SUBJECT BENCHMARK STATEMENT

IN

GEOMATICS

Quality Assurance and Accreditation Council
University Grants Commission
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CONTENT

FOREWORD

The work in connection with the development of Subject Benchmark Statements was begun in August 2003 as a part of the overall quality assurance framework that supports academic standards and the furtherance and dissemination of good practice in Universities in Sri Lanka.

Subject Benchmark Statements will support and promote quality and standards by:

- Providing universities with a common and explicit reference point for internal and external programme approval and review;

- Guiding and promoting curriculum development, especially in new departments and new universities, and in other institutions of higher education;

- Evolving over time to take account of changes and innovations that reflect subject development and new expectations;

- Providing an authoritative and widely recognized statement of expectations of what is expected of a graduate in a specific (or designated) subject area in a form readily accessible to students, employers and others with a stake in higher education;

- Providing a clear and transparent reference point for External Examiners;

- Assisting international comparison and competitiveness of higher education awards and student achievement.

SUBJECT BENCHMARK STATEMENT

GEOMATICS

1. INTRODUCTION

1.1. Subject Benchmark Statement

Subject benchmark statement is an essential component of quality assurance in the university system. This statements support to the academic community to describe the nature and characteristics of a specific subject or subject area.

Subject bench mark statements are used for different purposes. They provide support to higher education institutions in pursuit of internal quality assurance.

Subject bench mark statements provides

- Framework for developing and specifying intended learning outcomes for the institutions and academic staff.
- Minimum standards required for the award of the degree in the subject area for the institutions
- Reference points for making judgments on the appropriateness and academic standards during the review process for the peer reviewers
- Information regarding the academic standards expected from the graduated for the students, employers professional bodies and others
- Information on the qualities developed in graduates for the students, employers, professional bodies and others
- Reference points for programme approval for the institutions

Subject benchmark statements are useful to prospective professional bodies, students and employers, seeking information about the subject or subject area.

Subject benchmark statements do not describe the detail curriculum of the subject but they provide general guidance for articulating the learning outcomes associated with the subject or subject area.

They describe the nature and extend of the subject, subject aims, expected subject knowledge and understanding, expected skills and attitudes of award holders, teaching and learning strategies, assessment strategies, strategies used to maintain standards, minimum standards for the award of the degree in a subject area.

This statement is intended to be useful to these in HEIs who are involved in programme validation and design, thereby benefiting future prospective students and their sponsors. It is probably impossible to provide a document that will satisfy the needs and requirements of all stakeholders, but is should be a valuable benchmark to generate further progress towards improving quality and maintaining standards.

1.2 Nature & Extent of the subject

Geomatics is the fusion of ideas from geo sciences and informatics. Informatics is the integration of different discipline dealing with information.
Geomatics is a field of activity that uses a systematic approach to integrate all means of capturing and managing spatial data required for scientific administrative legal and technical operations involved in the production and management of spatial information.

Geomatics consists of three specialized area of study ; Surveying & Geodesy, Photogrammetry & Remote Sensing, Cartography and Geographical Information System (GIS).

Surveying is the major component of this degree programme. It is a highly practical oriented subject with more group-work activities in the field. Industrial training component is included within the period of four years.

Professional surveyors are needed for the public and private sectors in Sri Lanka as well as foreign countries. With the rapid change of the technology, handling of new instruments gives expert knowledge for data collection from various sources. Geodesy and land management help to delve deep into the earth measurements and land related problems respectively.

Computer knowledge is essential to handle necessary software for map making and other analysis. Cartography provides knowledge for map preparation and improves the lettering skill. For theoretical and practical knowledge in space observation, Photogrammetry and Remote Sensing are used as advanced data collection methods. Knowledge in Hydrographic Surveying provides the knowledge for measurement on water bodies.

Different data collection methods in a variety of fields, analysing and presenting of the final results to the end user are the major features of this degree programme.

The purpose of this statement is to identify and produce a generic benchmark statement to represent the standards for the award of the honours bachelors' degree in surveying sciences. This is a four year degree programme and offers a B. Sc (Surveying Sciences) special degree.

The main employment sectors are professional Land Surveyors, Hydrographers, RS and GIS analysists.

2. SUBJECT AIMS

Geomatics includes acquisition, modelling and analysis of spatially referenced data with Surveying as the major component.

The objective of the degree programme is to make the recipient graduate a person with academic qualifications and technical expertise to practice the sciences of Earth and Space measurements, to provide an industrial training to enhance the practical skills to

assemble and assess land and geographic related information, to use that information for the purpose of planning and implementation for the efficient management of the land, the sea and the structures thereon.

Fieldwork is an essential surveying practical component of this degree programme. It helps to develop the leadership qualities, ability to work in groups and communication skills. The knowledge and skills students have acquired will facilitate to resolve social problems related to the land when they work in the society.

3. SUBJECT KNOWLEDGE AND UNDERSTANDING

To achieve these aims, the degree programme in surveying Sciences should normally consist of land surveying, Geodesy, Cartography, Photogrammetry, Remote Sensing and Geographical information system. All students should especially know the basic techniques related to the surveying. The subject covers a wide range of measurements (including distance, angle, area, height, etc.), project and cost management, data collection (land, sea, space, night observations) and monitoring the projects.

Students must have essential knowledge and understanding, technical skills and professional attitudes which are required for this programme in order to practice as professional surveyors, university staff, researchers, technical staff, entrepreneurs, mangers and other positions in relevant institutions.

The degree programme should include

- Engagement with fundamentals, major concepts, principles and theories associated with Geomatics
- Understanding the terminology and classification systems
- Methods of acquiring, interpreting and analyzing information related to Geomatics
- Knowledge of a range of practical (field/lab) and experimental techniques related to the Geomatics
- Engagement with current developments in Geomatics and their applications

B.Sc. (Surveying Sciences) degree programme consists of eight semesters comprising of a foundation course, a specialization course and an industrial training component. In general, the foundation course should consist of Land Surveying, Geodesy, Mathematics, Physics, Adjustment Computations, Hydrographic Surveying, Cartography, Photogrammetry, Remote Sensing, Cadastre, GIS, Geology, Environmental Sciences, Computer Applications, English and Sinhala/Tamil, Management, Quantity Surveying, Architecture, Human Resource Management, Macro Economics, Micro Economics and Finance Management are as supplementary subjects.

The three areas of specialization, Surveying & Geodesy, Cartography & Photogrammetry, Remote Sensing & Geographical Information System, include the advanced knowledge of the relevant fields.

A research project should be included as a key component of this degree programme, should submit a report in the form of a dissertation and make an oral presentation based on their project. A period of industrial training, too, must be included as an important aspect of the programme.

4. SKILLS AND ATTITUDES

The degree programme in surveying sciences should encourage student to develop personal and professional skills that broaden accessibility to employment.

Graduate should be able to make a positive contribution to their place of work and to the community using the skills that they acquire.

4.1 Skills

- Ability to use appropriate techniques for spatial and aspatial data collection, managing, processing & analyzing for interpretation & presentation using relevant laws & standards
- Positioning and monitoring of objects in space
- Testing and calibration of surveying instruments
- Ability to undertake numerical computations, modelling & analyzing of information
- Ability to read and use appropriate literature on the subject
- Ability to identify a research problem, designing of research methodologies, both quantitative and qualitative, identification of sources of data and survey methods (office/field) for data collection, analysis and presentation
- A capacity for critical & scientific thinking with creativity & originality
- Appropriate use of Information Communication Technologies (ICT)
- Make decisions, prioritize & work on multiple tasks simultaneously
- An ability to understand & communicate effectively in English & basic communication skills in Tamil/Sinhala
- Basic skills in financial, operational and human resource management
- Self management and professional development skills which includes developing skills necessary for self managed and life-long learning; developing and adaptable, flexible and effective approach to study and work
- Ability to gather and summarise legal and other documents, citing evidence and make judgements, weighing up positives and negatives and evaluating competing explanations to draw appropriate conclusions

4.2 Attitudes

- Ability to work independently & in collaboration with others
- Self - discipline and ability to plan and achieve personal & professional goals
- Capacity for independent and self-managed learning such that they can analyse their own personal strengths and weaknesses and formulate strategies for improvement.
- Awareness in the care of instruments and physical resources
- Ability to lead the community and the willingness to accept social & civic responsibilities
- Respect the values of the other individuals and groups and appreciation of human & cultural diversity
- Intellectual openness & curiosity
- Intellectual integrity, respect for truth & for the ethics of research & scholarly activities

- Ability to question standard practice, and to apply professional judgement in making recommendations and solving problems for future best practice

5. TEACHING AND LEARNING STRATEGIES

The primary aim of teaching and learning strategies is to equip students with the necessary subject knowledge and skills appropriate to their preferred area of work. The teaching methods that any typical programme may include:

- Lectures with audio visual aids
- Oral presentations
- Use of text books
- Tutorial and assignments
- Field practical (day & night)
- Lab Practical (computer and other)
- Web based materials
- Field study visits
- Seminars/workshops/discussions
- Industrial training
- Writing reports and presentation

The above methods will vary from subject to subject and according to the availability of resources.

6. ASSESSMENT STRATEGIES

The assessment methods should aim to test the subject knowledge and other expected skills. A variety of assessment methods can be used to determine the knowledge, understanding and skills of the students. The assessment methods may include:

- End semester written examination
- Mid semester examination
- Quizzes
- Continues assessments (tutorial, practical)
- Oral presentations/Viva-voce
- Demonstration skill (surveying filed work)
- Industrial training supervision (relevant institutions/academic staff)

The suitable assessment methods must be selected according to the course.

7. MAINTAINING STANDARDS

All students completing B.Sc. (Surveying Sciences) degree programme are expected to demonstrate knowledge, understand, skills and ability that are specified above in this statement. These achievements can be monitored as follows;

- Involvement of external examiners
- Periodic subject reviews
- Peer reviews
- Reviews by course teachers/professional societies/stake holders

8. STUDENTS ATTAINMENT AND BENCHMARK LEVEL (STANDARD)

Two levels of achievements are specified as “threshold level” and “good level”. The “threshold” standard describes the minimum acceptable level of attainment for the award of a single honours degree. A graduate in any of the programmes with a first class or a second class (upper division) are required to achieve the “good level” of performance.

(a) Threshold level

B.Sc. (Surveying Sciences) special degree should be awarded to students will be able to

- use basic knowledge on the more fundamentals of principles in surveying and other related subjects to the Geomatics
- record data accurately and to carry out basic manipulations of data (Surveying/RS/GIS/etc.)
- plan and perform surveying measurements and observations by means of specialist measurements, instrumentation and modern techniques and methods
- evaluate, analyze and process of results of observations, making use of appropriate computations, mathematical statistics
- do presentation of results of observations and analysis in the form of maps, drawing, plans, and spatial model
- conduct geospatial analysis, modelling, development of databases, information system design
- use the knowledge in safe and proper handling of surveying instruments and other laboratory equipment
- use software packages (RS/GIS/etc.) for the analysis of data retrieval of information, simulation, data acquisitions and operation of equipment
- carry out research projects systematically and produce reports
- select and use appropriate techniques for presenting information using IT
- use the knowledge of the methodologies for different types of research
- minimize the social problems related to the surveying according to the rules and regulations
- understand the techniques and procedure adopted in the field to suit the requirement in the relevant industry
- be self-motivative and independent
- enhance the knowledge relevant to the field of Geomatics

(b) Good level

B.Sc. (Surveying Sciences) special degree with a class should be awarded to students will be able to

- use sound knowledge on the more fundamental principles in surveying and other related subjects to the Geomatics
- record data accurately and to carry out basic and advanced manipulation of data (Surveying/RS/GIS/etc.)
- plan and perform surveying measurements and observations by means of specialist measurements, instrumentation and modern techniques and methods

- evaluate, analyze and process of results of observations, making use of appropriate computations, mathematical statistics
- do presentation of results of observations and analysis in synthetic way especially in the form of maps, drawing, plans, and spatial model
- conduct geospatial analysis, modelling, development of databases, information system design appropriately
- use software packages (RS/GIS/GPS/etc.) for the analysis of data retrieval of information, simulation of models and for data acquisitions and operation of equipment
- use the appropriate knowledge in safe and proper handling of surveying instruments and other laboratory equipment
- carry out research projects systematically, analyze and produce reports
- select and use appropriate techniques for presenting information effectively using IT
- minimize the social problems related to the surveying by discussing with the relevant communities, according to the rules and regulations
- use sound understating of techniques and procedures adopted in the field to suit the requirements within a particular industry
- be self-motivative and independent for personal and professional development
- maintain and enhance the knowledge relevant to the field of Geomatics

9. ANNEX1. MEMBERS OF THE BENCHMARK GROUP

Ms. J. A. S. Jayakody	Sabaragamuwa University of Sri Lanka
Mr. G. S. N. Perera	Sabaragamuwa University of Sri Lanka
Mr. H. M. I. Prasanna	Sabaragamuwa University of Sri Lanka
Prof. U. G. A. Puswewala	University of Moratuwa
Ms. Padma Weerakoon	University of Sri Jayewardenepura
Dr. Uditha Ratnayake	University of Peradeniya