Bachelor of Applied Science (Forensic Science) (SC01)

Year offered: 2010
Admissions: Yes
CRICOS code: 003502J
Course duration (full-time): 3 Years
Course duration (part-time): 6 Years
Domestic fees (indicative): 2010: CSP $2,200 (indicative) per semester
International Fees (indicative): 2010: $11,750 (indicative) per semester
Domestic Entry: February and July
International Entry: February and July* (Conditions apply for July entry)
QTAC code: 418011
Past rank cut-off: 77
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.studentservices.qut.edu.au/apply/ug/info/knowledge.jsp

Total credit points: 288
Standard credit points per full-time semester: 48
Standard credit points per part-time semester: 24
Course coordinator: Dr Marion Bateson
Discipline coordinator: Dr Emad Kiriakous
Campus: Gardens Point

Overview
Crimes are committed daily in our society and science often assists the investigators to bring the perpetrators to justice. Forensic sciences are developed to serve the law by applying many chemical and biological principles and laboratory processes to identify and quantify material collected as potential evidence from a crime scene. Applications of forensic science include:

- the detection and identification of explosive and gunshot residues, accelerants used in arson cases, and trace evidence (eg paint, glass, fibres, soil)
- DNA profiling to distinguish between individuals by analysing samples involving blood, saliva, hair or semen
- toxicological identification of illicit and pharmaceutical drugs and poisons
- recording and photographing the crime scene, and fingerprinting.

Recommended Study
Chemistry and Biological Science.

Why Choose this Course
At QUT you will receive a strong grounding in the core areas of crime scene investigation, forensic biology and forensic chemistry. In addition you will complement your major in forensic science with a full major in biotechnology, biochemistry, microbiology or chemistry, allowing you to maximise your employment opportunities.

QUT’s forensic science course give you an advantage by providing you with more advanced skills across a range of problem-solving techniques focused on crime investigation. You will actually learn basic crime scene processing skills, not just how to handle evidence when it arrives in the laboratory.

You will obtain hands-on experience using QUT’s laboratory facilities and instrumentation which are some of the most advanced in Australia. You will gain experience in report writing and forensic evidence reporting, and learn from lecturers who are respected professionals in their discipline of science, along with current forensic scientists and crime scene investigators.

Career Outcomes
Forensic science work is popular, rewarding and highly competitive. Generally it involves employment in laboratories handling criminal casework in areas including forensic biology, chemistry, and toxicology. Crime scene investigation is another interesting profession which may be attained by joining the police force.

Professional Recognition
Graduates who complete the forensic science major in conjunction with a life science major in biochemistry, biotechnology or microbiology are eligible for membership of the Australian and New Zealand Forensic Society (ANZFSS), AusBiotech Ltd, and the Australian Society for Biochemistry and Molecular Biology (ASBMB).

Graduates who complete the forensic science major in conjunction with the chemistry major are eligible for membership of the Australian and New Zealand Forensic Science Society (ANZFSS) and the Royal Australian Chemical Institute (RACI).

Your Course
Year 1
You will undertake introductory core studies in a range of scientific areas including life sciences, chemistry, physics, mathematics and environmental science to give you a solid foundation for your future studies. Following these introductory studies you should be in a position to confirm your choice of major area of study.

Year 2
Your forensic studies program begins with an introduction to crime scenes and your lectures will be accompanied by laboratory work including mock crime scenes. You will learn about the legal aspects of forensic science, and take a big picture approach to the nature and analysis of physical and biological evidence. You can expand your knowledge through dedicated units in forensic evidence, analytical chemistry and biological methods of analysis.

### Year 3
You will build upon your previous studies to further develop your knowledge and skills in areas of crime scene investigation such as forensic photography and fingerprinting as well as interpretation of physical evidence. You will learn about the sophisticated instrumentation and interpretation of results used in the analysis of drugs, poisons and DNA. Hand-on laboratory sessions will provide knowledge of expanded applications in advanced forensic analysis and toxicology. All theory is complemented and supplemented by focused workshops and laboratory classes.

### Forensic Science Full-time Course Structure: First Semester Entry

**Note:** Must be taken as a double major with Biochemistry, Biotechnology, Chemistry or Microbiology

<table>
<thead>
<tr>
<th>Year 1, Semester 1</th>
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<tbody>
<tr>
<td>SCB110 Science Concepts and Global Systems</td>
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<td>SCB111 Chemistry 1</td>
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<td>SCB112 Cellular Basis of Life</td>
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<td>MAB101 Statistical Data Analysis 1</td>
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<td>MAB105 Preparatory Mathematics</td>
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<td>MAB120 Algebra and Calculus</td>
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<td>MAB121 Calculus and Differential Equations</td>
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**NOTE:**
1. Students with a Sound Achievement (4 semesters) in Maths A should enrol in MAB105.
2. Students with a Sound Achievement in Maths B and NOT wishing to major in Physics should enrol in MAB101.
3. Students with a Sound Achievement in Maths C and wishing to major in Physics should enrol in MAB121.
4. Students without a Sound Achievement in Maths C and wishing to major in Physics should enrol in MAB120.
5. Students without a Sound Achievement in Maths B or Maths A should consult with the course coordinator.

<table>
<thead>
<tr>
<th>Year 1, Semester 2</th>
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<tbody>
<tr>
<td>SCB121 Chemistry 2</td>
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<tr>
<td>SCB122 Cell and Molecular Biology</td>
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<td>SCB123 Physical Science Applications</td>
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<td>SCB131 Experimental Chemistry</td>
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<th>Year 2, Semester 1</th>
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<tr>
<td>LQB383 Molecular and Cellular Regulation</td>
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<tr>
<td>SCB384 Forensic Sciences - From Crime Scene to Court</td>
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<td>Plus TWO other units selected according to the second major requirements</td>
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<tr>
<th>Year 2, Semester 2 *</th>
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<tbody>
<tr>
<td>JSB979 Forensic Scientific Evidence</td>
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<tr>
<td>PQB312 Analytical Chemistry For Scientists and Technologists</td>
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<td>Plus TWO other units selected according to the second major requirements</td>
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<th>Year 3, Semester 1 *</th>
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<tr>
<td>PQB513 Instrumental Analysis</td>
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<td>PQB584 Forensic Physical Evidence</td>
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<td>Plus TWO other units selected according to the second major requirements</td>
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<tr>
<th>Year 3, Semester 2 *</th>
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<tr>
<td>LQB680 Forensic DNA Profiling</td>
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<tr>
<td>PQB684 Forensic Analysis</td>
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<td>Plus TWO other units selected according to the second major requirements</td>
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**NOTE:** Certain units in this major may also be listed for your second major. You must take a suitable replacement unit as each unit may only be counted towards one major. Please contact your discipline coordinator to obtain a list of suitable "extra" units.

*Elective Unit for all Majors:*

| SCB500 Industry Project |  |

**NOTE:** SCB500 Industry Project is a unit that will be offered as an elective in all majors. This unit requires 84 credit points of Level 2 and/or 3 Science units, so it may only be taken at the completion of Year 2 in Summer or during Year 3.

### Forensic Science Full-time Course Structure: Mid-Year Entry

**Mid-Year (July) Entry**
FOR DOMESTIC STUDENTS: Due to the careful construction of scientific knowledge demanded in the SC01 degree, mid-year entry requires some compromises. There are two ways to construct a mid-year program:

1. Take foundation units and their follow-up units together, rather than in sequence. This will be very challenging, but will allow you to start second year units at the start of the next year. Please contact either the course coordinator or the discipline coordinator to devise a suitable program of study. Please note: as this option usually involves taking units from different levels concurrently, which may not timetabled appropriately, in some cases it may not be possible to complete within the standard time frame.

2. Take three units per semester for the first three semesters, adding one semester to your degree completion time. This allows you to do your first year units in the correct sequence, at a slightly more leisurely pace, while still being officially a full-time student. You may enrol in a fourth unit (level 2 unit from your chosen major) provided you have the necessary pre-requisites. This is the recommended option.

FOR INTERNATIONAL STUDENTS: Mid-year entry is only available under certain circumstances. Please contact the Course Coordinator to discuss available midyear entry and advance standing options on a case by case basis.

UNIT SYNOPSES

JSB979 FORENSIC SCIENTIFIC EVIDENCE
The word 'forensic' once meant anything relating to a law court. However today the term 'forensic science' refers to a whole new subject: it means using science to solve legal issues. As science, and the many sub-disciplines of science, are appearing in court with ever-increasing rapidity, there is a clear need for scientists to understand the foundations to the law, the ways in which law reasons, the adversarial process, and the basics to the key area of evidence law. The aim of this unit is first to provide you with an understanding of evidence law, with a particular emphasis upon the foundations to reception of scientific evidence, and the ways in which expert scientific witnesses are received in our courts. The unit aims to clarify the links between science and law, as well as to articulate the differences between these two increasingly inter-twined disciplines.
Equivalent: JSB937, JSB444
Credit points: 12
Contact hours: 3
Campus: Gardens Point and External
Teaching period: 2010 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 LSB238
Antirequisites: LSB468 and LSB338
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching period: 2010 SEM-2

LQB680 FORENSIC DNA PROFILING
The unit covers the evolution of DNA typing from restriction fragment length polymorphism (RFLP) DNA "fingerprinting" to short tandem repeat (STR) analysis using multiplex PCR-based systems for human identification, the principles of single nucleotide polymorphism (SNP) technology, mitochondrial DNA analysis and future trends for forensic DNA analysis.
Prerequisites: SCB384
Credit points: 12
Contact hours: 4 per week
Campus: Gardens Point
Teaching
**MAB101 STATISTICAL DATA ANALYSIS 1**
Experiments, observational studies, sampling, and polls; data and variables; framework for describing and manipulating probability; independence; Binomial and Normal distributions; population parameters and sample statistics; concepts of estimation and inference; standard error; confidence intervals for means and proportions; tests of hypotheses on means and proportions (one sample and two independent samples); inference using tables of counts; modelling relationships using regression analysis; model diagnosis; use of statistical software.

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

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

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

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

**Assumed knowledge:** Grade of at least Sound Achievement in Senior Mathematics B (or equivalent) or MAB105 is assumed knowledge  
**Equivalents:** MAB100, MAB125, MAB180  
**Credit points:** 12  
**Contact hours:** 4

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

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

**PQB312 ANALYTICAL CHEMISTRY FOR SCIENTISTS AND TECHNOLOGISTS**
Reliable chemical analysis and testing is fundamental to the functioning of our society. This generic unit is designed for future scientists and technologists in the fields of chemistry, forensic science and other similar sciences. It introduces students to concepts of quality assurance, good laboratory practice and the vital instrumental areas of analysis – chromatography and spectroscopy. Laboratory work is a key extensive activity in this unit.

**Prerequisites:** SCB131  
**Equivalents:** PCB414  
**Credit points:** 12  
**Contact hours:** 4.5 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1 and 2010 SEM-2

**PQB513 INSTRUMENTAL ANALYSIS**
TBA  
**Prerequisites:** PQB312 or PCB414  
**Equivalents:** PCB514  
**Credit points:** 12  
**Contact hours:** 4 per week  
**Campus:** Gardens Point  
**Teaching period:** 2010 SEM-1

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

**Prerequisites:** PQB312, SCB384   **Antirequisites:** PCB584   **Credit points:** 12   **Contact hours:** 4 per week   **Campus:** Gardens Point   **Teaching period:** 2010 SEM-1

**PQB684 FORENSIC ANALYSIS**
This unit provides a theoretical and practical framework for forensic analysis and toxicology. It includes topics such as nature and abuse of drugs; introduction to pharmacology and toxicology; illicit drugs and trace evidence; the application of GC, MS and IR in forensic examination; examination of trace evidence. Substantial laboratory and workshop sessions complement the theory.

**Prerequisites:** PQB513 or PCB514   **Equivalents:** PCB584   **Credit points:** 12   **Contact hours:** 5 per week   **Campus:** Gardens Point   **Teaching period:** 2010 SEM-2

**SCB110 SCIENCE CONCEPTS AND GLOBAL SYSTEMS**
You will undertake interdisciplinary study of the physical, geological and biological concepts relating to the origins of life; from the creation of matter and planets, to the emergence of life in all its complexity, culminating in evolution of earth ecosystems. Human influences, overlaid upon earth’s complex systems, will be examined as to their type, extent, and impact. In 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:** 2010 SEM-1

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

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

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

**Antirequisites:** LSB118   **Credit points:** 12   **Contact hours:** 4 per week   **Campus:** Gardens Point   **Teaching period:** 2010 SEM-1 and 2010 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, particularly in regards to the chemistry of life. In this unit students will be introduced to fundamental aspects of chemistry including the electronic structure of atoms, chemical bonding and molecular structure. From this basis students will develop an understanding of the fundamentals of organic chemistry including chirality, functional groups and organic reactions which will lead to important bio-inorganic molecules and coordination complexes.

**Prerequisites:** (SCB111 or PCB142) . SCB111 can be studied in the same teaching period   **Antirequisites:** SCB113   **Credit points:** 12   **Contact hours:** 4.5 per week   **Campus:** Gardens Point   **Teaching period:** 2010 SEM-1 and 2010 SEM-2

**SCB122 CELL AND MOLECULAR BIOLOGY**
SCB122 Cell and Molecular Biology 1 equips students with a comprehensive understanding of the molecular basis of the cell. This unit expands on the basic principles and concepts relating to cell structure, function, perpetuation and specialisation introduced in SCB112 and introduces students to fundamental molecular mechanisms central to the organisation of the cell. Students will be shown how macromolecular interactions are crucial to information flow and heredity. Students are taught the relationships between chromosomes, genes and cellular function and ultimately how these may determine an organism’s phenotype. This unit underpins cell biology and molecular biology units that are offered in second year Life Science units. SCB122 is also ideal for interfaculty students (eg Education, Business,
Arts) who will undertake no further life science studies.

Prerequisites: SCB112  Antirequisites: LSB238
Credit points: 12  Contact hours: 4.5 per week
Campus: Gardens Point  Teaching period: 2010 SEM-2

SCB123 PHYSICAL SCIENCE APPLICATIONS

Physics principles underpin all of the sciences and ‘new technologies’. This unit adopts an investigative team-based approach to provide students with an appreciation of fundamental concepts in physical science, together with experience in the application of these concepts to a range of ‘real world’ problems. The unit should be taken in the first year of study as the fundamental principles introduced here will be built upon in later units in the context of each science student’s major discipline area. Employers in cutting-edge industries expect science graduates to have effective strategies for problem solving, skills for collaborative work and scientific communication and research skills. This unit aims to develop these skills by applying the fundamental concepts of physical science to problems in a team environment.

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

SCB131 EXPERIMENTAL CHEMISTRY

A study of chemistry and related disciplines such as medical science, biochemistry, molecular biology and pharmacy requires the development of practical laboratory skills used in synthesis and chemical analysis. 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.

Prerequisites: SCB111 or SCB113  Corequisites: SCB121 unless SCB113 has been successfully completed
Credit points: 12  Campus: Gardens Point  Teaching period: 2010 SEM-2

SCB384 FORENSIC SCIENCES - FROM CRIME SCENE TO COURT

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

Credit points: 12  Contact hours: 4.5 per week

Campus: Gardens Point  Teaching period: 2010 SEM-1

SCB500 INDUSTRY PROJECT

In this unit students will apply scientific methods and quantitative techniques to real work issues. Students will develop an appropriate plan for analysing and resolving an industry issue under the guidance of both a QUT supervisor and an associate supervisor from an industry partner. At the end of the unit students will present both an oral seminar and a written report.

Credit points: 12  Contact hours: 52  Campus: Gardens Point  Teaching period: 2010 SEM-1, 2010 SEM-2 and 2010 SUM