MAB233)  
**Equivalents:** PCB664  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2011 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 counterpoint, 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 hours: 4.5 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: LQB182, 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  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 effect 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 (e.g., 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

### 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 SCB121). SCB121 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