Bachelor of Urban Development (Spatial Science) (UD40)

Year offered: 2011
Admissions: Yes
CRICOS code: 056387B
Course duration (full-time): 4 years
Domestic Fees (indicative): 2011: CSP $3,878 (indicative) per semester
International Fees (indicative): 2011: $12,000 (indicative) per semester
Domestic Entry: February
International Entry: February
QTAC code: 412532
Past rank cut-off: 79
Past OP cut-off: 11
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 John Hayes
Discipline coordinator: Mr Robert Webb
Campus: Gardens Point

Why choose this course?
The QUT course is broad based and balanced and taught by staff with professional backgrounds.

Career Outcomes
There is a high demand for QUT Spatial Science (Surveying) graduates both in Australia and overseas. The employment rate has been near 100% for many years and is not expected to change in the near future. Surveyors and spatial professionals assess geographic and land information for implementing appropriate administration for the land, sea and related structures. Spatial information refers to information about the geographical relationship between places, people and other items within a particular area. There are employment opportunities in all levels of government, private practice and multi-national companies, statutory authorities or semi-government agencies. You will have the opportunity to travel as the degree is readily accepted overseas. After some years of experience you may become a manager or specialise as one of the following: Spatial Information Officer; Cadastral/Land Surveyor; Engineering Surveyor; Mine Surveyor; Remote Sensing Specialist; Topographic Surveyor; Cartographer (mapping).

Practical teaching
You will regularly be involved in practical activities such as field trips and are required to undertake work experience as part of your degree.

Industry links
The QUT staff are highly regarded professionally and maintain their links with industry by working closely with the professional bodies.

Facilities / technology
You will work in first-class laboratories, studying surveying instrumentation and mapping science.

Convenience
You will study at QUT's Gardens Point campus in the centre of Brisbane, within easy walking distance to public transport, including buses, trains and ferries.

Who should do this course?
If you are interested in any of the following you may enjoy a career in Spatial Science (Surveying):

- Mathematics
- Working in a variety of environments.
- Geography

Overview
This degree is a broad-based course. The first year is a foundation year designed to prepare students to deliver practical solutions to problems involving spatial information and decision-making. Students study foundation units such as mathematics, professional studies, sustainability as well as geospatial positioning in their first year. In the following years, the areas covered are boundary and control surveying, topographic mapping, photogrammetry, mine and hydrographic surveying, land development design and geographic information systems.

Professional Recognition
The course is recognised by Queensland Surveyors Board and the Surveying and Spatial Science Institute of Australia (SSSI).

Special Course Requirements
You will be required to attend compulsory field practicals off-campus in the Moreton Region and have access to an advanced scientific calculator for use during the course. To graduate you are required to have at least 90 days of approved industrial experience/practice in a spatial science/surveying environment.
Minors
For professional recognition you will undertake two minors (a minor is four units or 48 credit points in the same discipline) the first is a Science minor which includes Maths and the second an Applications minor which consists of a Work Integrated Learning unit, a project unit and two specialised spatial science units.

Limits on grades of 3
A new policy concerning grades of 3 comes into effect from 1 January 2009 (QUT MOPP C/5.2). With effect from this date grades of 3 will no longer be considered a conceded or low pass but will be classified as a fail grade. Any grades of 3 awarded prior to 1 January 2009 will 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
Faculty of Built Environment and Engineering - Phone +61 7 3138 1433, email: bee@qut.com

Full-time Course Structure - Commencing February 2010 onwards

<table>
<thead>
<tr>
<th>Year 1 - Semester 1</th>
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<tbody>
<tr>
<td>UDB100 Urban Development and Sustainability</td>
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<td>MAB120 Algebra and Calculus</td>
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<td>UDB101 Stewardship of Land</td>
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<td>UDB181 Geospatial Positioning and GPS</td>
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<th>Year 1 - Semester 2</th>
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<tr>
<td>UDB200 Project Planning in Urban Development</td>
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<td>MAB101 Statistical Data Analysis 1</td>
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<td>UDB104 Urban Development Economics</td>
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<td>UDB182 Surveying</td>
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<th>Year 2 - Semester 1</th>
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<tr>
<td>PCB172 Physics for Surveyors</td>
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<tr>
<td>UDB281 Geographic Information Systems</td>
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<td>UDB283 Surveying Computations</td>
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<td>UDB285 Cadastral Surveying</td>
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<th>Year 2 - Semester 2</th>
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<tr>
<td>MAB730 Surveying Mathematics 2</td>
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<td>UDB102 Applied Law</td>
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<td>UDB282 Remote Sensing</td>
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| UDB284 Engineering Surveying |  |

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<th>Year 3 - Semester 1</th>
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<tr>
<td>UDB381 Geospatial Mapping</td>
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<td>UDB383 Control Surveying and Analysis</td>
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<td>UDB385 Cadastral and Land Management</td>
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<td>UDB387 Spatial and Land Information Management</td>
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<th>Year 3 - Semester 2</th>
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<td>UDB202 Business Skills</td>
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<td>UDB302 Development Process</td>
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<td>UDB382 Photogrammetric Mapping</td>
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<td>UDB384 Geodesy</td>
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<th>Year 4 - Semester 1</th>
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<tr>
<td>BEB701 Work Integrated Learning 1</td>
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<tr>
<td>UDB301 Research Methods</td>
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<td>UDB483 Global Positioning Principles and Practice</td>
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<td>UDB485 Property Development Practice</td>
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<th>Year 4 - Semester 2</th>
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<tr>
<td>BEB801 Project 1</td>
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<tr>
<td>UDB388 Spatial Analysis Practice</td>
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<tr>
<td>UDB484 Topographic, Hydrographic and Mining Surveying</td>
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<td>UDB486 Cadastral Practice</td>
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Potential Careers:
Mapping Scientist/Photogrammetrist, Spatial Information Officer, Surveyor.

UNIT SYNOPSISES

BEB701 WORK INTEGRATED LEARNING 1
This unit aims to provide you with the opportunity to learn in a workplace environment. It will involve attendance, participation, observation, critical reflection, and report writing on workplace activities. The emphasis of your critical reflection and report writing will be on identifying and describing aspects of professional relevance incorporating: collaboration and teamwork; work place, health and safety; professional conduct; ethical responsibility, and other aspects of your work place experience. This unit may form part of your (compulsory) course core (as required by professional accrediting bodies e.g. Engineers Australia, Australian Institute of Building, Royal Institution of Chartered Surveyors), or it may be one of several work integrated learning (WIL) units (selected as
part of a Minor).

Assumed knowledge: This unit is not designed for first year students. It is recommended that you check WIL Community Blackboard site for information on enrolment pattern. If you are EN40 student you can only enrol after completing a minimum of 192 cp.  
Credit points: 12  
Campus: Gardens Point  
Teaching period: 2011 SEM-1, 2011 SEM-2 and 2011 SUM

MAB801 PROJECT 1
This unit is usually taken in the final year of study. Students complete an individual project involving the application of skills and knowledge attained during the earlier years of their degree program. For some students, this unit will be taken one of two ‘project’ units related to the same student project; in such cases this unit may be a pre-requisite or co-requisite to the second unit (or a follow-on from the first unit). The final ‘deliverable’ for this unit may vary for each discipline and details will be provided in lectures/tutorials and on the Blackboard website.  
Equivalents: CEB411, CEB420, CNB434, EEB781-1, EEB889-1  
Credit points: 12  
Contact hours: 2 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1 and 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  

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

MAB730 SURVEYING MATHEMATICS 2
Surveying and mapping involve the collection, processing, analysis and presentation of data about the earth's features. Typically, the processing and analysis of this data is performed using computer technology. Thus, knowledge of analytical mathematics and the mathematical algorithms behind a range of computational processes is essential for the surveying professional. The aim of this unit is to extend your knowledge of analytical mathematics and to introduce you to the mathematical algorithms behind a range of computational processes and the basic programming skills needed to enable you to implement these algorithms.  
Prerequisites: MAB100 or MAB120 or MAB125  
Antirequisites: MAB220  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-2

PCB172 PHYSICS FOR SURVEYORS
This unit includes the following: measurement and uncertainty kinematics (vector and scalar quantities, equations of motion); dynamics (friction, centripetal force, impulse and momentum, periodic motion, work and energy); gravity circular motion, centrifugal force, gravity, Kepler's Laws, orbits); fluid statics (pressure, barometry); fluid dynamics (fluid flow in pipes and channels, equation of continuity, Bernoulli's principle,); optical instruments (reflection, refraction, total internal reflection, spherical mirrors, thin lenses, transits, theodolites, corner cubes, cameras); electric and magnetic fields; electrical circuits (electronic components).  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1

UBC100 URBAN DEVELOPMENT AND SUSTAINABILITY
This unit introduces you to the essential professional skills and practises common to the fields and disciplines of urban development.  
Through this unit you will have an opportunity to develop and demonstrate professional knowledge in your specialized area while also developing foundation academic and university skills that you will use to enhance and support your further studies. Concepts relating to professional practice, ethics, information management and sustainability will be addressed through-out the unit. Information from this unit will be consolidated in UDB200.  
Antirequisites: DEB100 and ENB100  
Credit points: 12  
Contact hours: 3 per week  
Campus: Gardens Point
Teaching period: 2011 SEM-1

**UDB101 STEWARDSHIP OF LAND**

This interdisciplinary unit will introduce students to the characteristics of land and land tenure with a focus on land use and property rights. The particular issues of native title, land contamination, heritage and alternative utility will be covered. Thereafter the property development process will be described in general terms and emphasis placed on the impact of environmental and social factors on the financial evaluation. The final component will cover the management of land, both urban and regional. Case studies will demonstrate the part that each discipline plays in the stewardship of land and its development.

Equivalents: CNB105    Credit points: 12    Contact hours: 3 per week    Campus: Gardens Point    Teaching period: 2011 SEM-1

**UDB102 APPLIED LAW**

Introduces the fundamental principles and practices of Australian governance as they affect the built environment professions. The relevance of government policies, laws and regulations and aspects of Tort, Contract and Land and Environmental laws applicable to the Development and Construction processes are examined in context.

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

**UDB104 URBAN DEVELOPMENT ECONOMICS**

This unit will introduce microeconomic and macroeconomics concepts applied to urban and regional development. The unit will initially focus on demand, supply and determination of prices, and other important microeconomic concepts, at the level of an individual development. Here, the value of microeconomics in explaining aspects of development is demonstrated using local and national examples. In doing so, this unit will also help to deepen the appreciation of the key steps in development and the role of the main actors. Since anyone development project does not occur in a vacuum, the unit will then broaden to consider the impact of changes in the national and local economy on land use and development, including business cycle, monetary and fiscal policy.

Antirequisites: BSB113, BSD113    Credit points: 12    Contact hours: 4 per week    Campus: Gardens Point    Teaching period: 2011 SEM-2

**UDB181 GEOSPATIAL POSITIONING AND GPS**

This unit will introduce students to skills and knowledge of spatial referencing, site measurement; use of maps and air photos. It will include introduction to map projections; concepts and theory of Global Positioning Systems; introduction to global and local coordinate systems; mission planning and data collection. The unit will highlight the importance of geospatial positioning applications in society.

**UDB182 SURVEYING**

This unit provides a foundation in field instrumentation and survey computations; a framework for acquisition of a high level of knowledge and practical competence in plane survey computations; use of optical and electronic theodolites; EDM and total electronic station systems, and a focus on collection/presentation of pre-design contour and detail spatial information.

Equivalents: PSB640    Credit points: 12    Contact hours: 5 per week    Campus: Gardens Point    Teaching period: 2011 SEM-2

**UDB200 PROJECT PLANNING IN URBAN DEVELOPMENT**

This unit will enable you as a graduating Built Environment and Engineering professional to take active and positive steps to transform professional practice in ways that promote the sustainability of our planet, our economy and our society. As future professionals in the fields of Design, Urban Development and Engineering Systems, you will need to understand and apply the concepts of sustainability in your professional practice if we are to achieve sustainable development in the 21st Century.

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

**UDB202 BUSINESS SKILLS**

This unit focuses on career preparation with a business orientation. Current popular business tools are assembled and critiqued. A sequential approach is used starting with characteristics of the Resume, business protocol and ethics, the business plan, assessing business risk and Professional Liability.

Equivalents: CNB228    Credit points: 12    Contact hours: 3 per week    Campus: Gardens Point    Teaching period: 2011 SEM-2

**UDB281 GEOGRAPHIC INFORMATION SYSTEMS**

This unit investigates the basic concepts of geographic information systems. Topics to be covered include components of GIS, spatial databases, data acquisition, reference frameworks, use of photographs and images, spatial analysis and graphic output design issues. The unit will highlight the importance of geographic information systems the unit will highlight the importance of geospatial positioning applications in society.

Equivalents: PSB631    Credit points: 12    Contact hours: 4 per week    Campus: Gardens Point    Teaching period: 2011 SEM-1

**UDB282 REMOTE SENSING**
This unit includes the following: history and principals of remote sensing; types of imagery, image interpretation, satellite systems; supervised and unsupervised image classification; interpretation, analysis and presentation of data; applications in the earth sciences.

Equivalents: PSB655  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

UDB283 SURVEYING COMPUTATIONS
This unit includes the use of advanced scientific calculators and their application for geometric computations, solution of road and area problems, missing data closes, and simple curve problems. It offers solutions for more difficult problems including the three point problem, interrupted bases and various types of curve problems. It introduces spherical trigonometry, the solution of spherical triangles and the use of spherical trigonometry to determine position and direction on the Earth’s surface from observation to astronomical objects. Practical exercises determine position and direction.
Prerequisites: (MAB100 or MAB120) and UDB182  Equivalents: DBB646  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

UDB284 ENGINEERING SURVEYING
This unit includes: horizontal and vertical alignment for route surveys; areas, volumes and earthworks; surveying measurements and their assessment; propagation of variances; pre-analysis of survey tasks; least squares adjustment methods for various functional and stochastic models.
Prerequisites: MAB101, UDB182, and UDB283  Equivalents: PSB641  Credit points: 12  Contact hours: 5 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

UDB285 CADASTRAL SURVEYING
This unit includes land title systems, reinstatement: an explanation of the options of land title systems, with particular reference to Customary Land Tenure, Private Deeds registration, Public Deeds Registration, and Registration of Title. It includes an analysis of reinstatement of property boundaries as applicable to Queensland; the undertaking of a field survey to reinstate the boundaries of a section in the Brisbane Metropolitan area; preparation of cadastral and detail survey plans for survey actions; the legal aspects of re-establishment of boundaries; case law associated with re-instatement; statutory requirements that relate to the zoning and development of land.
Prerequisites: UDB182  Equivalents: PSB620  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

UDB301 RESEARCH METHODS
Research Methods will introduce students to the range of methods and techniques that may be utilised in examining questions related to professional practice. A comprehensive overview of research methods will be provided in order that students are able to contribute to research as a part of their professional practice, and to enable them to critically analyse research findings and publications.
Equivalents: CNB395  Credit points: 12  Contact hours: 3 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

UDB302 DEVELOPMENT PROCESS
This unit brings together concepts gained on strategic evaluation, risk, time management, organisational behaviour, planning, construction and development feasibility analysis. It places this knowledge in a total project context and provides you with an understanding of the processes involved in property development from conception to completion and beyond.
Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

UDB381 GEOSPATIAL MAPPING
This unit will provide the student with a sound knowledge and understanding of image mapping principles (including photogrammetry) and processes as well as practical skills and understanding required to collect spatial information and to produce fundamental mapping products. In addition this unit will provide the skills and knowledge of the principles and characteristics of cartographic communication, surface modelling techniques and digital mapping.
Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-1

UDB382 PHOTOGRAMMETRIC MAPPING
This unit builds upon the Geospatial Mapping unit to provide the student with developed knowledge and understanding of photogrammetric mapping theory and processes including spatial geometry, mathematics and aerotriangulation. The unit will also provide the student with an integrated knowledge and understanding of map production principles and practice applied to photogrammetric outputs.
Prerequisites: UDB381 and UDB383  Credit points: 12  Contact hours: 4 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2

UDB383 CONTROL SURVEYING AND ANALYSIS
This unit includes the following: reconnaissance for geodetic surveys (formulate mathematical models for the solution of linear and non-linear positioning in one, two and three dimensions); geodetic observations techniques and reduction of observations; the three classical methods of
geodetic surveying (triangulation, trilateration and traversing); precise levelling including instrument testing; properties of the meridian ellipse; radii of curvature, meridian arc; spheroid as a geodetic reference surface, latitude, longitude, geoid separation and ellipsoidal height; mutual conversion of geodetic and Cartesian coordinates.  

Prerequisites: MAB730  
Equivalents: PSB642  
Credit points: 12  
Contact hours: 5 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1

UDB384 GEODESY
This unit contains the following theory: concept and classification of geodesy, the basic concepts of Earth's gravity field, level surfaces and plumb lines, heights, geoid, mean sea level, spherical harmonics etc, fundamentals of satellite geodesy, reference coordinate systems. It considers GPS positioning models and algorithms, software, GPS field observing, various GPS applications in geomatics; mapping terms and definitions; the mapping principle; principles for deriving projections; the use of skew graticules; the UTM system.  

Prerequisites: UDB383  
Equivalents: PSB643  
Credit points: 12  
Contact hours: 5 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-2

UDB385 CADAstral AND LAND MANAGEMENT
This unit introduces the student to the basic civil engineering design processes and procedures associated with the development of subdivided urban/rural land for residential, industrial or commercial purposes. The unit covers the following: subdivisional road design types, hierarchy, longitudinal and cross sections, earthworks; stormwater design, basic urban hydrology, catchment properties, rational formula, pipe/gully parameters, pipe and open channel flows; water reticulation system features; sewer reticulation system features and basic design procedures. Modern trends in the above (including sustainability considerations) together with the general construction procedures and basic costings are introduced.

Prerequisites: BEB200 or UDB200  
Equivalents: CEB259  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1

UDB387 SPATIAL AND LAND INFORMATION MANAGEMENT
This unit provides you with an understanding of the spatial data infrastructure that will increasingly underpin decision making in diverse areas of development including resource management; urban and rural planning; cadastral administration and facilities management. The unit will provide an introduction to the concepts of a spatial data system planning overview, system implementation, and standards, legal issues, and knowledge-based techniques.  

Prerequisites: UDB281  
Equivalents: PSB612  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1

UDB388 SPATIAL ANALYSIS PRACTICE
This unit expands a student’s knowledge in the field of spatial information science within the framework of a practical exercise focussing on advanced spatial analysis techniques. This approach facilitates exposure to and the incorporation of emerging processes of acquisition, validation, storage, extraction, analysis and presentation of spatial information. A geographic information system environment is used to provide a practical introduction to industry practices and client expectations. This unit will provide students with enhanced knowledge of the extent, theory and practice of spatial information science and an enhanced ability to define and solve problems associated with manipulation of spatial information systems to meet client expectations.  

Prerequisites: UDB281  
Equivalents: PSB664  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-2

UDB483 GLOBAL POSITIONING PRINCIPLES AND PRACTICE
This unit includes the following: GPS operation and navigation messages; GPS observable and error budget; differencing techniques; GPS positioning models and algorithms; software; GPS field observing; static, kinematic, RTK and various GPS applications in geomatics. It also includes a practical on the GPS network.  

Prerequisites: UDB383 and UDB384  
Equivalents: PSB644  
Credit points: 12  
Contact hours: 4 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-1

UDB484 TOPOGRAPHIC, HYDROGRAPHIC AND MINING SURVEYING
This unit includes the following: field surveys for DTMs as-constructed surveys; associated specifications and standards; mining surveying for surface and below surface mining activities; Hydrographic surveying for exploration and port management.

Prerequisites: UDB383  
Equivalents: PSB645  
Credit points: 12  
Contact hours: 5 per week  
Campus: Gardens Point  
Teaching period: 2011 SEM-2

UDB485 PROPERTY DEVELOPMENT PRACTICE
This unit develops your knowledge and capability to engage in a professional manner with land and property development practice. Land development issues dealt with in preceding units are bought together in this final semester unit to prepare you to fulfil your professional role in the practice of land and property development. This unit will further develop the practical skills necessary for the preparation of lot reconfiguration plans suitable for sealing and registration with appropriate organizations.  

Prerequisites: UDB302 and UDB385  
Credit points: 12
Contact hours: 4 per week  Campus: Gardens Point  
Teaching period: 2011 SEM-1

UDB486 CADAstral PRACTICE
This unit includes the following: property rights as a method of resource control; creating and maintaining knowledge of property rights, including issues concerned with parcel identifiers, land tenure, land boundaries, land subdivision, land registration, changing rights through statutory changes, attitudes and responses of the public; evidence of property rights; evolution from customary land tenures to land registration systems; factors leading to breakdown of systems; effects of technological change on land use; evolving property rights and obligations; information technology and land use controls; procedures of the various departments including but not confined to, the Department of Lands, Resources Industries.  
Prerequisites: UDB285  Credit points: 12  Contact hours: 5 per week  Campus: Gardens Point  Teaching period: 2011 SEM-2