



## Undergraduate Unit Offerings and Course Advice

### General Information

If ever there was a time for the study of the Earth, and of changes to its systems and processes, plants and animals, ecosystems and social systems, surely it is now. Such study is integral to the mission of the School of Geography and Environmental Studies. We offer distinctive programs in human and physical geography, environmental management and planning, and spatial science. Our internationally recognised researchers and award winning teachers are committed to providing rich experiences for students during their time at the University of Tasmania.

### Hobart Campus

Our main office is located on the Sandy Bay campus, where 17 academic staff, eight general staff, and many students work on a wide range of cutting-edge projects. The campus is located close to the Sandy Bay shopping precinct, near the Derwent River at Marieville Esplanade and—in the opposite direction—is a short distance from the University Reserve and some great walks.

We offer a broad choice of undergraduate and postgraduate degree programs across the arts and sciences. Among the degrees to which we contribute are:

- Bachelor of Science
- Bachelor of Arts
- Bachelor of Natural Environment and Wilderness Studies
- Bachelor of Environmental Science
- Bachelor of Surveying and Spatial Sciences
- Graduate Certificate in Geographic Information Systems
- Honours programs
- Graduate Diploma and Masters programs in Environmental Management, Environmental Planning, Applied Science and Spatial Science

We also offer masters by research and doctorate programs; please contact the School to speak with the Graduate Programs Coordinator if you are interested in these.

### Newnham Campus

The School has a dedicated presence on Launceston's Newnham Campus, and services a number of undergraduate degree programs in Arts, Science, Environmental Science and Natural Environments and Wilderness Studies.

The School is located in the Science Building on School Road near the AMC. Two staff are based there full-time, with at least one other working part-time, and with other staff visiting through semesters during which they teach.

A number of honours and research higher degree students are working on environmental science, forest ecology, agroforestry, or environmental management and policy problems with those staff.

### Please contact us

For additional information about any of these matters or the units outlined in this prospectus, contact the:

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## Career prospects

Our graduates have real flexibility of choice in their career paths. They have been trained to understand the world as an integrated whole, and to appreciate elements of the parts that make up that whole. Consequently they have much to offer in local, State and Australian government departments dealing with every aspect of society. Graduates also are employed in small, medium and large private firms—and especially in local, national and international environmental consultancies—and in non-government organisations, many of which are directed to environmental management, conservation or social and ecological justice.

Graduates from Geography and Environmental Studies will finish university with a range of useful generic attributes such as advanced writing, speaking and listening skills; numeracy; and critical and creative thinking. Importantly, they also will have a powerful mix of specific disciplinary skills; for example in mapping, spatial data analysis, field work, archival research, statistical and qualitative research, and planning and management.

Many of our students also go on to honours, postgraduate coursework and research higher degree programs, and then into employment.

## Course design

Prospective and current students **must** pay careful attention to degree specifications and schedules in designing a program of study; these may be found in the University's Course and Unit Handbook, which is located online at <http://courses.utas.edu.au>.

The University will be implementing from 2010 major changes to how degree programs are organised; this process is known as the Course Structures Project ([www.coursestructures.utas.edu.au](http://www.coursestructures.utas.edu.au)). A generalist three-year undergraduate degree requires 24 units, of which eight to 10 are introductory units, six to 10 are intermediate, and six to 10 are advanced units, with some flexibility in four units in terms of level of study.

For example:

Introductory			
Intermediate			Intro/intermed/adv
			Intro/intermed/adv
Advanced			Intermed/adv
			Intermed/adv

Other guidelines will apply for specialist or combined degrees. **Students should seek precise information** about appropriate combinations of units for degrees by talking with School enrolment officers, the University's designated degree coordinators ([www.utas.edu.au/scieng/firstyear/coordinators.htm](http://www.utas.edu.au/scieng/firstyear/coordinators.htm)) or Faculty officers ([www.its.utas.edu.au/cgi-bin/organisational\\_chart.pl?task=orginfo](http://www.its.utas.edu.au/cgi-bin/organisational_chart.pl?task=orginfo)).

The units we offer are known by their KGA (geography and environmental studies) and KGG (spatial science) codes. Each unit is weighted at 12.5 per cent of a 100 per cent full-time load, and all but two are taught either in Semester One (February to June) or Semester Two (July to November). Those units are KGA13 natural environment field techniques and KGA331 vegetation management. The two exceptions—both field techniques units—are taught in December, and assessments are due before the start of Semester One the following year.

## Majors and minors

The scope of Geography and Environmental Studies means that it can be usefully combined with units from other schools across a range of faculties. Combinations will vary with the interests and intentions of the student, the availability of units, specified prerequisites, or timetable and campus, for example. Thus the models outlined on the following pages are **not prescriptive**. They are illustrative of the Bachelor of Arts and Bachelor of Science programs and of double majors—which are not compulsory in the Arts.

**Again, the message is to seek advice from enrolment specialists prior to making firm decisions about degree and unit choices, since the ‘realities’ are less clear-cut than the models suggest, and are affected by prerequisites or the availability of units in different semesters or according to odd/even year rotations, among other considerations.**

## Specialist degrees

The common course structure project also specifies enrolment patterns for specialist degrees. The Bachelor of Surveying and Spatial Sciences is one such degree offered by the School of Geography and Environmental Studies. The BSurvSpSc comprises a major in GIS and Remote Sensing, a major in Surveying, a minor in Geography and Environmental Studies, and elective units. The spatial sciences units offered by the School are described later in this Prospectus.

Students primarily interested in **environmental, life and earth science** also may wish to take a minor in spatial sciences (GIS and Remote Sensing). The following table shows an enrolment pattern that leads to a major in Geography and Environmental Studies, a major in Plant Science or Zoology, a minor in GIS and Remote Sensing, and a minor in Earth Science.

KGA171 The Geography of Global Change	KGG102 GIS: Introduction	Earth Science	Plant Science/ Zoology
KGA172 Space, Place and Nature	KGG340 GIS: Spatial Analysis	Earth Science	Plant Science/ Zoology
KGA204 Earth, Climate and Life	KGG103 Remote Sensing: Introduction	Earth Science	Plant Science/ Zoology
KGA213 Natural Environment Field Techniques	KGG213 Remote Sensing: Image Analysis (new from 2010)	Earth Science	Plant Science/ Zoology
KGA320 Our Changing Climate	KGA332 Fauna Conservation Management	Plant Science/ Zoology	Plant Science/ Zoology
KGA331 Vegetation Management	KGA327 Conservation Geomorphology	Plant Science/ Zoology	Plant Science/ Zoology

Students interested in **climatology** may wish to develop a background in, for example, mathematics and physics, or marine and Antarctic science, and could pick up computing, and GIS and Remote Sensing in first year.

KGA171 The Geography of Global Change	Computing	Maths/Physics	Marine and Antarctic Science
KGA172 Space, Place and Nature	Computing	Maths/Physics	Marine and Antarctic Science
KGA213 Natural Environment Field Techniques	KGG102 GIS: Introduction	Maths/Physics	Marine and Antarctic Science
KGA204 Earth, Climate and Life	KGG103 Remote Sensing: Introduction	Maths/Physics	Marine and Antarctic Science
KGA331 Vegetation Management	KGA300 Environmental Research Project	Marine and Antarctic Science	Marine and Antarctic Science
KGA319 Making Sense of Climate Change	KGA320 Our Changing Climate	Marine and Antarctic Science	Marine and Antarctic Science

Students interested in the **social science dimensions of major environmental or social change** may find it useful to also study psychology, philosophy and political science.

KGA171 The Geography of Global Change	Psychology	Philosophy	Political Science
KGA172 Space, Place and Nature	Psychology	Philosophy	Political Science
KGA205 Geographies of the Human Landscape	Psychology	Philosophy	Political Science
KGA223 Environmental Management	Psychology	Philosophy	Political Science
KGA319 Making Sense of Climate Change	KGA378 Wilderness Management	Political Science	Political Science
KGA373 Sustainable Settlements	KGA381 Environmental Impact Assessment	Political Science	Political Science

Students pursuing **tourism, international relations or international environmental fields**, for example, may decide to take units in history, sociology and Asian studies.

KGA171 The Geography of Global Change	History	Sociology	Asian Studies
KGA172 Space, Place and Nature	History	Sociology	Asian Studies
KGA202 Geography of Asia	History	Sociology	Asian Studies
KGA204 Earth, Climate Life OR KGA205 Hum Geog OR KGA223 Env Mgt	History	Sociology	Asian Studies
KGA378 Wilderness Management	KGA319 Making Sense of Climate Change	Asian Studies	Asian Studies
KGA381 Environmental Impact Assessment	KGA373 Sustainable Settlements	Asian Studies	Asian Studies

Students engaged in the **humanities** may find geography and environmental studies enhances at least two of the major inspirations for artistic output—**sense of place and environment**.

Students studying in Launceston in the Bachelor of Environmental Science and wishing to study exclusively on that campus can obtain a major in Geography and Environmental Studies. Note that those students with one distinction at intermediate level may apply to enrol in KGA300 Environment Research Project (see description later in this Prospectus).

KGA171 The Geography of Global Change	Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science
KGA172 Space, Place and Nature	Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science
Two of: KGA202 The Geography of Asia	Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science
KGA204 Earth, Climate, Life	Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science
KGA213 Natural Environment Field Techniques			
KGA223 Environmental Management			
Four of: KGA326 Env Geomorph		Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science
KGA333 Forest Ecosystems			
KGA334 Agroforestry		Units approved in the Bachelor Environmental Science	Units approved in the Bachelor Environmental Science
KGA378 Wilderness Management			

Remember, the models above are just some of the many possibilities available to students under the Common Course Structure.

### So, what do we teach?

The rest of this prospectus outlines the basic content of the units that we teach; note that prerequisites and availability are not detailed here and can be found in the Handbook (<http://courses.utas.edu.au>).

## Geography and Environmental Studies Units

Immediately below are listed the units that we offer in the KGA suite. These are listed as introductory, intermediate and advanced units. Information about their general availability, semester scheduling and staffing, along with assessment requirements, prerequisites and other particularities, also are noted in the Handbook. KGG units follow thereafter.

### Introductory Level Units

#### KGA171 The Geography of Global Change

This introduction to human and physical geography develops your knowledge of global patterns and processes of environmental and social change. The unit explores issues such as climate change, population growth, poverty, food security, natural hazards and resource depletion through an integrated study of earth systems, human development and their interactions. Workshops develop your skills in critical thinking and communication, systems analysis, quantitative and qualitative methods, fieldwork and mapping. In an era of economic globalisation and global environmental change, this unit enhances understanding of the global context of everyday life, as well as being vital to a wide variety of occupations and professions. It should be taken with the complementary unit, *Space, Place and Nature*, as the basis for intermediate and advanced units in *Geography and Environmental Studies*.

#### KGA172 Space, Place and Nature

This unit develops your knowledge of spatial analysis, how people turn space into place, how patterns of landforms, soils, plants and animals form on the surface of the earth, and how cultures, societies and economies manage, and are affected by, ecosystem processes. Workshops will provide you with tools to spatially relate geographic phenomena, describe landforms, soils and vegetation, and undertake value analyses of environmental and cultural issues. Local examples that have wider application will be the focus of workshops. This unit enhances everyday life, as well as being vital to a wide variety of occupations and professions. It should be taken with the complementary unit, *The Geography of Global Change*, as the basis for intermediate and advanced units in *Geography & Environmental Studies*.

### Intermediate Level Units

#### KGA213 Natural Environment Field Techniques

A field-based unit taught in one of Tasmania's unique island environments. Students who successfully undertake this unit will develop a wide variety of skills in environmental data recording in the context of a project designed both to increase knowledge of natural environments and to contribute to their proper management. The skills include: the use of global positioning systems; rapid topographic survey techniques; microclimatic data collection techniques;

soil analysis, geomorphological measurement; vegetation survey; fauna survey; data entry and analysis. The unit provides students with the opportunity to build their field skills and their ability to work cooperatively on a meaningful project in one of the many interesting natural environments in Tasmania.

### KGA202 Geography of Asia

Examines issues relevant to the understanding of the geography of contemporary Asia. Topics such as population pressure and policies, environmental change and degradation, economic growth in urban and rural areas, and the problems produced by modernisation and development are considered using different areas as case studies.

### KGA204 Earth, Climate and Life

This unit provides important foundations for students to understand fundamental biogeophysical concepts, processes and interactions that have shaped, and continue to shape, the *Earth, Climate and Life* of our planet. Students will extend prior learning on a range of topics, among them:

- materials, tectonics, weathering and mass movement, and fluvial, coastal, glacial and aeolian processes;
- contemporary local, regional and large scale weather and climate processes and interactions, including the general circulation of the atmosphere and oceans; and

- the origins and distribution of life, including life in air, water and soil, and the role of disturbances and interactions.

These topics will be integrated across a variety of time and space scales emphasising Southern Hemisphere and Australian examples throughout. The unit is foundational to a number of third year offerings in the School.

### KGA205 Geographies of the Human Landscape

Human geography is the study of human life in the context of space, place and environment, and at every scale from the local to the global. This unit provides students with opportunities to study different conceptual and practical approaches in human geography, encompassing the sub-disciplines of economic geography, political geography, social geography and cultural geography. Students will contribute to discussions about the importance of geography to questions of human identity, cultural diversity, political justice, environmental emplacement and social prosperity. Students will be given training in some of the common research and field techniques that human geographers employ to understand the dynamic interplay between people and place, society and space. On completion of the unit, students should have a comprehensive appreciation of the fundamental ideas of human geography and possess a number of practical skills of immediate

relevance to a range of third year units and of extended relevance in a range of employment sectors.

### KGA223 Environmental Management

This unit introduces the principles and practice of environmental management. We examine the multiple contexts of human-environment interactions and the changing relationships between government, economy, society and environment. Sustainability is used as a guiding framework for the analysis of economic, regulatory, institutional and community-based approaches and tools in environmental management. Workshops facilitate the exploration and critical analysis of lecture material and give emphasis to issues of values, governance, knowledge politics and the concepts of environmental economics. Case studies used in lectures and workshops cover key environmental issues including natural resource management, forestry, marine management, biodiversity conservation, climate change and waste management.

### Advanced Level Units

#### KGA300 Environmental Research Project

This unit comprises a one-semester environmental or geographic research project. The aim of the unit is to provide students with research experience in an area of their own choosing. Project design, data collection, data management and data presentation skills will be developed. The unit will involve an average of six hours per week planning and completing an individual research

project, closely supervised by a staff member of the School of Geography and Environmental Studies. Students do not need to have well developed ideas before beginning discussions. Students can undertake this unit in either semester, but it must be completed within that semester.

#### KGA308 Global Political Ecology

Political ecology brings together the study of natural systems and social systems, exploring questions of social power in the context of environmental transformation and resource use. This unit addresses contemporary concerns about the scarcity, distribution and sustainability of natural resources in the light of global power relations, especially those between 'developed' and 'developing' countries. Taking food, water and fossil fuels as key examples, global patterns of resource production and consumption are analysed. Likely social implications of climate change impacts on these resources are also addressed. International case studies, with an emphasis on island populations, are presented to investigate complex interactions between local environments and global political and economic processes.

#### KGA319 Making Sense of Climate Change

Climate change is an immensely complex social and ecological problem with implications for all areas of study. Over coming decades, climate change issues will be central to public debate, professional practice, and personal concerns. This unit will help you to

interpret and synthesise a wide range of disciplinary perspectives and cultural questions in relation to climate change. Case-based learning about real world situations set in the three regions of Africa, Oceania and the Arctic will help you to critically evaluate approaches to social and ecological resilience in the face of climate change. Assessment will be based on your demonstrated ability to synthesise different perspectives in group-based class activities and in individual reflective and academic writing.

### KGA320 Our Changing Climate

Human-induced climate change is arguably the most serious problem currently facing our planet. Detection and attribution of human-induced climate change requires an understanding of the mechanisms of natural climate variability as well as climate change. Earth's climate is essentially a coupled system between atmosphere, ocean, land surface, biota, snow and ice. Gaining an understanding of how our climate system works is an important first step to more confidently diagnosing and potentially predicting the effects of human-induced climate change. In this unit, we will learn about how Earth's climate works. We will begin to understand mechanisms underpinning important known natural climate variations such as El Niño—Southern Oscillation and the Antarctic Oscillation. To do this, we examine global observations (*in situ* and satellite) and learn about global climate models. We will consider detection and

attribution techniques to discern human-induced climate change above natural variability. We also will examine recent statements by the Intergovernmental Panel on Climate Change (IPCC) on human-induced climate change.

### KGA326 Environmental Geomorphology

Applies geomorphological principles and techniques to the solution of environmental issues related to Earth surface processes and landforms. This unit involves examination of process and change in geomorphology, in relation to human activities, and problems of terrain management and mismanagement. Focus is on river catchments, coasts, beaches and estuaries, including natural hazards such as flooding, landslides and coastal erosion. Training is provided in field and laboratory techniques by which geomorphologists and other environmental scientists may measure, monitor and manage processes in the physical environment that affect human society.

### KGA327 Conservation Geomorphology

*Conservation Geomorphology* facilitates an understanding of geomorphic processes and landscape evolution in a number of environmental settings, with an emphasis on the significance of geoconservation for nature conservation, National Park management and environmental sustainability. The unit considers the geomorphic effects of structure and such processes as weathering, volcanism and karst development (including groundwater and

limestone caves), together with their implications for management. The impact of cold climate (glacial and periglacial) processes in mountain and polar environments, including the evolution of the Tasmanian wilderness landscape, are also addressed. A field component enhances the ability of students to undertake a variety of geomorphological tasks including data collection and analysis, interpretation of landforms and Quaternary landscape evolution, and the development of management strategies to protect sites of geoconservation significance. The principal field exercise forms a major component of assessment.

### KGA331 Vegetation Management

Develops an understanding of factors relevant to the conservation management of Australian natural vegetation and threatened plant species, and trains students in the formulation of vegetation management plans. Field work is used to familiarise students with the management problems of local vegetation types and to collect data relevant to the formulation of a vegetation management plan.

### KGA332 Fauna Conservation Management

Develops an understanding of: threats to the conservation of animal biodiversity and approaches to ameliorate them; rapid biodiversity assessment; the conservation needs of rare species and communities; the integration of fauna management with conservation of flora and landscape, on and off reserves. The unit will train students in the formulation

of fauna assessment and management plans, including recovery plans, and their evaluation. The laboratory component has a large field base and will familiarise students with approaches to survey, documentation, analysis and management planning using local fauna communities.

### KGA333 Forest Ecosystems

Introduces the ecology and evolutionary history of Tasmania's native forests in relation to the present distribution of vegetation. Principles of forest ecology and processes which sustain plant and animal interactions within forest environments are discussed. Practical implications for forest and reserve management are presented through comparative sampling and analysis of forest environments, species diversity and biological productivity in selected native forests and plantations. Ecosystem processes which contribute to the dynamics of forests, eg regeneration and ageing, succession and response to disturbance, are examined in preparation for subsequent studies in natural area management.

### KGA334 Agroforestry

The study of principles and techniques for integration of farm forestry and rural land management in Tasmania and elsewhere. Ecological and economic benefits of combining sustainable farm forest management with agriculture are emphasised in field visits and a research project. The history and causes of rural tree decline and other plant and animal interactions with environment

are examined in their ecological and land management contexts. Principles of whole-farm planning are outlined. Other topics include site amelioration, ecosystem protection and sustainability, design and environmental impacts of tree shelter, tree species selection, tree establishment and silviculture of native forests and plantations in combination with agriculture, yield and use of wood and non-wood products, financial analysis and farm forest profitability.

### KGA340 Historical Geography: Making the Tasmanian Landscape

This unit examines the nature of historical geography through the study of geographical change in rural, urban and wilderness regions of Tasmania. Particular attention will be paid to the factors creating the distinctive landscapes of Van Diemen's Land, the demographic and economic transformation occurring between 1850 and 1870, and the processes creating new 'Tasmanian' landscapes in the late nineteenth and early twentieth century. The imprint of the past on the present will be examined though consideration of relict features. Landscapes that have disappeared but which may be recovered, landscapes that have disappeared completely and visible only in the documentary record, and landscapes proposed but never implemented will also be considered. The practical program includes two local field trips and four sessions involving the collection of historical data from archival and related sources as preparation for the research essay.

### KGA373 Sustainable Settlements

The unit focuses on the question 'how can we foster the development and care of sustainable settlements?' We seek to provide students with advanced capacities to understand the challenges that characterise planning for sustainable settlements by examining five key concepts: sustainability, community, governance, citizenship and scale. We explore a number of key problems for settlements: climate change, the oil economy, globalisation, regionalism, transport, the neighbourhood and house, consumerism, and social and personal values. The assessment encourages you to come to grips with the key concepts and their implications for policy and planning. At the completion of the unit, you should have a sound understanding of many of the conditions which may or may not foster sustainable settlements and regions, and skills that would allow you to work in professions related to urban geography and planning, sustainable development, and urban environmental management.

### KGA378 Wilderness Management

This unit provides practical skills for planning and managing wilderness and other natural areas, with emphasis on conservation of both natural and cultural values; environmental protection; and impacts of adjoining or associated uses such as nature-based tourism and primary production. Major themes include wilderness, conservation management; changing concepts of national parks

and other reserves; cultural and world heritage; ecologically sustainable tourism development and tourism education; provision and impacts of technical services and infrastructure; and the ecological and environmental impacts of human access and industrial activity. The unit has a significant fieldwork component which includes the inspection of natural areas and reserves and the analysis of wilderness management strategies. The unit takes an international perspective generally but with special emphasis on Tasmania.

### **KGA381 Environmental Impact Assessment**

Provides an introduction to legal, administrative, social and scientific aspects of environmental impact assessment, environmental auditing, environmental management systems and related environmental management tools. The unit emphasises the practical aspects of environmental management (Tasmanian, Australian and international). The unit is intended for students who are interested in or plan to work in environmental management or a related field.

### **Units in Spatial Sciences**

The units listed below form the suite of offerings for Spatial Sciences. The first four units listed may be taken as a GIS and Remote Sensing minor in a number of degrees. These four, and the remainder of the units, also may be counted towards a professionally accredited undergraduate

degree in surveying and spatial sciences. The units listed below may change over the period to 2011, and prospective students are advised to see the Degree Coordinator for further details ([www.utas.edu.au/spatial/](http://www.utas.edu.au/spatial/)).

### **KGG102 GIS: Introduction**

This unit introduces the basic concepts and applications of Geographic Information Systems (GIS). Definitions, components and functions of GIS are examined. The theory behind spatial data representation, data structures, cartography, projections, vector and raster data models, and spatial analysis is addressed. A significant component of the unit consists of practical sessions using PC-based GIS packages designed to apply concepts presented in lectures. Emphasis is placed on the foundations of GIS for the input, management, and querying of spatial data. These foundations are illustrated with a range of interesting environmental and social applications. An introduction will be given to the decision support role of GIS through multi-criteria decision making and other means of spatial data analysis. This unit may be taken as part of a spatial minor. See also KGG340.

### **KGG103 Remote Sensing: Introduction**

This unit familiarises students with the acquisition, processing and application of remotely sensed imagery to the physical and human environment. The unit starts with the foundations of electromagnetic energy and its interaction with the

atmosphere and the earth surface. The unit covers a range of satellite image systems, aerial photography, and airborne laser scanning. The approach is multi-disciplinary in nature, and is aimed at providing students with the ability to understand and apply remote sensing technology to specific applications. Students will learn to analyse and interpret data from a wide variety of remote sensing systems that acquire imagery in the visible, infrared, thermal infrared, and radar wavelengths. The unit includes applications from vegetation mapping, environmental monitoring, land use mapping, climatology and oceanography. State-of-the-art remote sensing software and imagery is used to illustrate theoretical concepts in computer practicals. This unit may be taken as part of a spatial minor. See also KGG213.

### KGG213 Remote Sensing: Image Analysis

This unit builds onto the theory and skills of KGG202 Remote Sensing: Introduction and focuses on advanced aspects of remotely sensed image analysis. The unit covers advanced geometric and atmospheric corrections, image filters, image enhancements and transformations, classification algorithms, object-based image analysis, change detection, and accuracy assessment. The theory is illustrated with a range of real-world applications using optical, hyperspectral, and RADAR imagery, and LiDAR data. Computer practicals and an independent project promote practical remote sensing

skills in professional image processing software. This unit may be taken as part of a spatial minor. See also KGG340.

### KGG 220 Surveying 2

Develops a broad knowledge relating to the use and application of different instrumentation and measurement methodologies in the fields of spatial information science and surveying. a) Instrumentation: optical levels, precise levels, mechanical and electronic theodolites, distance measurement techniques, digital and optical techniques for angular measurement, inertial and other miscellaneous instrumentation; calibration requirements and survey standards. b) Methodology: standard and precise levelling, trigonometrical heighting, intersection, resection, triangulation, trilateration, detail surveying, set out, precise traversing; associated software systems; reduction of field observations to the geodetic reference surface; introduction to the Global Positioning System (GPS).

### KGG260

This unit introduces you to the concepts of the various geometric surfaces and their mathematical properties for use in mapping and computation on the surface of the earth. It covers the following topics: surveying and mapping projections; transverse Mercator projection; spherical trigonometry; AGD66/84 and AMG; GDA94 and MGA; geometry of the ellipsoid; ellipsoidal

computations; arc-to-chord, scale factor, grid convergence; and transformation of coordinates between coordinate systems. The Projections section deals with the description and mathematical definition of the different classes of map projections. This is an important topic, as map projections form the basis for the graphical representation of the spatial data captured using the various surveying and remote sensing techniques. The Transformations section covers two topics. The first relates to the ellipsoid and includes the geometry of the ellipsoid, computations on the ellipsoid and the reduction of observations on the ellipsoid. The second deals with the mathematics of the Map Grid of Australia (MGA) and the Transverse Mercator Projection as it relates to the ellipsoid, and as a basis for mapping in Australia. The Geocentric Datum of Australia (GDA) will also be covered.

### KGG270 Analysis of Observations

Provides students with a working knowledge of least squares techniques and their application in spatial information science; theory of least squares; adjustment of measured data; adjustment with constraints; detection of outliers; network design and optimisation. Case studies are used to provide practical application of the material presented in the lectures. Students are shown various adjustment software packages and introduced to advanced least squares problems at the conclusion of the course.

### KGG320 Surveying 3

Applies acquired knowledge of spatial measurement techniques and associated instrumentation to develop an improved understanding of a range of specific surveying applications including: industrial metrology, construction surveying (monument selection, control networks and set out techniques), road design (horizontal and vertical curves), deformation and monitoring applications, hydrographic surveying, cadastral surveying and surveying with Real Time Kinematic (RTK) GPS. Case study examples are used to illustrate specific applications and provide a real world context to material covered in the lectures and undertaken in allocated practical sessions.

### KGG330 Remote Sensing: Photogrammetry

This unit introduces the science of photogrammetry, including flight planning, camera types and camera geometry, the mathematical foundations of stereo photogrammetry, the principles of operation of analytical and digital stereoplotters, the principles of camera calibration and block adjustment. The unit also introduces the theory and practice of airborne and terrestrial laser scanning.

### KGG340 GIS: Spatial Analysis

This unit builds onto the foundations of KGG240 GIS: Introduction and focuses on spatial analysis aspects of GIS. The unit covers geodatabases, exploratory

spatial data analysis, interpolation, terrain modelling, multi-criteria decision analysis, and spatial data quality. These topics are explored in lectures and practical sessions through a range of practical applications with a focus on environmental modelling. Spatial problem solving skills are developed through the integration of diverse data within a powerful GIS environment. A significant component of the unit consists of practical sessions using PC-based GIS packages designed to apply concepts presented in lectures. This unit may be taken as part of a spatial minor. See also KGG102.

### KGG350 Geodesy

Geodesy is the science of measuring and mapping the earth's surface, using both terrestrial and space-based (satellite) techniques. The unit provides students with an understanding of fundamental geodetic computations and principles, progressing to the use of satellite techniques to determine 3-D position on the earth's surface. The content of the unit can be divided into two parts:

- Geodesy—Reference coordinate systems and geodetic reference frame definition; geodetic height systems and datums; the earth's gravity field and geoid models; elements of satellite surveying (time and reference systems, orbital motion); VLBI and SLR
- Global Navigation Satellite Systems (GNSS)—Global Positioning System (GPS) satellites, signal and

measurement characteristics; GPS instrumentation; GPS observations and equations; introduction to GPS baseline processing; ambiguity resolution; modern GPS surveying techniques; other GNSS such as Galileo.

### KGG355 Spatial Research Project

This unit allows students to undertake a research project in the field of spatial information science that may include aspects of all or some of the following: project design, pre-analysis, data collection, data analysis, data management, and project report writing and presentation.

### KGG375 Advanced Spatial Data Analysis

This unit builds onto the theory and skills of KGG340 GIS: Spatial Analysis and focuses on advanced aspects of spatial data analysis, including practical aspects GIS application development. The unit covers exploratory spatial data analysis (ESDA), geostatistics, data interpolation, and error propagation modelling. The theory is illustrated with a range of important real-world applications. In addition, students will gain experience with batch processing, automating, and customising tasks in a GIS using a scripting language.

### KGG401 Professional Experience

Provides professional training and experience in a range of surveying and spatial science disciplines and exposes

students to the workplace environment. A minimum of 20 weeks of industry experience approved by the degree coordinator, supported by the submission of assessed work experience reports.

### KGG407 Land Law and Cadastral Studies

The Land Law component teaches the principles and application of land law as it applies to legal surveys. Topics include land tenure, estates in land, freehold and leasehold tenure, interests in land, easements and profits, mortgages, erosion, riparian rights, land transfer, common law and real property, adverse possession, law relating to surveys of land for the purposes of title subdivision and resumption of land, and the general principles of the law of evidence.

This component also examines the professional role and obligations of a cadastral surveyor. The Cadastral Studies component covers cadastral systems, land registration systems, and multi-purpose cadastres.

### KGG425 Surveying Practice

Covers (a) the surveyor and statutory authorities; survey regulations; assessment of survey evidence; (b) professional ethics, professional societies, surveyor-consultant, surveyor-client relationship; professional indemnity, responsibility under the Surveyors Act Regulations; disciplinary procedures; (c) fieldwork technique—students are required to demonstrate competent preparation (calibration, instrument

adjustment, reconnaissance), survey design and methodology; and (d) office operations, financial, record and staff management, costing, charging and marketing and business planning.

### KGG455 Spatial Research Project

This unit allows students to undertake a research project in the field of spatial information science that may include aspects of all or some of the following: project design, pre-analysis, data collection, data analysis, data management, and project report writing and presentation.

# Notes