No. 921 **5 September 2008**

SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)

In accordance with Regulation 24(c) of the National Standards Bodies Regulations of 28 March 1998, the Standards Generating Body (SGB) for

Geographical Information Sciences

registered by Organising Field 12, Physical Planning and Construction, publishes the following Qualification and Unit Standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the Qualification and Unit Standards. The full Qualification and Unit Standards can be accessed via the SAQA web-site at **www.saqa.org.za**. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, SAQA House, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the Qualification and Unit Standards should reach SAQA at the address below and ***no later 5 October 2008.*** All correspondence should be marked **Standards Setting – Geographical Information Sciences** addressed to

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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:
National Diploma: Geographical Information Science

SAQA QUAL ID	*QUALIFICATION TITLE*		
63589	National Diploma: Geographical Information Science		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
QUALIFICATION TYPE	*FIELD*	*SUBFIELD*	
National Diploma	12 - Physical Planning and Construction	Physical Planning, Design and Management	
ABET BAND	*MINIMUM CREDITS*	*NQF LEVEL*	*QUAL CLASS*
Undefined	240	Level 5	Regular-Unit Stds Based

This qualification does not replace any other qualification and is not replaced by another qualification.

PURPOSE AND RATIONALE OF THE QUALIFICATION
Purpose:

This qualification is aimed at learners who work or intend to work in the Geographical Information Science (GISc) occupational area as systems Technicians or related occupational fields and who seek recognition for essential skills in the conduct of GIS. The qualification will also be valuable for those who may have been practising within the GIS sector, but without formal recognition.

This qualification has been developed to assist with professional advancement across the GISc industry. This will allow learners to register as systems Technicians in the Geo-informatics field and lay a foundation for future career advancement in this learning area.

On achieving this qualification a learner will be able to:

> Collect, capture and exchange data from various formats and sources.
> Manipulate and visualise data to meet the stated requirement.
> Manage a database to store the required data sets and develop simple SQL queries.
> Operate effectively as a GISc Technician in a professional practise.

Rationale:

The introduction of a National Diploma in GISc based on unit standards will allow learners to enter the occupational area as Geographical Information Systems (GIS) Technicians and to reach full potential of advancement without formal education becoming an impassable barrier and in addition, allow for the recognition of prior learning.

This Qualification represents a planned combination of learning outcomes with a defined purpose in that they consist of the essential theory and applied competence required by the GISc profession and those learners who seek to be recognised by the profession for formal qualifications and registration as a GISc practitioner.

This Qualification is accessible to learners' who are employed within the Construction Industry, new entrants into the world of work and persons who are unemployed.

RECOGNIZE PREVIOUS LEARNING?
Y

LEARNING ASSUMED IN PLACE
> Communication at NQF Level 4.
> Mathematics at NQF Level 4.
> Geography at NQF Level 4.
> Computer literacy at NQF Level 3.

Recognition of Prior Learning:

This qualification can be achieved wholly or in part through recognition of prior learning in terms of the defined exit level outcomes and/or individual unit standards.

Evidence can be presented in various ways, including international and/or previous local qualifications, products, reports, testimonials mentioning functions performed, work records, portfolios, videos of practice and performance records.

All such evidence will be judged in accordance with the general principles of assessment described above and the requirements for integrated assessment.

Access to the Qualification:

Access to this qualification is free bearing in mind learning assumed to be in place.

QUALIFICATION RULES
This qualification is made up of a combination of learning outcomes from Fundamental, Core and Elective components, totalling 240 credits.

> Fundamental components: It consists of unit standards totalling 46 credits.
> Core component: It is made up of unit standards totalling 159 credits. All unit standards in this section are compulsory.
> Elective component: The learners are expected to choose a minimum of 35 credits from the Elective to achieve minimum total credits of 240 in order to be awarded this qualification.

EXIT LEVEL OUTCOMES
1. Collect and capture data under supervision from various formats and sources.

2. Manipulate and visualise the data under supervision to meet the stated requirement.

3. Manage a database to store the required data sets and develop simple SQL queries.

4. Operate effectively as a GISc Technician in a professional practise.

Critical Cross-Field Outcome:

This qualification promotes, in particular, the following Cross-Field Outcomes:

Ability to solve problems:

> When analysing data in order to make informed decisions.
> When managing projects according to specifications, while meeting dead lines and budget constraints.

Work effectively with others as a member of a team/group/organisation or community:

> When sourcing data from different custodians.
> When analysing data and assist users to make informed decisions.
> When managing team members to achieve optimal performance.

Organise and manage oneself and one's activities responsibly and effectively:

> When performing the work in accordance with industry standards.
> When managing projects according to specifications, while meeting dead lines and budget constraints.
> When sourcing and managing data from different custodians.

Collect, organise and critically evaluate information:

> When complying with user need requirements.
> When analysing data and assist users to make informed decisions.
> When managing projects according to specifications, while meeting dead lines and budget constraints.

Communicate effectively using visual, Mathematics and language skills in the modes of oral and written presentations:

> When analysing data and assist users to make informed decisions.
> When managing projects according to specifications, while meeting dead lines and budget constraints.
> When providing metadata for data sets.

> Use science and technology effectively and critically (showing responsibility towards the environment and health of others):

> When analysing data and assist users to make informed decisions.
> When managing projects according to specifications, while meeting dead lines and budget constraints.
> When using the appropriate technology and tools in consideration of environmental constraints.

Demonstrate an understanding of the world as a set of related systems:

> The inter-relatedness when applying knowledge and technology regarding spatially related entities in problem solving.

ASSOCIATED ASSESSMENT CRITERIA
Associated Assessment Criteria for Exit Level Outcome 1:

> Digital data files in different physical formats are imported into the dataset.
> Data sets in different co-ordinate systems are transformed into an appropriate target co-ordinate system.
> Source data at different levels of accuracy, currency and scale are manipulated for the target data set.
> Data are collected from various data sources.
> Meta data should be included in all data sets.

Range: Sources: Including but not limited to Government and private data providers, Internet, other systems (e.g. financial data), paper maps, multi-spectral satellite imagery and aerial photography, alphanumeric data, digitizing.

Associated Assessment Criteria for Exit Level Outcome 2:

> A given dataset is analysed to assist the end user in making an informed decision.
> Data is symbolised in a way, which will allow for visual interpretation and decision-making.

Associated Assessment Criteria for Exit Level Outcome 3:

> A database is managed to facilitate results.
> Database is populated with batch importing and single record capturing.
> Data is captured in an accurate and consistent manner.
> Data is analysed and queried in an effective way to assist in decision making.
> Relevant data is backed up to enable restoration of data in the case of any data loss.

Associated Assessment Criteria for Exit Level Outcome 4:

> Projects are managed according to specification, on time and within budget.
> Ethical principles are applied in all decisions.
> Team members are co-operated with in such a way that optimal performance is achieved.

Integrated Assessment:

Integrated assessment provides learners with an opportunity to display an ability to integrate practical performance, actions, concepts and theory across unit standards to achieve competence in relation to the purpose of this qualification.

Assessment shall:

> Measure the quality of the observed practical performance as well as the theory and underpinning knowledge behind it.
> Use methods that are varied to allow the learner to display thinking and decision making in the demonstration of practical performance.
> Maintain a balance between practical performance and theoretical assessment methods to ensure each is measured in accordance with the level of the qualification.
> The relationship between practical and theoretical is not fixed but varies according to the type and level of qualification.

INTERNATIONAL COMPARABILITY

Extensive International comparability was conducted with various countries and the following countries were chosen because of their best practise.

Australia:

Queensland University of Technology:

Graduate Diploma in Geographic Information Systems:

> Remote Sensing.
> Geographic Information Systems.
> Topics in Spatial Information Science.
> Specialisation.

Potential Careers:

> Geologist, Mapping Scientist/Photogrammetrist, Surveyor.

Topics in Spatial Information Science:

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.

Specialisation:

This unit ensures personalised study that supports the student's elected specialisation and contributes directly to the better understanding of the research project topic. Students undertake study to develop specialised knowledge and skills related to the specific specialisation and to support the direction of the proposed research project topic. Study is taken from specific programs offered by the School, or from advanced units within the University or, where appropriate, through another university or through specialist studies offered by staff in their areas of expertise and approved by the Head of School on the recommendation of the student's supervisor.

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.

USA:

Northwest Missouri State University offers a Master of Science degree in Geographic Information Science. The program includes courses on modelling with GIS, Geostatics, Cartographic design, GIS database design and project management.

University at Buffalo:

The University at Buffalo offers a doctoral degree concentration in Geographic Information Science - an emerging interdisciplinary field that incorporates innovative research in environmental science, social science, information science, and engineering. The goal of the program is to prepare Ph.D. students with the interdisciplinary background and the technical, professional and personal skills needed for careers in Geographic Information Science. Students in the GI Science concentration at the University at Buffalo take a core of courses in GI Science, while also completing requirements for doctorates in any of the seven discipline-based departments.

GI Science students obtain research training through individualized faculty mentoring, and participate in active research programs under three broad themes: Geographic Information Science, Geographic Environmental Science, and Geographic Social Science. Students also gain a wealth of practical experience through internships, international opportunities, and participation in workshops, conferences, and fieldwork. By awarding degrees in traditional disciplines, while having an inherently interdisciplinary curriculum, the GI Science Concentration

allows students to combine an innovative program of study suited to our rapidly changing world with the solid credentials of an established doctoral degree.

Curtin University of Technology:

Curtin offers a wide range of master and doctoral degrees by research. To qualify as a research degree, at least two-thirds of the required work for the award must be research. The award of a Master's (by Research) or a PhD indicates that a student has contributed substantially to the knowledge or understanding in a field, and is capable of carrying out independent research.

University of Dallas:

To receive the PhD in Geospatial Information Sciences, students must complete the Geospatial Science Core (15 SCH) to achieve a mastery of GI Science technologies and theory, have a Geospatial Specialization Area (15 SCH), have a Specific Application area or Technical field (12 SCH), evidence research skills through successful completion and defense of a Ph. D. dissertation, and take related electives as necessary for a total of 90 semester credit hours. In addition, students must satisfy a set of exams and qualifiers. Other courses may be substituted for those listed below with the written permission in advance of the Director of the GIS Doctoral program.

Geospatial Science Core (15 credit hours):

> GIS Fundamentals.
> Applied GIS.
> Spatial Analysis and Modeling.
> GIS Theories, Models and Issues.
> Geographic Information Systems Workshop.

Geospatial Specialization Area (select from one, with a minimum of 15 credit hours):

Geospatial Computing and Information Management:

> Advanced Operating Systems.
> Object Oriented Analysis and Design.
> Database Design.
> Spatial Data Management.
> Artificial Intelligence.
> Computer Graphics.
> Computer Vision.
> Combinatorics and Graph Algorithms.
> Neural Nets and Machine Learning.
> GIS Management and Implementation.
> Internet Mapping and Information Management.
> GIS Application Development.
> Database Management Systems.

Spatial Analysis and Modeling:

> Descriptive and Inferential Statistics.
> Advanced Regression Analysis.
> Econometrics.
> GIS Pattern Analysis.
> Spatial Statistics.
> GIS Network Modeling.

> Demographic Analysis and Modeling.
> Spatial Epidemiology.
> Data Analysis for Geoscientists.
> Advanced Raster Modeling.
> Data Structures.

Remote Sensing and Satellite Technologies:

> Intro to Remote Sensing.
> Applied Remote Sensing.
> Remote Sensing Digital Image Processing.
> Radar Remote Sensing.
> GPS Satellite Surveying Techniques.
> GIS Applications to Geosciences.
> Remote Sensing Workshop.
> Digital Signal Processing.
> Digital Image Processing.

Customized Geospatial Specialization.

Identified by the student with approval in advance by the Director of the GIS Doctoral Program.

Application Area or Technical Field (12 SCH):

Twelve semester-credit hours of specialized course work in an application area or technical field relevant to GIScience. Normally, these will derive from the student's masters degree. These hours may be transferred from another institution, or taken at UTD in an existing master's program area and may be applied toward a master's in that area:

Technical field examples: statistics, computer science, software engineering, management information systems, image analysis, operations research, instrumentation, etc.

Research and Dissertation (24-48 credit hours which could include):

> GIS PhD Research Qualifier.
> Research Design I.
> Research Design II.
> GIS Research Design.
> Research in GIS.
> Geoscience Presentations.
> Dissertation.
> Other Related Electives (0-24 credit hours).
> GISC: Geospatial Information Sciences.
> CS: Computer Science.
> GEOS: Geoscience.
> MIS: Management Information Systems.

Ph.D. Research Project Qualifier:

All doctoral students must register for and complete GISciences PhD Research Project Qualifier. This requires completion, according to uniform guidelines established by the GIS program, of a GIS Research draft proposal and its evaluation by a committee of at least three GIS faculty, two of whom are chosen by the student with approval of the Director of the GIS Doctoral Program, and the third is appointed by the Director of the GIS Program and represents the program. The committee will judge the quality of the project as it exemplifies the student's potential to conduct

original research (including their ability to define their research objective, survey literature, develop an appropriate design, etc) and the strength of the student's course record to date, and make a determination of the student's suitability to continue toward the PhD degree. The student must receive a PASS. If a FAIL is recorded, the course may be repeated one time only in the immediate following semester, including Summer. This course will normally be taken after the student has completed between 15 and 30 hours. A student must register for GISC 7389 in the semester immediately following the one in which he/she first accumulates 42 or more hours. GISC 7389 GIScience Research Project Qualifier can substitute for GISC 6389 GIScience Master's Project, but not the reverse unless a special petition is presented and granted.

United Kingdom:

University of Edinburg:

(Honours):

Year 1:

> Plane Surveying.
> Information Technology.
> Quantitative Methods.
> Mapping (including field scheme).
> Introduction to GIS.
> Applications in GIS.

Year 2:

> Applied Information Technology.
> Data Acquisition and 3D Modelling.
> Legal Framework for Geomatics.
> Handling Spatial Data.
> Analysing Spatial Data.
> Digital Cartography.

Year 3:

> Dissertation.
> Management Studies in Geomatics.
> Professional Studies in Geomatics.
> Options - choice of two (there may be timetable implications).
> Geographical Information Management.
> Spatial Data Analysis.
> Integrated Water Management.
> Information Technology Applications
> Cadastre and Land Administration.

You will have a mixture of timetabled classes and dedicated.

Kingston University London:

BSC. Honours:

Year 1:

> Introduction to GIS 1.

> GIS Techniques 2.
> Applications of Geo-Analysis 3.
> Mathematics and Statistics.
> Sustainable Development: Issues and Concepts.
> Investigating the Earth and Environment I.
> Investigating the Earth and Environment II.
> Understanding the Environment.

Year 2:

> Geographical Analysis and Modelling 4.
> GIS Enterprise and Research 5.
> Spatial Databases 6.
> GIS Software Development 7.
> Remote Sensing and Image Processing 8.
> Digital Mapping 9.
> Geodemographic Analysis 10.
> Mobile GIS (overseas fieldwork) 11.

Year 3:

> Contemporary Issues in GIS 12.
> Geo-visualisation 13.
> Crime Patterns and the Environment 14.
> Systems Analysis and Design.
> Applications of Remote Sensing 15.
> Land Information Systems 16.
> Geodemographic Analysis 10.
> GIS and hazards 17.
> GIS Dissertation (double) 18.
> GIS Dissertation (single).
> Water Resources Management.
> Ecology and Conservation in Temperate Ecosystems.
> Geography of Recreation and Tourism.
> Global Environments: Strategic Assessment (overseas fieldwork).

Geographical Information Systems (GIS) MSc programmes:

Postgraduate GIS courses at Kingston:

There are two MSc programmes in Geographical Information Systems (GIS) at Kingston:

> Applied Geographical Information Systems MSc - a mixed mode course with an 'applications' focus, which is taught partly by distance learning and partly in class.
> Geographical Information Systems and Science MSc - taught entirely by distance learning using our online course materials (due to start in September 2008 subject to validation).

The two MSc programmes in GIS both operate within Kingston University's modular course system, each comprising eight taught modules and a research project. The courses have been designed to provide a flexible learning environment to suit all needs, whether you prefer face-to-face contact or are currently in employment and wish to take a non-contact course to study in your own time.

What does one study?

The MSc GIS programmes at Kingston University provide the high quality education needed to meet the needs of users of geotechnology or those seeking to enter a career in GIS. Students will gain a high level of competency in the principles of GI Science and the use of geotechnology; they will be able to routinely use professional software for data acquisition, handling, exploration and mapping.

Knowledge and skills in spatial analysis and spatial databases will provide students with the skills to develop GIS in addition to working with GIS in a range of environments for crime mapping, health analysis, hurricane prediction, 3d modelling and animation and many more.

The MSc GIS programmes have a number of key overarching features. You will:

> Develop a knowledge and understanding of the principles of GI science and the use of geotechnology.
> Understand the conceptual foundations of geographical information handling.
> Effectively handle spatial entities for data transformations, generalisation and aggregation.
> Develop competency in analytical operations, methods and spatial analyses.
> Effectively implement principles of map design and graphical representation techniques.
> Understand spatial database systems and application design.
> Perform storage and retrieval operations, work with alternative data models, 3d modelling and advanced visualisation.
> Explore the role of GIS in society including organisational and institutional aspects.
> Study a range of themes in geography and environmental science.
> Prepare yourself for employment, career advancement, further research and lifelong learning by developing your intellectual, problem solving, technical and other key professional and academic skills.

Core modules:

> Geographical Information Fundamentals 2.
> Spatial Information Analysis and Modelling 3.
> Contemporary Issues in GIS4.
> Digital Mapping 5.
> Research Methods and Data Analysis 6.
> Research Methods.
> Dissertation.

Applied GIS option modules (choose three):

> Land Information Systems 7.
> Remote Sensing of the Environment 8.
> GIS and Hazards 9.
> Mobile GIS 10.
> Mineral and Energy Resources 11.
> Water Resource Management 12.
> Waste Management and Contaminated Land Remediation 13.

GIS and Science option modules (choose two):

> Remote Sensing.
> GeoVisualisation 14.
> Geodemographic Analysis.
> Spatial Databases.
> Mobile GIS 10.
> GIS and Health 15.

> Crime Patterns and Environment.

Sweden:

University of Gävle:

Bachelor's degree:

The bachelor's degree is attained after the student has completed the course requirements of 180 credits with particular focus decided by the individual college, of which at least 90 credits will be for gradual specialisation within the main area of study. To gain the Bachelor's degree the student shall, within the framework of the:

> Geodesy, photogrammetry.
> Cartography, geographic information.

Technology (GIT) and mathematics:

> The use of modern instruments and programme software within the main.

Area of geomatics:

> Working with and carrying out projects.

As a result of the course the student shall have developed the skill and ability to:

> Understand the need of society for geographical information.
> Use modern geographical information technology.
> Use and evaluate different methods of working.
> Show an ability to work in the different roles required in project work.
> Present results both orally and in writing.

On completion of the course the student shall:

> Show the ability to make judgements of the methods of working within.
> The area of study.
> Have knowledge and insight of ethical values and issues within the area of study.

Programme description:

Main area:

Main area Geomatics:

The programme consists of the main area Geomatics which is an internationally accepted co mprehensive term for individual academic disciplines concerning geographical information. These comprise: photogrammetry, geodesy, surveying, cartography, GIT and remote sensing. In GIT, GIS (geographical information systems) plays a central role as an effective tool. Courses in these disciplines are sometimes identical with courses in geography and spatial planning.

Thesis:

The programme concludes with a bachelor's thesis. In the thesis the student shall show that they can independently carry out a bigger project where they both show proof of the ability to integrate knowledge from the areas studied and to choose relevant methods for solving complex

problems. Generally it is important that in the thesis knowledge from earlier studies is applied, broadened and deepened. Students shall show through their thesis that those goals for a basic university education as given in the Higher Education Act and the Bachelor's degree education as given in the Higher Education Ordinance and the special goals stated in this course of teaching have been achieved. Upon completion of the course the student should be able to take into account the human scientific and environmental demands when solving problems and developing programmes, and has the prerequisites to work for an environmentally adapted technology. The working methods that practice these abilities are therefore central to the programme.

Year 1:

Credits Level Main area:

1 Introduction to Higher, Education in Sweden, 15 B Technology.
2 Geographical Information, Technology, 7,5 B Geomatics.
2-3 Mathematics: Linear Algebra and Calculus, 15 B Mathematics.
3 Basic Cartography 7,5 B Geomatics.
4 Basic Land Surveying 7,5 B Geomatics.
4 Programming with Visual, Basic.NET, 7,5 B Computer science.

Year 2:

Credits Level Main area:

1 Field Training in Land Surveying, B Geomatics.
1 Mathematics: Statistics and Algebra, 7,5 B Mathematical, Statistics.
1 GIS raster/vector 7,5 B Geomatics.
2 Geodetic Theory of Errors 7,5 B Geomatics.
2 GIS Application Development, alt. Thematic Cartography, 7,5 B Geomatics.
3 Photogrammetry 7,5 B Geomatics.
3 Mathematics: Multivariable Calculus, 7,5 B Mathematics.
4 Geodetic Instruments 7,5 B Geomatics.
4 GIS Databases 7,5 B Geomatics.

Year 3:

Credits Level Main area:

1 Environmental Geography 7,5 B Geography.
1 Spatial Planning in Land, Management, 7,5 B Spatial planning.
2 Remote Sensing and GIS, Analysis in Land Management, 7,5 B Geomatics.
2 Digital Photogrammetry 7,5 B Geomatics.
3 Industrial and Special, Measurements, B Geomatics.
3 Scientific writing 7,5 B Geomatics.
4 Bachelor's Thesis 15 B Geomatics.

Those who qualify to be admitted to the Bachelor of Science programme in Geomatics are those who fulfil the conditions for basic qualification as given in the Higher Education Ordinance as well as the following particular qualifications (or equivalent)
Degree of Bachelor of Science in Geomatics, 180 credits.

India:

Centre Ror Continuing Education, CEPT University:

Ahmedabad:

Diploma in Geomatics:

The Diploma in Geomatics Programme is of one year duration. It is divided into two semesters.The classes are conducted for six days a week, except Sunday from 6.30 p.m. to 9.00 p.m. This course covers Geospatial Science, Cartography, Physics of Remote Sensing, Principles of Aerial Photography, Fundamentals of GIS, Global Positioning System, Spatial Data Base Management, Programming Language, Research Methodology and Statistics. The hands-on practical knowledge is given equal emphasis to learn Digital Image Interpretation, GIS and GPS applied to real time problem solving through case studies and assignments.

Advance Diploma in Geomatics:

The duration of Advance Diploma is of two years, comprising of four semesters. The curriculum of first two semesters remains similar to that of the course on 'Diploma in Geomatics'. This course covers Advance Remote Sensing, Digital Photogrammetry, Advance GIS, Applications of GPS, Relational Data Base Management System, Advance Programming Language, Web GIS and Internet Mapping, Location Based System and Navigation. The hands-on practical knowledge is given equal emphasis to give applied knowledge of real time problem solving through case studies, assignments and a project.

Masters in Geomatics:

The three year Degree course of Masters in Geomatics primarily aims at creating expertise in the field of Geographic Information System and Remote Sensing. The six semester course provides a complete technological knowledge of the subject leading to design and execution of projects based on Remote Sensing, GIS and GPS. Keeping pace with the advancement in the technology the candidates are prepared to face challenges and adopt futuristic approach to cope up with the requirement and arrive at complete solutions for effective planning and management. This course covers High Level of Remote Sensing, GIS and GPS, Modeling, Software Development and Technical Applications and Dissertation. Periodical group discussions, presentations, preparation of project proposals, their execution, report writing is compulsory.

China:

University Of Hong Kong:

Master of Geographic Information Systems (MGIS) degree programme on a two-year part-time and a 16-month full-time basis. Alternatively, a Postgraduate Diploma in Geographic Information Systems (PDipGIS) is available for one-year part-time study.

Programme Requirements:

Applicants will normally be required to hold a good honours degree or a relevant professional qualification of equivalent standard with appropriate experience. Three programme options are available to suit individual needs - (1) MGIS two-year part-time, (2) MGIS 16-month full-time and, (3) PDipGIS one-year part-time. Pending satisfactory academic performance, PDipGIS candidates may declare their intention to transfer to the second year of the two-year part-time:

> GIS Data Processing.
> Programming for GIS.
> Photogrammetry and Remote Sensing.
> Digital Terrain Modelling.

> Cartographic Presentation and Visualisation Programmes.

At the end of completing the PDipGIS programme, students should be able to:

> Understand the generic concepts in GIS.
> Develop ability to handle spatial data.
> Identify data needs, sources, and acquisition procedures.
> Undertake spatial and cartographic analyses.
> Operate at least one commercially available GIS.
> Compile GIS algorithms using a high level language.

In addition to the above skills, students of the MGIS programme should have acquired the knowledge to:

> Manage GIS projects.
> Customise applications development at local project, enterprise (Intranet) and distributed (Internet) levels.
> Resolve standards for data interchange and geospatial processing models.

Additional Pedagogic Requirements for MGIS Programme:

In addition to the courses, students will be required to attend a series of seminars to be offered by scholars and practitioners in the field. Field trips are designed to provide opportunities for students to examine first hand geographic information systems applications in Hong Kong. Candidates of the MGIS programme must also complete a dissertation (see below):

GEOG 7230 MGIS Dissertation:

The course includes two parts: (i) a topic study or research project, and (ii) oral presentation. A topical study or research project must be completed in the form of a dissertation of 10,000 - 20, 000 words, with a focus on GIS in an applied setting (such as planning, environmental protection and management, transport, housing, civil engineering, or architecture). The choice of topics may vary from year to year in response to demand and student composition. Each candidate is also required to present their research project proposal in the "Dissertation Seminars".

Coursework:

Candidates must satisfy the examiners in coursework assessment for each of the courses (excluding the dissertation). The assessment of coursework will include oral presentation, written assignments, tests, laboratory and practical work.

Examinations:

Examinations will be held at the end of each semester. Some courses are assessed by 100% coursework:

> Environmental Mapping.
> Risk Assessment.
> Internet GIS.
> GIS in Transport Planning and Management.
> GIS Project Management.
> GIS in Workshop or Internship.
> GIS in Health Studies.
> Survey and Data Analysis in Transport Studies.
> Transport Logistics Planning and Services Management.
> Seminars, fieldtrips.

> MGIS Dissertation.
> [for MGIS students only].
> Topics in Database Systems.
> Spatial and Geostatistical Data Analyses.

Comparisons with similar programs that is available has shown that the South African range of qualifications is much more comprehensive It is concluded from the above that South Africa compares favourably with countries such as Australia, Canada, India, USA, UK and the Sweden, which are considered to have best practise in GIS Science and Technology research.

ARTICULATION OPTIONS
Vertical Articulation is possible with the following qualifications:

> Bachelor of Geographical Information Science, NQF Level 6.
> Bachelor of Geographical Information Science (Honours), NQF Level 7.
> Master of Arts: Geographical Information Science, Level 8.
> Doctor of Philosophy: GIS, Level 8+.

Horizontal Articulation is possible with the following qualifications:

> National Diploma: Hydrographic Surveying, NQF Level 5.
> National Diploma: Surveying NQF Level 5.

MODERATION OPTIONS
> Anyone assessing a learner or moderating the assessment of a learner against this Qualification must be registered as an assessor with the relevant ETQA.

> Any institution offering learning that will enable the achievement of this Qualification must be accredited as a provider with the relevant ETQA.

> Assessment and moderation of assessment will be overseen by the relevant ETQA according to the ETQAs policies and guidelines for assessment and moderation; in terms of agreements reached around assessment and moderation between ETQAs (including professional bodies); and in terms of the moderation guideline detailed immediately below.

> Moderation must include both internal and external moderation of assessments at exit points of the qualification, unless ETQA policies specify otherwise. Moderation should also encompass achievement of the competence described both in individual unit standards as well as the integrated competence described in the qualification.

> Anyone wishing to become an assessor or provider of learning must provide an affordable assessment/learning service.

CRITERIA FOR THE REGISTRATION OF ASSESSORS
For an applicant to register as an assessor, the applicant needs:

> A minimum of 2 (two) years' relevant occupational experience at NQF Level 6.
> Declared competent in all the outcomes of the National Assessor Unit Standards as stipulated by SAQA.
> Detailed documentary proof of educational qualification, practical training undergone, experience gained by the applicant must be provided (Portfolio of evidence).

NOTES
N/A

UNIT STANDARDS

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Fundamental	120476	Adhere to professional conduct and organisational ethics	Level 5	4
Fundamental	242714	Apply elementary statistical methods	Level 5	5
Fundamental	119335	Conduct and apply statistical analyses required to make informed public sector finance decisions	Level 5	15
Fundamental	243840	Use and apply matrices and graphs to solve systems of equations and network problems	Level 5	2
Fundamental	12432	Use mathematical and statistical techniques effectively	Level 5	20
Core	116819	Apply basic Geographic Information System (GIS) vector software functions	Level 4	2
Core	116829	Demonstrate knowledge of capturing methods for primary spatial data	Level 4	8
Core	15234	Apply efficient time management to the work of a department/division/section	Level 5	4
Core	244501	Apply image analysis methodology	Level 5	12
Core	244539	Apply image analysis techniques	Level 5	8
Core	114049	Demonstrate an understanding of Computer Database Management Systems	Level 5	7
Core	258648	Demonstrate fundamental knowledge and understanding of photogrammetry	Level 5	3
Core	15229	Implement codes of conduct in the team, department or division	Level 5	3
Core	116832	Manage a work process	Level 5	3
Core	252025	Monitor, assess and manage risk	Level 5	8
Core	258636	Read hard copy maps	Level 5	3
Core	14277	Select a map projection for cartographic design and production	Level 5	4
Core	258638	Assess fitness for use of spatial data	Level 6	13
Core	258660	Complete an original GIS project under supervision	Level 6	8
Core	258661	Demonstrate a basic knowledge and understanding of photogrammetry	Level 6	8
Core	258654	Demonstrate an understanding of different visual variables used on maps	Level 6	4
Core	258656	Demonstrate an understanding of map composition elements in map production	Level 6	4
Core	258652	Demonstrate an understanding of map design and layout	Level 6	3
Core	258657	Demonstrate an understanding of the context of GI Science	Level 6	4
Core	258650	Demonstrate capability of visual image interpretation of the real world	Level 6	4
Core	258646	Demonstrate understanding of the various spatial and attribute data transfer formats	Level 6	7
Core	258641	Develop a basic understanding of GIS data structures for data acquisition	Level 6	6
Core	11822	Produce cartographic products according to cartographic specifications and design standards	Level 6	6
Core	11820	Select a map projection and transform data between projections or ellipsoids	Level 6	3
Core	258639	Supervise the capture of Geo-information from secondary data sources	Level 6	4
Core	258640	Understand data quality and metadata	Level 6	10
Core	258653	Understand the basic principles of Remote Sensing Imagery	Level 6	4
Core	258658	Work with map projections	Level 6	6
Elective	14910	Apply the principles of Computer Programming	Level 4	8
Elective	14909	Describe the difference between programming in Object Orientated and Procedural Languages	Level 4	4
Elective	252446	Acquire copyright permissions	Level 5	10
Elective	244519	Administer the image acquisition process	Level 5	10
Elective	244516	Analyse an image acquired by an active sensor	Level 5	12
Elective	244509	Analyse the effects of damage on imagery	Level 5	5
Elective	114183	Apply the principles of resolving problems for single-user and multi-user computer operating systems	Level 5	7
Elective	115753	Conduct outcomes-based assessment	Level 5	15
Elective	114048	Create database access for a computer application using structured query language	Level 5	9

	ID	UNIT STANDARD TITLE	LEVEL	CREDITS
Elective	114055	Demonstrate an awareness of ethics and professionalism for the computer industry in South Africa	Level 5	3
Elective	10043	Develop, implement and manage a project/activity plan	Level 5	5
Elective	258643	Process and or create simple cartographic models under supervision	Level 5	12
Elective	119176	Respond to a request for proposal	Level 5	5
Elective	258647	Be aware of the principles of spatial data in database	Level 6	8
Elective	258659	Demonstrate an understanding of the basic principles of spatial data	Level 6	6
Elective	258649	Demonstrate an understanding of topology for storing spatial data	Level 6	4
Elective	258637	Demonstrate basic GPS knowledge	Level 6	4
Elective	258655	Demonstrate knowledge of sources for spatial data	Level 6	4
Elective	258642	Develop simple SQL queries	Level 6	4
Elective	11830	Interpret the Professional and Technical Surveyors' Act, no. 40 of 1984 and the rules framed thereunder	Level 6	3
Elective	258644	Perform basic spatial and hybrid queries under supervision	Level 6	11
Elective	258645	Understand concepts and theory of networks	Level 6	10
Elective	258651	Understand concepts and theory of sampling strategies	Level 6	2
Elective	258635	Use field data capture devices	Level 6	4

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION
None

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Use field data capture devices

SAQA US ID	*UNIT STANDARD TITLE*		
258635	Use field data capture devices		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Use a field survey instrument.

SPECIFIC OUTCOME 2
Use a laser range finder.

SPECIFIC OUTCOME 3
Administer a questionnaire.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Read hard copy maps

SAQA US ID	*UNIT STANDARD TITLE*		
258636	Read hard copy maps		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 5	3

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Understand what maps are.

SPECIFIC OUTCOME 2
Understand how to orientate a map.

SPECIFIC OUTCOME 3
Relate the map to the real world.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate basic GPS knowledge

SAQA US ID	***UNIT STANDARD TITLE***		
258637	Demonstrate basic GPS knowledge		
ORIGINATOR		***PROVIDER***	
SGB Geographical Information Sciences			
FIELD		***SUBFIELD***	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	***UNIT STANDARD TYPE***	***NQF LEVEL***	***CREDITS***
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Demonstrate an understanding of the GPS satellite system.

SPECIFIC OUTCOME 2
Demonstrate an understanding of how a GPS calculates position.

SPECIFIC OUTCOME 3
Demonstrate an understanding of errors in GPS positions.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Assess fitness for use of spatial data

SAQA US ID	*UNIT STANDARD TITLE*		
258638	Assess fitness for use of spatial data		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	13

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Understand the parameters given for doing the assessment.

SPECIFIC OUTCOME 2
Demonstrate meticulousness, conscientiousness and thoroughness.

SPECIFIC OUTCOME 3
Demonstrate an ability to check data manually, semi-automatically and fully automatically.

SPECIFIC OUTCOME 4
Log, report on the results, and determine whether or not the data are fit to use.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Supervise the capture of Geo-information from secondary data sources

SAQA US ID	*UNIT STANDARD TITLE*		
258639	Supervise the capture of Geo-information from secondary data sources		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Define parameters that can be used in the capture of geo-information data from secondary sources.

SPECIFIC OUTCOME 2
Supervise a data capture project.

SPECIFIC OUTCOME 3
Data capture is verified according to organisational rules and principles.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Understand data quality and metadata

SAQA US ID	*UNIT STANDARD TITLE*		
258640	Understand data quality and metadata		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	10

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Understand the principles of data quality.

SPECIFIC OUTCOME 2
Understand and interpret metadata.

SPECIFIC OUTCOME 3
Compile metadata for a data set.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Develop a basic understanding of GIS data structures for data acquisition

SAQA US ID	*UNIT STANDARD TITLE*		
258641	Develop a basic understanding of GIS data structures for data acquisition		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	6

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Use a prescribed spatial reference framework to set up a data capture environment.

SPECIFIC OUTCOME 2
Use the appropriate feature type when capturing data.

SPECIFIC OUTCOME 3
Understand theory and principles of spatial data models used in data capture.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Develop simple SQL queries

SAQA US ID	*UNIT STANDARD TITLE*		
258642	Develop simple SQL queries		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Create and execute a simple SQL query under supervision.

SPECIFIC OUTCOME 2
Create and execute combinations of simple alphanumeric queries under supervision.

SPECIFIC OUTCOME 3
Multiple alphanumeric selection queries are created, executed and stored under supervision.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Process and or create simple cartographic models under supervision

SAQA US ID	*UNIT STANDARD TITLE*		
258643	Process and or create simple cartographic models under supervision		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 5	12

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Understand the concept of cartographic modeling.

SPECIFIC OUTCOME 2
Interpret and execute an existing, simple cartographic model.

SPECIFIC OUTCOME 3
Understand and explain the stages in the development of a cartographic model.

SPECIFIC OUTCOME 4
Adopt a standard method for presenting a cartographic model.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Perform basic spatial and hybrid queries under supervision

SAQA US ID	*UNIT STANDARD TITLE*		
258644	Perform basic spatial and hybrid queries under supervision		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	11

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Create and execute a simple vector spatial query under supervision.

SPECIFIC OUTCOME 2
Create and execute a simple raster spatial query under supervision.

SPECIFIC OUTCOME 3
Create and execute a combination of simple spatial queries under supervision.

SPECIFIC OUTCOME 4
Create and execute hybrid queries under supervision.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Understand concepts and theory of networks

SAQA US ID	*UNIT STANDARD TITLE*		
258645	Understand concepts and theory of networks		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	10

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Describe the different types of networks.

SPECIFIC OUTCOME 2
Demonstrate a basic understanding of network data structures.

SPECIFIC OUTCOME 3
Demonstrate an understanding of the techniques used for network analysis.

SPECIFIC OUTCOME 4
Demonstrate an ability to set up and use an existing network model.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate understanding of the various spatial and attribute data transfer formats

SAQA US ID	*UNIT STANDARD TITLE*		
258646	Demonstrate understanding of the various spatial and attribute data transfer formats		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	7

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Understand vector data transfer formats.

SPECIFIC OUTCOME 2
Understand raster data transfer formats.

SPECIFIC OUTCOME 3
Understand attribute data transfer formats.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Be aware of the principles of spatial data in database

SAQA US ID	*UNIT STANDARD TITLE*		
258647	Be aware of the principles of spatial data in database		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	8

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Demonstrate an understanding of unique identifiers.

SPECIFIC OUTCOME 2
Demonstrate an understanding of label properties.

SPECIFIC OUTCOME 3
Demonstrate an understanding of Spatial Data Types and the representation thereof.

SPECIFIC OUTCOME 4
Demonstrate an understanding of Spatial Data Indexes.

SPECIFIC OUTCOME 5
Demonstrate an understanding of location and spatial reference identification.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate fundamental knowledge and understanding of photogrammetry

SAQA US ID	*UNIT STANDARD TITLE*		
258648	Demonstrate fundamental knowledge and understanding of photogrammetry		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 5	3

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Demonstrate an understanding of photographic scale.

SPECIFIC OUTCOME 2
Demonstrate knowledge of flight planning for aerial photography.

SPECIFIC OUTCOME 3
Demonstrate understanding of qualitative and quantitative information extraction.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an understanding of topology for storing spatial data

SAQA US ID	*UNIT STANDARD TITLE*		
258649	Demonstrate an understanding of topology for storing spatial data		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Demonstrate an understanding of components of the topology model.

SPECIFIC OUTCOME 2
Explain different topological characteristics.

SPECIFIC OUTCOME 3
Demonstrate an understanding of the advantages of storing topology for spatial data.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate capability of visual image interpretation of the real world

SAQA US ID	*UNIT STANDARD TITLE*		
258650	Demonstrate capability of visual image interpretation of the real world		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Understand the characteristics of remotely sensed images.

SPECIFIC OUTCOME 2
Identify different features visually.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Understand concepts and theory of sampling strategies

SAQA US ID	*UNIT STANDARD TITLE*		
258651	Understand concepts and theory of sampling strategies		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	2

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Understand probability methods of sampling.

SPECIFIC OUTCOME 2
Understand non-probability methods of sampling.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an understanding of map design and layout

SAQA US ID	*UNIT STANDARD TITLE*		
258652	Demonstrate an understanding of map design and layout		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	3

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Demonstrate the use of the graphic elements of map design.

SPECIFIC OUTCOME 2
Plan a maps design.

SPECIFIC OUTCOME 3
Demonstrate an understanding of map generalisation.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Understand the basic principles of Remote Sensing Imagery

SAQA US ID	*UNIT STANDARD TITLE*		
258653	Understand the basic principles of Remote Sensing Imagery		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Understand the importance of sensor design in remote sensing.

SPECIFIC OUTCOME 2
Understand how satellites work.

SPECIFIC OUTCOME 3
Define remote sensing and the components of a remote sensing system.

SPECIFIC OUTCOME 4
Describe the role played by the electromagnetic spectrum in remote sensing.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an understanding of different visual variables used on maps

SAQA US ID	*UNIT STANDARD TITLE*		
258654	Demonstrate an understanding of different visual variables used on maps		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Demonstrate the use of different visual variables with point data.

SPECIFIC OUTCOME 2
Demonstrate the use of different visual variables with line data.

SPECIFIC OUTCOME 3
Demonstrate the use of different visual variables with polygon data.

SPECIFIC OUTCOME 4
Demonstrate the use of different charts.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate knowledge of sources for spatial data

SAQA US ID	*UNIT STANDARD TITLE*		
258655	Demonstrate knowledge of sources for spatial data		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	4

This unit standard replaces:

US ID	Unit Standard Title	NQF Level	Credits	Replacement Status
116824	Demonstrate knowledge of sources for spatial data	Level 4	1	Will occur as soon as 258655 is registered

SPECIFIC OUTCOME 1
Identify the different sources for the core data sets as defined by South Africa's Committee for Spatial Information (CSI).

SPECIFIC OUTCOME 2
Identify the different sources for other vector data sets.

SPECIFIC OUTCOME 3
Identify the different sources for other raster data sets.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an understanding of map composition elements in map production

SAQA US ID	*UNIT STANDARD TITLE*		
258656	Demonstrate an understanding of map composition elements in map production		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Include fundamental elements on a new map.

SPECIFIC OUTCOME 2
Select a spatial contextual reference to include on the map.

SPECIFIC OUTCOME 3
Select a map grid to include on the map.

SPECIFIC OUTCOME 4
Include technical references for map data where appropriate.

SPECIFIC OUTCOME 5
Include symbology reference on the map.

SPECIFIC OUTCOME 6
Include legal references on the map, as appropriate.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an understanding of the context of GI Science

SAQA US ID	***UNIT STANDARD TITLE***		
258657	Demonstrate an understanding of the context of GI Science		
ORIGINATOR		***PROVIDER***	
SGB Geographical Information Sciences			
FIELD		***SUBFIELD***	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	***UNIT STANDARD TYPE***	***NQF LEVEL***	***CREDITS***
Undefined	Regular	Level 6	4

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Demonstrate a generic understanding of what GIS is.

SPECIFIC OUTCOME 2
Demonstrate an appreciation of the specialist knowledge needed to build a proper GI system.

SPECIFIC OUTCOME 3
Demonstrate an understanding of how GIS can be used in different industries.

SPECIFIC OUTCOME 4
Demonstrate an understanding of the functionality available from a GIS.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Work with map projections

SAQA US ID	*UNIT STANDARD TITLE*		
258658	Work with map projections		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	6

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Explain components of a reference system.

SPECIFIC OUTCOME 2
Identify appropriate Map Projection for a specific task.

SPECIFIC OUTCOME 3
Convert from one projection and or reference system to another.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate an understanding of the basic principles of spatial data

SAQA US ID	*UNIT STANDARD TITLE*		
258659	Demonstrate an understanding of the basic principles of spatial data		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	6

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Demonstrate an understanding of models of the real world.

SPECIFIC OUTCOME 2
Demonstrate a basic understanding of the vector data model.

SPECIFIC OUTCOME 3
Demonstrate a basic understanding of the raster data model.

SPECIFIC OUTCOME 4
Understand the concept of attribute extractions from real world entities.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Elective	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Complete an original GIS project under supervision

SAQA US ID	*UNIT STANDARD TITLE*		
258660	Complete an original GIS project under supervision		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	8

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Interpret a project scope.

SPECIFIC OUTCOME 2
Prepare a GI System to solve the problem.

SPECIFIC OUTCOME 3
Develop the project.

SPECIFIC OUTCOME 4
Develop spatial operations required for the project.

SPECIFIC OUTCOME 5
Develop map reports.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

UNIT STANDARD:

Demonstrate a basic knowledge and understanding of photogrammetry

SAQA US ID	*UNIT STANDARD TITLE*		
258661	Demonstrate a basic knowledge and understanding of photogrammetry		
ORIGINATOR		*PROVIDER*	
SGB Geographical Information Sciences			
FIELD		*SUBFIELD*	
12 - Physical Planning and Construction		Physical Planning, Design and Management	
ABET BAND	*UNIT STANDARD TYPE*	*NQF LEVEL*	*CREDITS*
Undefined	Regular	Level 6	8

This unit standard does not replace any other unit standard and is not replaced by another unit standard.

SPECIFIC OUTCOME 1
Demonstrate a basic understanding of aerial photography.

SPECIFIC OUTCOME 2
Demonstrate a basic knowledge and understanding of Ground Control.

SPECIFIC OUTCOME 3
Demonstrate an understanding of the science of photogrammetry.

QUALIFICATIONS UTILISING THIS UNIT STANDARD

	ID	QUALIFICATION TITLE	LEVEL
Core	63589	National Diploma: Geographical Information Science	Level 5