
GOVERNMENT NOTICES

SOUTH AFRICAN QUALIFICATIONS AUTHORITY

No. 959

12 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 for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the Qualification. The full Qualification can be accessed via the SAQA web-site at www.saga.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 should reach SAQA at the address below and **no later 13 October 2008**. All correspondence should be marked **Standards Setting – Geographical Information Sciences** addressed to

The Director: Standards Setting and Development
SAQA

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DR S BHIKHA**DIRECTOR: STANDARDS SETTING AND DEVELOPMENT**



SOUTH AFRICAN QUALIFICATIONS AUTHORITY

QUALIFICATION:**Doctor of Philosophy: Geographical Information Science**

SAQA QUAL ID		QUALIFICATION TITLE	
63709		Doctor of Philosophy: Geographical Information Science	
ORIGINATOR		PROVIDER	
SGB Geographical Information Sciences			
QUALIFICATION TYPE	FIELD	SUBFIELD	
Doctoral Degree	12 - Physical Planning and Construction	Physical Planning, Design and Management	
ABET BAND	MINIMUM CREDITS	NQF LEVEL	QUAL CLASS
Undefined	360	Level 8 and above	Regular-ELOAC

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

PURPOSE AND RATIONALE OF THE QUALIFICATION

Purpose:

The principal purposes of the qualification are to:

- > Provide advanced training in research methods and procedures within the GISc environment.
- > Facilitate appropriate, advanced study.
- > Produce qualified persons:
 - > Who are capable of undertaking GISc related research at an advanced level.
 - > Whose work will be to the advantage of the national economy.
 - > With the capacity to work independently on advanced research projects.
 - > Who are competent to work as educators and researchers in institutions of higher learning.
 - > With the capacity to work in teams appointed to conduct advanced research.
 - > For employment in fields of economic activity related to the built environment.

The following illustrates how the qualification addresses the objectives of the National Qualifications Framework (NQF):

NQF Objectives:

Recognition of Prior learning:

- > Allows for Recognition of Prior Learning as a means of career advancement.

Articulation/Progression:

- > Forms part of the following learning pathway incorporating a range of qualifications in GISc and related disciplines:

Category; Qualification; Current NQF Level; Envisaged NQF Level:

- > Professional; Doctor of Philosophy; Level 8+; Level 10.
- > Professional; Master's Degree; Level 8; Level 9.
- > Professional; Bachelor Honours Degree; Level 7; Level 8.

- > Technologist; Bachelor's Degree; Level 6; Level 7.
- > Technician; Diploma; Level 5; Level 6.
- > Operator; Higher Certificate; Level 5; Level 5.

Life-Long learning:

Produces qualifying learners who are prepared for and understand the principles of:

- > Life-long learning.
- > Critical citizenship.
- > Lateral, critical and creative thinking.
- > A wide range of issues which are crucial to the welfare of the society.

Rationale:

The Doctor of Philosophy in Geographical Information Science (PhD GISc) is awarded on successful completion of research which makes a substantial and original contribution to the international body of knowledge related to the built environment, encourages and supports pursuance of related research-based enquiry and promotes the dissemination of previously-unpublished information in GISc. It is important to note that a learner having gained this qualification and the required experience, should be able to register with the South African Council for Professional and Technical Surveyors (PLATO) in terms of Act 40 of 1984 and through this body's reciprocal agreements with other similar bodies gain international recognition.

The research, and other advanced study which may be required, is undertaken under the guidance of a supervisor or supervisors appointed for that purpose.

The qualification is for persons who:

- > Meet the admission requirements.
- > Satisfy the requirements for the award of the qualification.
- > Desire to undertake research in GISc and possibly other advanced study, at the highest postgraduate level.

Intended to assist all relevant stakeholders and role-players, such as potential employers operating in the built environment or other fields related to physical planning and construction, curriculum developers and providers of learning programmes, all education and training bodies, moderators, learners and their parents, to understand the criteria which determine the level and the outcomes associated with this postgraduate programme.

RECOGNIZE PREVIOUS LEARNING?

Y

LEARNING ASSUMED IN PLACE

It is assumed that learners are already competent in:

- > Prior experience in research.
- > Analytical thought at a level appropriate to conducting advanced independent research and advanced study.
- > Writing and communication skills.

Recognition of Prior Learning:

This qualification can be obtained wholly or in part through the recognition of prior learning. Learners desiring entrance to the programme leading to this Qualification are:

- > Advised, assisted and supported (portfolio compilation, orientation to required levels of competence, substantiation of their claims regarding prior skills/experience, planning of progression).
- > Evaluated and assessed in accordance with their claims regarding prior skills and experience gained (portfolio review, implementation of assessment/evaluation methods, recommendations arising from the assessment/evaluation processes).
- > Provided with quality management/assurance objectives to support the achievement of competence leading to the award of the Qualification (assessment of competence in respect of required outcomes, auditing, approval, recommendation, reporting).

Access to the Qualification:

- > Any appropriate Masters' level qualification recognised for the purposes of access to this qualification.

OR

- > Appropriate prior learning, skills/competence and experience which has been evaluated and assessed in accordance with the Recognition of Prior Learning policy.

QUALIFICATION RULES

A minimum of 360 credits is assigned to the qualification, which is awarded for the successful completion of a research thesis.

EXIT LEVEL OUTCOMES

1. Demonstrate an understanding of the construction of knowledge within a relevant field of study and apply that understanding to knowledge creation and application.
2. Demonstrate a thorough familiarity with the relevant literature.
3. Demonstrate the knowledge to independently plan, implement and execute a research activity.
4. Demonstrate the ability to do and publish quality original research.
 - > Range: Publication in national and international peer-reviewed journals (i.e. research that significantly contributes to knowledge).

Critical Cross-Field Outcomes:

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:

- > Understanding of epistemological and methodological issues in drafting a research thesis.
- > Interact with relevant literature in accordance with the research methodologies.

Associated assessment criteria for Exit Level Outcome 2:

- > Possess the ability to collect, analyse, organise, interpret and evaluate information.
- > Use methodologies for the field of study.
- > Work effectively with other role players at exploring, analysing and interpreting attained knowledge.

Associated assessment criteria for Exit Level Outcome 3:

- > Write a research proposal in accordance with the required research quality standards.
- > Conduct a critical literature review.
- > Structure precise research questions.
- > Select or devise appropriate research methods.
- > Execute the research.
- > Apply recognised referencing methods.

- > Critical analysis of the results emanating from the research.
- > Write up the research thesis.

Associated assessment criteria for Exit Level Outcome 4:

- > Use linguistic skills to pursue and complete an extensive and comprehensive research programme.
- > Publish research work that significantly contributes to knowledge that meets the prerequisite standards for publication.

Integrated Assessment:

Formative assessment practises that will be implemented:

- > Learners undertake a relevant research project in the GISc study field on an advanced and relevant research problem that leads to a thesis.
- > Progress is continuously assessed by regular meetings with the supervisor.
- > Learners and supervisors enter into a contract that describes mutual responsibilities.

Summative assessment practises that will be implemented:

The learner must demonstrate:

- > Discipline related skills aimed at problem identification and solving.
- > The application of scientific methodology both theoretically and practically.
- > The ability to acquire, analyse and interpret scientific data.
- > Presenting scientific findings.
- > Contribute to the development of new knowledge.
- > Examiners submit formal reports on the thesis, which should be made available to the candidate.

INTERNATIONAL COMPARABILITY

An accepted Doctoral study, whether solely research-based or based on a programme of specified study combined with the production of a dissertation, is required to be of a standard and rigour comparable with international benchmarks. Required quality is assured by the design and implementation of external examination systems associated with doctoral degree programmes. 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 PhD 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):

- > GISCI: 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 GISCI 7389 in the semester immediately following the one in which he/she first accumulates 42 or more hours. GISCI 7389 GIScience Research Project Qualifier can substitute for GISCI 6389 GIScience Master's Project, but not the reverse unless a special petition is presented and granted.

United Kingdom:

University of Edinburgh:

(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 GIS 4.
- > 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 comprehensive 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.
- > 7 GIS raster/vector.
- > 5 B Geomatics.
- > Geodetic Theory of Errors 7, 5 B Geomatics.
- > 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 for 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

This qualification allows for both horizontal and vertical articulation:

- > Vertical articulation can occur with the relevant postdoctoral studies.
- > Horizontal articulation can occur with relevant qualifications within the Geomatics fields.

MODERATION OPTIONS

- > Doctoral theses are examined by at least two examiners external to the institution concerned.

> External examiners and supervisors of doctoral research should ideally themselves be in possession of a doctorate. External examiners/assessors and internal supervisory academic staff will be appointed in a manner consistent with the quality assurance system of the institution offering the programme.

CRITERIA FOR THE REGISTRATION OF ASSESSORS

Examiners/assessors are appointed in a manner which is consistent with the quality assurance system of an institution offering the programme.

However the following criteria should be considered:

- > Assessors shall have a similar or related qualification at or above the level of the qualification.
- > Assessors should have a minimum of three years experience in the relevant field of study.

NOTES

Learning Pathway:

The learning pathway for Geographical Information Science is as follows:

> National Certificate: GISc NQF Level 5 -> National Diploma: GISc NQF Level 5 -> B. Degree: GISc NQF Level 6 -> B. Hon. Degree: GISc NQF Level 7 -> Masters Degree: NQF Level 8 -> Doctorate Degree: GISc NQF Level 8+.

Category; Qualification; Current NQF Level; Envisage NQF Level:

- > Professional; Doctoral Degree; Level 8+; Level 10.
- > Professional; Master's Degree; Level 8; Level 9.
- > Professional; Bachelor Honours Degree or Post Graduate Diploma; Level 7; Level 8.
- > Technologist; Bachelor's Degree or Advanced Diploma; Level 6; Level 7.
- > Technician; Diploma; Level 5; Level 6.
- > Operator; Higher Certificate; Level 5; Level 5.

Other relevant specifications of the HEQF policy will be included in the qualification.

UNIT STANDARDS

This qualification is not based on Unit Standards.

LEARNING PROGRAMMES RECORDED AGAINST THIS QUALIFICATION

None