

Adigrat University

College of Social Sciences & Humanities

Department of Geography & Environmental Studies

Proposal & Curriculum

**For
Postgraduate Programme in
GIS and Remote Sensing**

2015

CONTENT

Headings	Page
1. Background and Rationale	3
2. Program Objectives	4
3. Professional Profile	5
4. Graduate Profile	6
5. Program Profile	6
6. Admission Requirement	6
7. Graduation Requirement	6
8. Performance Scaling and grading	7
9. Program duration	7
10. Degree Nomenclature	7
11. Facilities	8
12. Staff profile	8
13. Collaborative Partners	9
14. Quality Assurance	9
15. Course List	10
16. Semester Course Distribution	11
17. Course Description	12
Appendix	36

1. Background and Rationale:

Geographic Information Systems (GIS) and Remote Sensing have become key technological tools for the collection, storage and analysis of spatially referenced data. Sectors that utilize these spatial technologies include administration, industries, agriculture, forestry, mining, market research, environmental analysis as well as the social and physical sciences.

Spatial science helps professionals make critical decisions. It can be used to assess, monitor and make predictions about the environment and resources at a landscape scale. Specialist areas such as ecological modeling and multi-objective decision support systems are used to understand spatial variability, temporal dynamics / change and interrelationships in the environment. A course in spatial science can provide with the technical skills to analyze and help resolve complex problems that affect the health of our environment and our overall wellbeing.

In view of its significance, it has been inducted in higher education by different Universities of the Ethiopia and world to produce human resources skilled.

The Adigrat University has started Graduation Programme in Geography & environmental discipline with specific focus on GIS & Remote Sensing since 2012. At present department of Geography and environmental science is serving 175 under graduate students with high-tech GIS laboratory containing thirty computers. Fifty five students are expected to pass under graduation in the current session. Majority of the students are willing to enhance their GIS and remote sensing understanding getting enrolled in Post Graduation Programme. Post graduate Programme in GIS and remote sensing will also be supportive for community research and development at local, regional and national level. It may serve the need of the students of other disciplines as Geology, Archeology, Agriculture & resource management etc.

The department has undertaken need assessments within concern classes. The results of the need assessment specify that there is a remarkable human resource need in GIS and remote sensing technologies for spatial data handling and decision making, land resource management, urban issues, developments issues, regional and local development planning endeavors. The result shows that graduates in this study can secure job in various offices and institutions.

The department of geography and environmental studies in Adigrat University has satisfactory resources that would enable it to run the postgraduate program.

The idea of the department is to be a center of excellence in GIS and remote sensing. The basic mission of the postgraduate programme is to fulfill this idea and to pursue the standards of excellence and thereby to meet the needs of the country and the society.

Importance and Need of the Program for Ethiopia

Through Master program in GIS and Remote Sensing the department of Geography and Environment science seeks to expose students with modern teaching methods in classrooms and practical with use of computers for Geo spatial Analysis. More over the practical training in research techniques and field-based education will make this program unique for Ethiopia and crucial for the modernize systems. Through this program the university will be able to train professionals and create awareness among general public regarding various aspects of GIS and remote sensing. The subjects that are learning in this program are directly relating to GIS and remote sensing techniques, which are not very familiar to Ethiopian society at present.

2. Program Objectives

Objectives of the Programme are mentioned as per the vision of the Adigrat University.

- A. Teaching learning Process
- B. Research and development
- C. Community services

A. Teaching learning Process

- To produce students skilled in the use of geospatial technologies.
- To produce students competent in Geospatial data acquisition.
- To produce students competent in Geospatial data analysis.
- To produce students capable in Geospatial data presentation.
- To link students with the GIS User Groups to promote and coordinate GIS activities.
- Direct students to online GIS and remote sensing resources offered through the ESRI Virtual Campus, NASA, Landsat Programme, USGS, and ITC etc.

B. Research

- Work to incorporate geospatial technologies as an integral part of water resources studies.
- Strengthen and expand the existing collaboration on research projects in the field of geospatial research among faculty in the College of Arts & Sciences, College of Management, College of Agricultural Sciences and Natural Resources, College of Engineering.
- Foster new collaboration with faculty from other research centers that have the potential to incorporate geospatial technologies.
- Work to develop geospatial research publications in the form of videos & text.

C. Community services

- Develop Internet map services to share GIS data and imagery with the community.
- Increase the use of geospatial technologies in local city and regional government.
- Increase the use of geospatial technologies in the local field offices of state and national agencies.
- Increase the use of geospatial technologies by local non-profit groups.
- Coordinate with local city, district and regional governments to provide GIS training and technical support through the university.
- Provide local area governments and non-profit groups with access to GIS data and satellite imagery through the development of the geospatial data clearinghouse.
- Coordinate with local area governments and non-profit groups to share geospatial data, either through the data archive or links to the organization's servers.

- Coordinate with faculty from the College of Education identify local area high school science teachers who are interested in GIS.
- Arrange for teachers to bring classes to the Center for GIS demonstrations.
- Provide local area high schools with information on how to set up a GIS program.
- Develop a GIS training class designed for local area high school teachers.
- Inform university administrators about applications of GIS.
- Coordinate with university administrators to develop GIS applications as a way to manage information in appropriate administrative units.
- Provide training and technical support to administrative units who might want to incorporate GIS as part of their mission.

3. Professional Profile

Professionals will be from diverse disciplines as Geography, Computer Science, Statistics and Geology.

Geography professional will teach Concepts of GIS and remote sensing, Computer Cartography, relations between cultural and the natural environment, Concept of sustainable and eco – developments, Contemporary issues in Geographical studies, Research methods in Geography, Regional Planning, Geostatistical & quantitative Techniques for data analysis etc.

Computer science professional will teach database management, programming languages for GIS as visual basics, Python, Java.

Statistics professional will teach inferential statistical techniques for GIS.

Geology professional will teach geomorphic and chemical analysis of rock and minerals.

4. Graduate Profile

The curriculum is designed with the view that graduates who complete their studies in *Master of Science Degree in GIS and Remote Sensing* shall be able to:

- Acquire satellite data of their interest;
- Collect waypoints, path with the help of GPS;
- Image Preprocessing using Erdas, Arc info, QGIS;
- Digital Image Processing using Erdas, Arc info, QGIS;
- Create, edit & Manage Geodatabase;
- Study land use classification with Remote sensing techniques;
- Study Geostatistical analysis;
- Study Spatial Analysis;
- Create Maps, Atlas & Digital data modeling;
- Report ground realities cultural as well as natural;

- Plan for eco development;

5. Program Profile

The Master Program in GIS and Remote Sensing includes two categories of courses:

- Compulsory courses
- Optional courses in GIS and Remote Sensing.

Every graduate student will take all the Compulsory courses. Optional will be allotted as per the interest and performance of the students. This will be done in meeting with the graduate program coordinator of the Department. The choice will be based on program coherence and the availability of staff and resources.

6. Admission Requirement

Selection for admission into the Graduate Program in GIS and remote sensing is made on the basis of the candidate's performance in the entrance examination, letters of recommendation and the undergraduate performance. Applicants need to have a Bachelor of Arts/Science in Social, Environmental, Agriculture, and Geo-Sciences.

7. Graduation Requirement

A candidate to be awarded a Master of Science/Social Science Degree in GIS and Remote Sensing must take 30 credit hours of course including the thesis. She/he must also have:

- A pass mark in each of the required courses (not D or F);
- Cumulative GPA of ≥ 3.00 ; and
- Pass in his/her Master's thesis

8. Performance Scaling and grading

Scaling and grading of students' performance will be as per the rules and regulation of the post graduate program of Adigrat University

The following grades and corresponding grade points will be used in evaluation.

S. No.	Grades	Grade Points
1.	A+	4.00
2.	A	4.00
3.	B+	3.50
4.	B	3.00
5.	C+	2.50
6.	C	2.00
7.	D+	1.50
8.	D	1.00
9.	F	0.00

9. Program duration

The duration of the program shall be two years. Year I will be devoted to course work while Year II will be for Thesis work. A candidate may stay more than two years under valid reasons.

10. Degree Nomenclature

Students completing the graduate program of the Department of Geography and Environmental Studies will be awarded:

Master of Science/Social Science Degree in GIS and Remote Sensing

_____ (*Amharic Version*)

11. Facilities

The department has established a GIS, Remote Sensing and Cartographic center well equipped to the necessary materials to run both the undergraduate and postgraduate programs. The center is furnished with

- 30 high capacity Desk top computers - installed on each of them Arc GIS, ERDAS
- A3 size scanner,
- 1 Black and white LaserJet printer,
- 1 LCD projector,
- 5 Lap-top computers,
- 5 latest GPS,
- Topo-sheets in digital format
- 30 imported good quality chairs

The department has the capacity for 30 students at a time. Currently, it is being used as the venue for basic training GIS, RS and Cartography technologies. Resources from the departments will be shared whenever the need arises while executing the training programs and research work.

12. Staff profile

The department has the following academic staff members and technical assistant currently.

PhD staff that have specialization in

- GIS/Remote Sensing
- Environmental Science
- Human Geography and Regional Planning

Staff with masters qualifications:

Five Staff in MA Geography and Environmental Studies

- One staff in Natural resource management
- One staff in Natural resource management
- One staff in Land Resource Management
- One staff in Land Resource Management
- One staff in Urban and regional planning
- One staff in Urban and regional planning

13. Collaborative Partners

Among others, partners pledged to support our post graduate programs in course handling, advising and joint research includes the following.

- S.No. Institution willing to collaborate in course, advising and research administration in relation to the post Graduate program
- 1 Soil & Water Resource Department, EARI
 - 2 Ethiopian Mapping Authority
 - 4 Addis Ababa University, Department of Geography and Environmental Studies
 - 5 National Soil Research centre
 - 6 Addis Ababa University, Department of Earth Science
 - 8 Forestry Research Center
 - 9 African Highlands Initiative
 - 10 International Water Management institute
 - 11 BOARD, Tigray
 - 12 Information & Statistical Development (BOFED Tigray)

14. Quality Assurance

At the University level, we have Quality Assurance Institute. Also at the college level we have College Quality Assurance (CQA) Office. Moreover, at the department level there are course and research teams. All these bodies are responsible to have a follow-up to maintain and enhance the quality of the undergraduate and postgraduate programs (need, relevance and quality of a program, curricula review and approval and enhancement of teaching-learning processes).

In the University there are well established system of initiation of programs (need assessment survey), curriculum design, and curriculum review and approval procedures. This program has passed through all these steps. In need assessment, curriculum design and evaluation processes; professionals, employers, alumni and other important stakeholders largely involve.

The University has a Quality Assurance Policy which is meant for monitoring and evaluation of program, teaching-learning and assessments. In addition, the university has an assessment policy and procedures and the criteria to ensure that students are graded fairly and that standards are appropriate and applied consistently.

The CQA office ensures that assessment methods for each course are balanced (e.g. between continuous and end of course, formative and summative, diagnostic and attainment), are matched to the learning outcomes and are applied appropriately.

CQA office and Department course and research teams will have systematic and formal procedures for obtaining comprehensive data on the quality of the program and recommend actions to enhance quality. Moreover, good practice will be benchmarked and disseminated.

Moreover, in order to enhance quality of the program:

- Team teaching will be applied,
- Varied teaching learning methods; such as peer teaching, term paper, field work and report, class presentation, seminars and course examination will be employed,

- External examiner of theses,
- Program evaluation after every 4 years will be administered.

15. Course List

SN	Code	Course Title	Cr. hr
1	GeES 511	Fundamentals of GIS	3
2	GeES 512	Fundamentals of Remote Sensing	3
3	GeES 513	Advanced Quantitative Methods in Geography & Environmental Studies	3
4	GeES 514	Global Positioning System	3
5	GeES 611	Geodatabase Management in GIS - Common	3
6	GeES 612	Data Analysis in GIS	3
7	GeES 613	Web GIS	3
8	GeES 614	GIS and remote sensing for urban planning	3
9	GeES 615	Advance remote sensing	3
10	GeES 616	GIS and Remote sensing in Land cover, land use change analysis	3
11	GeES 617	Terrain Analysis	3
16	GeES 700	M.sc. Thesis	6

16. Semester Course Distribution

Year	Sem ester	Course code	Course Title	Cr. hr	
		Common course			
I	I	GeES 511	Fundamentals of GIS	3	
		GeES 512	Fundamentals of Remote Sensing	3	
		GeES 513	Advanced Quantitative Methods in Geography & Environmental Studies	3	
		GeES 514	Global Positioning System	3	
		Total		12	
	II	Any Four Papers			
		GeES 611	Geodatabase Management in GIS - Common	3	
		GeES 612	Data Analysis in GIS - Common	3	
		GeES 613	Web GIS	3	
		GeES 614	GIS and remote sensing for urban planning	3	
		GeES 615	Advance remote sensing	3	
		GeES 616	GIS and Remote sensing in Land cover, land use change analysis	3	
		GeES 617	Terrain Analysis	3	
		Total		12	
II		GeES 800	Thesis	6	
Grand Total			30		

17. Course Description

Course Title: Fundamentals of GIS

Course Code: GeES 511

Credit Hour: 3

Course Category: Compulsory

Prerequisite: No

Co-requests No

Rationale

The application of the GIS and remote sensing technology in the development activities in Ethiopia is minimal. There is a need for new and practical approaches to solve problems related to environment and society. GIS technology is among the new approaches practically important for problem solving-both environmental and societal. It is also important in academics to introduce new scientific knowledge, enhance research skills, community development and policy intervention.

This course will give the trainees adequate knowledge in the fundamental of GIS. GIS expertise will be developed by the consecutive course in this study.

Course Objectives

The main objective of the course is to learn how to generate information about the Earth from data stored in geographic Information Systems. At the end of this core module participants must be able to:

- Explain the concept, definition, nature and scope of GIS;
- Describe the nature of geographic phenomena;
- Outline the principal data models for spatial and non-spatial data used in GIS databases;
- Outline the main components of a GIS and their functions;
- Explain the relationship between spatial data and coordinate systems;
- Outline the main spatial data analysis functions;
- Describe aspects of data quality and how various stages of spatial data handling;
- Carry out basic GIS operations:
- Carry out basic data preparation, geo-referencing and data entry into a GIS;
- Perform basic manipulation, analysis and visualization operations using a GIS;
- Apply basic data quality assessment procedures;
- Apply appropriate GIS methods for problem solving;
- Understand the capabilities, uses and limitations of GIS in their field of application;
- Evaluate the results of data processing;
- Be aware of organizational issues of GIS development and implementation.

Course Description

This course introduces the principal concepts and techniques of geographic information systems (GIS). The course consists of two interrelated parts: a theoretical one that focuses on the concepts and a practical one that aims at developing hands-on skills in using (mostly software) tools. The concepts and techniques introduced in this course will be further enhanced during subsequent courses of the study.

Course contents

The course covers the following topics

Fundamental of GIS

- Geographic phenomena
- Geographic information and spatial data types
- Data processing systems
- Data quality
- Spatial referencing
- Spatial data entry and preparation.
- Spatial data visualization.

Recommended knowledge

Basic computer skills

Hardware and Software Required

PC, GIS software

Methods of delivery

Lecture

Intensive practical works

Lab exercise

Group discussions

Methods of Assessment/Evaluation

Midterm (60%), Final (40%)

Course Title: Fundamentals of Remote Sensing

Course Code: GeES 512

Credit Hour: 3

Course Category: Compulsory

Prerequisite: No

Co-requests No

Rationale

The applications of remote sensing technology are growing. Before image preprocessing, processing and analysis, it is important to understand the basics of remote sensing.

Course Objectives

The main objective of the course is to learn fundamentals of remote sensing satellite images, characteristics of the images and the factors which influence these images. At the end of this core module participants must be able to:

- Understand concepts and historical development of Remote sensing
- Identify the principles of how remote sensing images are acquired
- Understand how Electromagnetic radiation interacts with the Earth & atmosphere
- Interoperate and extract usable information from remotely sensed images using remote sensing image processing computer systems
- Explore the potential applications of remote sensing images in solving real world geographic problems.
- Examine the advantages of using remote sensing image data in solving real world geographic problems
- Identify the characteristics of different types of remote sensing images and their respective application

Course Description

This course introduces the principal concepts of remote sensing. The course consists the contents essential to develop the base for further advance level remote sensing analysis.

Course contents

The course covers the following topics

Fundamental of remote sensing

- Definition of remote sensing
- Elements of remote sensing process
- Advantage of Remote sensing
- Application of Remote sensing
- Electromagnetic radiation
- Electromagnetic spectrum

- Energy interaction in the atmosphere
- Energy interaction with the earth's surface
- Satellite Sensors and platforms
- Satellite Characteristics: Orbits and Swaths
- Satellite Image data characteristics
- Image Specifications of Multispectral Satellite Sensors

Recommended knowledge

Basic Knowledge of Insolation

Hardware and Software Required

PC, GIS software

Methods of delivery

Lecture

Intensive practical works

Methods of Assessment/Evaluation:

Performance of students will be assessed on the basis of assignments and an exam.

Methods of Assessment/Evaluation

Continuous assessment (60%)

Paper and/or final exam (40%)

Course Title: Advanced Quantitative Methods in Geography and Environmental Studies

Course Code: GeES 513

Credit Hours: 3

Course Category: Common

Prerequisite: No

Co-requests No

Rationale:

Advanced quantitative methods deals with the process of geographical, societal and environmental methods of data acquisition, analysis and model making. A basic understanding of advanced quantitative methods (*inferential and model making techniques*) in geography and environmental studies is essential to geographers pursuing their postgraduate program in the field. It provides to students an ideal skill to observe practical applications of human activities, collect, and analyze data in order to be able to infer about the population based on sample data (through inferential techniques) and build models to present processes, practices, changes, scenarios and predictions on geographical and environmental problems and developments.

Course Objectives

The objective of the course is to develop further the quantitative skills of students to the use of advanced quantitative methods for geographical data/information analysis. In particular, the student will learn how inferential and model making techniques can be applied in a spatial manner. Thus, upon completion of this course the student will use advanced quantitative methods to examine geographic data and perform scientifically rigorous analysis.

Course Description

Quantitative method in geography may be generalized into three major groups: *descriptive technique, inferential techniques and model making techniques*. Descriptive techniques are used to summarize information about places, areas, location patterns, or trends, or fluctuations through time; in order to provide a single comprehensive index or graphs and thereby facilitate accurate descriptions and comparisons. An inferential technique is a method of data acquisition from a sample and is essential to estimate the extent to which a sample may be regarded as representative of the whole, or the degree to which a collected data supports a hypothesis. Model making techniques is more advanced method which is used to summarize reality, processes, and changes. Some of such models are *simulation models, gravity model and general linear models, etc.* This course focuses on the last two techniques, by presumptuous that *descriptive technique* is simple and students have had sufficient knowledge and practice in their undergraduate studies. Thus, how to mathematically and statistically model geographic problems is the focus of this course. The application of nonparametric tests, bivariate and multivariate statistical techniques and model making techniques are central issues.

The course covers the following topics

1. Simple Correlation
2. Measures of Correlation
3. Coefficient of Determination
4. Linear Regression
5. Nonparametric measures of association

6. Measures of Spatial Distribution
7. Gravity model and
8. General linear models using SPSS package

Methods of delivery

Lectures

Group and individual presentations

Course paper

Methods of Assessment/Evaluation

Continuous assessment (60%)

Paper and/or final exam (40%)

Course Title: Global Positioning System

Course Code: GeES 514

Credit Hours: 3

Course Category:

Prerequisite: No

Co-requests No

Rationale:

The Global Positioning System and the availability of free and fee-based correction signals has revolutionized navigation, mapping and surveying. With the advent of low cost receivers, GPS is being used by thousands of people for applications ranging from recreation to wildlife research to fleet management.

Course Objectives

On completing this course, Students will able to:

- Collect GPS data
- Import GPS data in different GIS environment
- Map with the help GPS data

Course Description

This course provides an in-depth overview of the Global Positioning System and covers the growth of the GPS concept. Included in the course is a description of the NAVSTAR constellation and the various types of augmented GPS systems. Basic GPS components are covered, including satellites, ground stations, antennas and receivers. Emphasis is placed on signals, timing and false signals including spoofing, jamming and cryptographic concepts.

Course contents

The course covers the following topics

Overview of GPS

- GPS Satellite Network
- GPS operating conditions (weather, buildings, trees)
- GPS Accuracy

Presentation of Garmin GPS and functions

- Button layout
- Turning unit on/off, setting screen contrast & backlight
- Menu navigation

- Setting up the GPS (units, time, coordinate system)

Presentation of Garmin GPS and functions, understanding the map

- Zooming in/out
- Changing level of detail
- Map orientation
- Map display fields

Method for data upload/download using Map Source Software

- Planning routes and waypoints using Map Source
- Uploading routes and waypoints to the GPS

Practice in the field: Waypoint collection

- Saving waypoint in the field
- Checking waypoint list
- Deleting & renaming waypoints
- Navigating to waypoints

Practice in the field: Track collection

- Starting/stopping the Tracklog
- Setting the Tracklog interval
- Saving and naming Tracklogs

Download data from field survey

- Connecting the GPS to a computer
- Downloading waypoints

Managing data, other topics & review as required

- Exporting data to disk
- Exporting data to a GIS

Methods of delivery

Lectures

Practical

Field Survey

Group and individual presentations

Course paper

Methods of Assessment/Evaluation

Continuous assessment (60%)

Paper and/or final exam (40%)

Course Title: Geo-Database Management

Course Code: GeES 611

Credit Hours: 3

Course Category:

Prerequisite: No

Co-requests No

Rationale:

Data management in GIS environment is essential now days especially in the offices like municipal corporations, land use and administration, electricity and water works.

Course Objectives

On completing this course, Students will able to:

- Understand Data Types for GIS
- Understand Data Sources for GIS
- Organize your data in GIS Environment
- Building Geodatabase
- Editing Geodatabase

Course Description

This course provides an practical know how of data, its types & sources. In this course students will be taught to organize data in GIS environment. Building and editing Geodatabase will be explained practically at the end of the chapter.

Course Contents

The course covers the following topics

Exploring the geodatabase

- Geodatabase components
- Connecting to a geodatabase
- Geodata services

Creating and loading data

- Creating a geodatabase
- Creating feature classes and tables
- Modifying feature classes and tables
- Data loading techniques
- Database recovery and backups

Managing raster data

Considerations for raster management

Creating a mosaic dataset

Maintaining data integrity using subtypes

What are subtypes and when should you use them?

Creating subtypes

Specifying default values

Maintaining attribute integrity

Creating attribute domains

Applying domains to subtypes

Validating attribute edits

Relating data using relationship classes

When to use

Table cardinality

Relationship class properties and rules

Adding attachments

Storing file-based information with features

Adding attachments using a geoprocessing tool

Designing geodatabase topologies

Topology workflow

Topology rules

Validating a topology

Sharing a geodatabase

Sharing methods: map packages and geodata services

Publishing geodata services

Managing service data

Sharing map packages

Designing a geodatabase

Design process and considerations

Template data models

Project: Build a geodatabase

Create feature classes and tables

Load data

Design attribute integrity rules

Create domains, subtypes, a relationship class, and a topology

Test rules in an edit session

Share the geodatabase schema

Methods of delivery

Lectures

Practical

Field Survey

Group and individual presentations

Course paper

Methods of Assessment/Evaluation

Continuous assessment (60%)

Paper and/or final exam (40%)

Course Title: Data Analysis in GIS

Course Code: GeES 612

Credit Hours: 3

Course Category:

Prerequisite: No

Co-requests No

Rationale:

Data analysis may include spatial analysis, Geostatistical analysis and other analysis which is helpful for research.

Course Objectives

On completing this course, Students will able to:

- To measure Site suitability
- To find the best route
- To find the closest service
- To create a surface using default parameters
- To explore your data
- To Map concentration

Course Description

In this course student will learn how to create, query, and analyze cell-based raster maps, derive new information from existing data, query information across multiple data layers, and fully integrate cell-based raster data with traditional vector data sources.

They'll learn how to create network datasets and use them to find routes; find closest features on a network; calculate service areas; as well as how to build a model for route analysis.

They'll learn how to represent and explore data and determine data trends; perform diagnostic tests on data; choose and fit a model such as kriging, cokriging, IDW, and others; and compare the results of different models.

Course Content

The course covers the following topics

- 1. Spatial Analysis with GIS**
 - Site suitability
- 2. Network Analysis**
 - Finding the best route
 - Finding the closest service
- 3. Geostatistical Analyst**

Creating a surface using parameters

Exploring data

Mapping Pattern

Methods of delivery

Lectures

Practical

Field Survey

Group and individual presentations

Course paper

Methods of Assessment/Evaluation

Continuous assessment (60%)

Paper and/or final exam (40%)

Course Title: Web GIS

Course Code: GeES 613

Credit Hours: 3

Course Category:

Prerequisite: No

Co-requests No

Rationale:

Web GIS help to create interactive web maps and apps that student can share with anyone. With ready-to-use content, apps, and templates, student can be productive right away.

Course Objectives

On completing this course, Students will able to:

To combine data with data from Esri and other contributors to create maps for the work.

To Browse the world's most extensive online geographic resource and discover maps and data about thousands of topics. Combine content any way they want and see it on a map.

To analyze relationships and patterns, they can better understand problems and locate opportunities.

To share the latest maps, data, and ideas on a single platform.

To create project groups, customize work tools, and build your own web apps to connect people

Course Description

This course covers the types of content which can be published to ArcGIS Online and shows how to author GIS resources to support their planned use. Students will also see how including GIS resources in published web maps and web applications extends their value throughout the organization and even to the general public.

Course contents

Online Platforms for Web GIS

ArcGIS Online overview

Adding content to ArcGIS Online

Data types

Services

Publishing feature services and tiled map services

Creating web maps with ArcGIS Online

Authoring workflow

Configuration options

Data analysis with ArcGIS Online

Creating web applications using ArcGIS Online templates

Available templates

Workflow to create a web application

Sharing content to ArcGIS Online

Sharing options

Choosing the right option for the content's intended use

Methods of delivery

Lectures

Practical

Group and individual presentations

Course paper

Methods of Assessment/Evaluation

Continuous assessment (60%)

Paper and/or final exam (40%)

Course Title: GIS and remote sensing for urban planning

Course Code: GeES 614

Credit Hours: 3

Course Category:

Prerequisite: Computer skill

Co-requests No

Rationale:

Cities are growing due to rapid urbanization. Infrastructure management is a big challenge for planners and administrators. This course will make students able to meet such challenges.

Course Objectives

On completing this course, Students will able to:

- To understand urban morphology
- To use remote sensing data for urban studies.
- To develop geodatabase for management.
- To study change detection
- To study change detection.
- To report urban ground realities.

Course Description

This course is designed for developing students from the view point of urban managing and planning. It will help them to learn various aspects of the city.

Course contents

Urban morphology

Urban area interpretation and analysis with GIS and remote sensing

Urban Hydrology

Remote sensing application for large scale mapping for cadastral data base and urban area

Urban growth monitoring

Urban land use classification system

Urban land use mapping and analysis

Municipal GIS

Geodatabase for Water works department

Geodatabase for Electricity department

Geodatabase for land use planning and administration department

Facility mapping

Suitability analysis for development

Urban structure and transport study

Digital surface modeling

Virtualizing 3D real world for urban design

Urban plan monitoring and change detection

Methods of delivery

Lectures

Practical

Group and individual presentations

Course paper

Methods of Assessment/Evaluation

Continuous assessment (60%)

Paper and/or final exam (40%)

Course Title: Advance Remote Sensing

Course Code: GeES 615

Credit Hours: 3

Course Category:

Prerequisite: Computer skill

Co-requests No

Rationale:

Remote sensing is integral to a wide range of applications including: global climate change, deforestation, fire mapping, oil exploration, ice sheet dynamics, earthquakes, pollution, oceanography, ecology and conservation, resource management, food security and humanitarian applications.

Course Objectives

On completing this course, Students will able to:

- To collect satellite images
- To make required corrections in the images.
- To analyze satellite image data.
- To create land use maps.
- To study change detection.
- To report ground realities.

Course Description

This course is an applied science course which will introduce students to the science, art, and uses of remotely sensed data. They will learn about the collection, processing, analysis, and use of multiple types of remotely sensed data from lectures, field work, and computer lab assignments

Course contents

- Remote sensing introduction.
- Sensors used in remote sensing.
- Atmospheric transmission.
- Factors affecting spectral reflectance and emittance of objects on the earth's surface.
- Field measurements of reflectance.
- Image geometric calibration.
- Image radiometric calibration.

Spectral signatures.

Digital image display.

Remote sensing digital image processing; simple filtering techniques.

Spectral indices

Thermal Remote Sensing

Application of PCA to multi spectral images

Unsupervised and supervised classification.

Ground truth collection.

Accuracy assessment.

Applications of remote sensing to environmental problems.

Methods of delivery

Lectures

Practical

Field Survey

Group and individual presentations

Course paper

Methods of Assessment/Evaluation

Continuous assessment (60%)

Paper and/or final exam (40%)

Course Title: GIS and Remote sensing in Land cover, land use change analysis

Course Code: GeES 616

Credit Hours: 3

Course Category:

Prerequisite: Computer skill

Co-requests No

Rationale:

Land use and land cover change has become a central component in current strategies for managing natural resources and monitoring environmental changes. The advancement in the concept of vegetation mapping has greatly increased research on land use land cover change thus providing an accurate evaluation of the spread and health of the world's forest, grassland, and agricultural resources has become an important priority. Remote Sensing (RS) and Geographic Information System (GIS) provide new tools for advanced ecosystem management. The collection of remotely sensed data facilitates the synoptic analyses of Earth - system function, patterning, and change at local, regional and global scales over time.

Course Objectives

- To introduce general and advanced GIS and Remote Sensing in land use/ cover changes.
- To expose participants to Digital Image Processing with more emphasis on classification.
- To demonstrate case study of a selected regions using remote sensing software.
- To develop a sound basis for understanding the operation of GIS and Remote Sensing in Land use/cover change.

Course Description

Students will acquire hands-on skills in use of Geographic Information System (GIS) and Remote Sensing as a tool to capture, store, analyze, manage, and visualize land cover/use change and analysis.

Course content

Introduction and definitions of key concepts of Land use and land cover change

- Introduction to GIS and Remote sensing in Land cover, land use change analysis

GIS Data management

- Data sources in GIS for Land cover, land use change analysis
- Data Acquisition

- Working with a GIS software
- Working with data from different sources
- Geodatabase creation
- Integrating GPS data into GIS

Change detection mapping

Pre-classification of Digital Image processing

- Radiometric and atmospheric correction
- Temporal normalization
- Geo-coding and geo-referencing
- Transformation
- Thermal bands for use in land cover classification

Land use/cover classification

- Signature development
- Supervised Classification
- Unsupervised Classification
- Accuracy assessment
- Case studies for use of GIS and Remote Sensing in land cover/use change

Methods of delivery

Lectures

Practical

Field Survey

Group and individual presentations

Course paper

Methods of Assessment/Evaluation

Continuous assessment (60%)

Paper and/or final exam (40%)

Course Title: Terrain Analysis

Course Code: GeES 617

Credit Hours: 3

Course Category:

Prerequisite: Computer skill

Co-requests No

Rationale:

Three dimensional analysis and visualization is an essential area of geo-technology that will greatly change our daily life, the workplaces (e.g. 3D visualizations of urban planning options and engineering infrastructures) and even student learning (e.g. study of vegetation over 3D landscape).

Course Objectives

The objective of this lecture is for students to get the concepts, principle, construction and the applications of DEMs.. Interesting and useful practices is carefully designed to help students get a thorough and comprehensive understanding of DEMs as well as their applications in geo-analysis.

Course Description

DEM (digital elevation models) is the digital representation of the continuous variation of relief over space. Now, DEMs are playing a key role in survey and mapping, remote sensing, geographical analyses and some engineer projects.

Course content

Introduction of DEM

DEM: Concepts

Types of DEM

Function & Application of DEMs

Organization & Generation

DEM Data Model and Structure

Regular Grid-Based DEM

TIN-Based DEM

DEM Generation

DEM Data Sources

DEM Data Acquisition Technology

Constructing Raster DEMs

Visualization of DEM

Introduction

Rendering Method of Terrain
Stepped Relief Model
Illuminated Contours
3-D Terrain Visualization

Principle & Operation of Digital Terrain Analysis

Method for GIS Based Spatial Analysis
The Types of Digital Terrain Analysis (DTA)
DTA Research & Application Development

Extraction of Terrain Attributes and Features

Basic Terrain Variables
Other Terrain Attributes
Terrain Feature Statistics

Hydrological Analysis

Extraction of Drainage Networks
Extraction of Watershed
Flow Length Analysis

Extraction of Typical Terrain Feature

Concept of Terrain Feature
Extraction of Point-terrain-features
Extraction of Line-terrain-features
Extraction of Area-terrain-features

DEM Application Cases

Terrain Analysis
Terrace Land Model Building
Urban DEM & its Application
Geological Analysis

Methods of delivery

Lectures
Practical
Field Survey
Group and individual presentations
Course paper

Methods of Assessment/Evaluation

Continuous assessment (60%)
Paper and/or final exam (40%)

Appendix A

Adigrat University

College of Social Sciences and Languages

Department of Geography and Environmental Studies

- A. Need Assessment survey results.
- B. Questionnaire prepared for Field Survey and Consultations as a part of Need assessment.
- C. Questionnaire prepared for Field Survey and Consultations as a part of Curriculum preparation for Postgraduate Programme in GIS and Remote Sensing.

Adigrat University

College of Social Sciences and Humanities

Department of Geography and Environmental Studies

Summary Result of Need Assessment

I. Background

The department of Geography and Environmental Studies, at Adigrat University (AU) has been offering undergraduate program since 2011.

The Department is committed to produce competent students in geography and environmental studies that have the desired academic knowledge, sufficient GIS and remote sensing skill, appropriate citizenship and respect for those ethical values enshrined in the Ethiopian Constitution.

In response to the growing demand, Academics, Adigrat University and the request of the government for competent and qualified man power in GIS and Remote Sensing, now the department decided to commence a post graduate programme in GIS and Remote Sensing along with thesis.

Generally the fundamental mission of the postgraduate programme is to continually improve its provision of services and to pursue the standards of excellence in and thereby to meet the needs of the country and the community. For opening of this program, the department has undertaken need assessments.

II. Surveyed Stakeholders

In the need assessment survey, important institutions, alumni and other potential trainees have been consulted.

1. Surveyed institutions

- a. Municipal office, Adigrat.
- b. Land administration and Planning, Adigrat.
- c. Adigrat University
 - College of Natural Science*
 - College of Natural Resource Management*
 - College of Commerce*
- d. Poly - Technique College

2. Alumni and other potential trainees

III. Result of Institution

All surveyed institutions deal with GIS and Remote sensing issues for efficient governance. The extent of their work dealing with GIS and Remote Sensing is greater than 25 % of their business (Table 1). This indicates that the absolute contribution of their view is believed as an essential for the development of the curriculum in the department.

Table 1. The response of institutions on the extent of their work dealing with GIS and RS

no	Item	Respondent	Percentage	Remark
1	Less than 25%	0	0	
2	25- 50%	4	20.0	
3	50-75%	6	30.0	
4	More than 75%	10	50.0	

The contacted institutions are believed to contribute in ranking the pre-selected courses by the curriculum development task force. Ranking the courses is important to prioritize for the addition of valuable course with the orientation of the countries development programme.

Accordingly, contacted institutions have been asked to rank courses to be included in the curriculum in the order of importance of courses (1st rank the most important and 17th rank least important). The result of the survey is shown in Table 2.

Table 2. Priority lists of courses as responded by institutions

SN	TENTATIVE COURSE LIST	RANK
1	Fundamentals of GIS	1
2	Fundamentals of Remote Sensing	2
3	Advanced Quantitative Methods in Geog. & Env. Studies	3
4	Global Positioning System	4
5	Geodatabase Management in GIS - Common	5
6	Data Analysis in GIS	6
7	Web GIS	7
8	GIS and remote sensing for urban planning	8
9	Advance remote sensing	9
10	GIS and Remote sensing in Land cover, land use change analysis	10
11	Terrain Analysis	11
12	Town Planning with GIS	12
13	Watershed development	13
14	Municipal GIS	14
15	Climate Change and adaptation with GIS and Remote Sensing	15
16	Natural Resource Assessment with GIS and Remote sensing	16
17	Hydrological analysis with GIS and remote sensing techniques	17

Apart from courses given options, institutions have been asked to include some courses that they think are important and to be considered in the curriculum. In this regard 4 courses have been suggested (Table 3).

Table 3. Courses suggested to be included other than courses listed above

SN	Courses
1	Route Network Analysis
2	GIS for crime analysis
3	GIS and remote sensing for agriculture planning
4	GIS for market analysis

Since institution collaboration is basic for the successful implementation of the program, the surveyed institutions have been asked the extent of their agreement, whether they can collaborate with the department for the intended postgraduate program. From the survey results we have learnt that 70 % of the institutions have responded strongly agree to form institutional collaboration and links (Table 4).

Table 4. Agreement or disagreement of intuitions to form institutional collaboration or link with department of Geography pertaining the post graduate program

Scale	Response	Frequency	%
1	Strongly agree	14	70
2	Agree	4	30
3	Neither agree nor disagree	0	0
4	Disagree	0	0
5	Strongly disagree	0	0

There are many ways for organizations to work together which may vary in nature, purpose, degrees of commitment and levels of formality. In order to gain our students a practical oriented, and thorough knowledge on the proposed field of specialization, knowing collaboration type of institution is very important for consideration. The indicated areas of collaboration/links, were research, Co-advising of MA/MSc. theses, Teaching and research materials exchange, staff exchange respectively by 23, 17, 27 and 33 of institutions (Table 5).

Table 5. Indicated areas of collaboration/links

S. No.	Areas of collaboration	Frequency	%
1	Staff exchange in course deliberation	7	23.33
2	Co-advising of MA Theses	5	16.67
3	Research collaboration	8	26.67
4	Teaching and research material exchange	10	33.33

In the above indicated areas of collaboration 1-3,

a. Staffs (professionals) with qualification of Ph.D. or equivalent are 5

b. indicated courses to be handled and areas of advising and research collaboration

Table 6. Professional with their area of competence and their institutions who have agreed to give courses, advising or research collaboration

S. No	Courses, areas of advising and research collaboration	Institution
1	Natural resources management	AU
2	Geology Department	AU
3	College of Commerce	AU
4	Statistics Department	AU

In order to decide whether the department can open the Master's program based on the relevant of the courses and the future contribution of graduates to the development of the country, incorporating institutions view in this regard is very fundamental.

Table 7. Opening of Post-graduate programme in GIS and Remote Sensing in the department of Geography, AU with the above suggested courses (curriculum) will contribute in producing important professionals required by the country to participate in development areas. Institution responses

Scale	Response	Frequency	%
1	Strongly agree	16	80
2	Agree	3	15
3	Neither agree nor disagree	1	5
4	Disagree	0	0
5	Strongly disagree	0	0

The broad sweep of Geography as a discipline and the range of options available in graduating with proposed postgraduate programme in the department shall forecasted from the institution point of view to ensure that GIS and Remote Sensing graduates have a wide range of career opportunities open to them. This can be predicted from the courses to be given and the assumption with a wide range of expected employers who can appreciate the range of personal and transferable skills in terms of team work, field work, presentation skills, and technical abilities.

Table 8. Employment opportunities to graduates with Postgraduate Programme in GIS.

Scale	Response	Frequency	%
1	Certainly will get employment opportunity	14	70
2	Likely will get employment opportunity	5	25
3	Difficult to predict whether they will get employment or not	1	5
4	Unlikely will get employment opportunity	0	0
5	Certainly will not get employment opportunity	0	0

IV. Results of Alumni and other potential trainees

As it is depicted in Table 9, most of the respondents were completed their education in current year only. For instances almost 60 percent of them have completed their education in the current year and one year ago.

Table 9. Years of completion of undergraduate

Years of completion	No	Percentage
Current year	20	40
A year ago	10	20
Two years ago	7	14
Three years ago	5	10
Four years ago	4	8
Before four years ago	4	8
Total	50	100

Respondents were also asked whether they deal with GIS and Remote Sensing in their current profession. A large majority 75 % of them replied that most of the issue raised and done in their respective job /profession has a great relationship with subject GIS and Remote Sensing.

Table 10. In your current profession do you deal with geographical environmental and developmental studies?

Alternatives	Number	Percentage
Yes	15	75
No	5	25
Total	20	100

We also asked our respondents to indicate the proportion of their current work to what extent it focuses on GIS and Remote Sensing. Table 11 shows the results.

Table 11. What proportion of your work is focusing on geography and environmental studies?

Alternatives	Number	percentage
Very low (<25%)	2	13.33
Low (25-50%)	1	6.67
Medium (50-75%)	2	13.33
High (> 75 %)	10	66.67
Total	15	100

Regarding pursuing postgraduate study, almost 67 % of them replied that they will start postgraduate enrollment very shortly. Table 12 shows values of other alternatives.

Table 12. Respondents attitude whether to peruse postgraduate study or not

Alternatives	Number	percentage
A) Yes very shortly	10	66.67
B) Yes after one year	2	13.33
C) Yes, after 2-3 years	2	13.33
D) Yes, but after 4 years	1	6.67
Not at all	0	0
Total	15	100

Out of the consulted sample respondents about all of them preferred to join post graduate study in GIS and Remote Sensing. Other results are shown in table 13.

Table 13. If your answer is A-D, do you enroll in the post graduate program of GIS and RS?

Alternatives	Number	Percentage
Strongly disagree	0	0
Disagree	0	0
Neither agree nor disagree	0	0
Agree	3	20
Very agree	12	80
Total	15	100

As indicated in Table 14 courses are ranked by the respondents in the following manner

1st ranked course Fundamentals of GIS

2nd >> Fundamentals of Remote Sensing

3rd >> Advanced Quantitative Methods in Geog. & Env. Studies

4th >> Global Positioning System

SN	COURSE LIST	RANKING (R) AGAINST FREQUENCY (F)																	Σf	$\Sigma(r*f)$	$\Sigma(r*f)/\Sigma f$	GROUP RANK
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
1	Fundamentals of GIS	7	5	3	2	3	2	4	4	2	3	2	2	3	2	3	1	2	50	377	7.54	1
2	Fundamentals of Remote Sensing	2	8	2	3	3	3	2	3	2	3	3	3	4	1	2	2	4	50	420	8.40	2
3	Advanced Q. Methods in Geog. & Environmental Studies	1	3	8	2	2	3	2	3	3	2	3	2	3	4	3	2	4	50	449	8.98	3
4	Global Positioning System	1	1	3	7	3	2	4	4	2	3	2	2	3	2	4	4	3	50	466	9.32	4
5	Geodatabase Management in GIS	2	1	2	1	8	2	2	3	3	4	4	3	4	1	3	2	5	50	479	9.58	5
6	Data Analysis in GIS	1	1	2	2	2	8	2	3	3	2	3	4	3	5	3	2	4	50	495	9.90	6
7	Web GIS	1	2	1	2	2	5	4	4	2	3	4	2	4	3	3	3	5	50	504	10.08	7
8	GIS and RS for urban planning	2	1	2	1	3	3	2	5	2	3	3	3	6	4	2	4	4	50	514	10.28	8
9	Advance remote sensing	2	1	1	2	2	3	2	3	3	2	3	6	3	4	3	6	4	50	537	10.74	9
10	GIS and RS in Land cover, land use change analysis	1	1	1	2	3	2	1	3	2	4	7	4	3	3	5	5	3	50	542	10.84	10
11	Terrain Analysis	1	1	2	1	3	1	2	1	2	3	3	3	4	8	5	6	4	50	576	11.52	11
12	Town Planning with GIS	1	1	1	2	2	1	2	3	3	2	3	4	3	4	3	8	7	50	583	11.66	12
13	Watershed development	1	1	2	2	1	2	1	1	2	3	2	2	5	6	3	8	8	50	601	12.02	13
14	Municipal GIS	2	2	1	1	1	1	1	1	2	1	3	1	4	5	8	7	9	50	619	12.38	14
15	Climate Change and adaptation	1	1	1	1	1	1	1	1	2	2	1	2	6	4	7	9	9	50	645	12.90	15
16	Natural Resource Assessment	1	1	1	1	1	1	1	1	2	2	1	2	2	5	9	9	10	50	654	13.08	16
17	Hydrological analysis with GIS and remote sensing techniques	0	0	0	0	0	0	1	0	0	3	1	7	2	7	6	8	15	50	729	14.58	17

In addition, Alumni and other potential trainees have been asked to include some courses that they think are important and to be considered in the curriculum and they suggested the following areas.

I. Marketing GIS

II. Remote Sensing for weather forecasting

III. GIS for Journalism

IV. GIS for crime analysis

Priority lists of courses as by institutions and Alumni and other potential trainees have been combined (Table 15). The combined result indicates the following courses were in the front priority lists.

1. Fundamentals of GIS
2. Fundamentals of Remote Sensing
3. Advanced Q. Methods in Geog. & Environmental Studies

Table 15. Combined priority lists (institution + Alumni and other potential trainees) of courses

SN	COURSE LIST	Alumni & potential Trainees Rank	Institution Rank	Combined value	Combined Rank
1	Fundamentals of GIS	1	1	1	1
2	Fundamentals of Remote Sensing	2	2	2	2
3	Advanced Q. Methods in Geog. & Environmental Studies	3	3	3	3
4	Global Positioning System	4	4	4	4
5	Geodatabase Management in GIS	5	5	5	5
6	Data Analysis in GIS	6	6	6	6
7	Web GIS	7	7	7	7
8	GIS and RS for urban planning	8	8	8	8
9	Advance remote sensing	9	9	9	9
10	GIS and RS in Land cover, land use change analysis	10	10	10	10
11	Terrain Analysis	11	11	11	11

Respondents were also requested concerning their feeling whether to open post graduate in GIS and Remote Sensing. Consequently 90% of them were in favor of opening the program (Table 16).

Table 16. Suggestions of the respondents on opening of M.A program in Geography and Developmental Studies

Alternatives	Number	Percentage
Strongly Agree	35	70
Agree	10	20
Neither agree nor	5	10
Disagree	0	0
Disagree	0	0
Very disagree	0	0
Total	50	100

With regard to employment opportunities of the would be graduate in GIS and RS, almost all 60% of them argued that graduates will definitely secure job opportunity in the job market (Table 17). Only 10% of the respondents were not sure about what to happen in the future. This can also be a good reason behind opening the P.G programme in our department.

Table 17. What is your judgment about the job opportunities of Graduates in GIS and RS?

Alternatives	Number	Percentage
Certainly will get employment opportunities	30	60
Likely will get employment opportunities	15	30
Difficult to predict	5	10
Unlikely to get employment opportunities	0	0
Certainly will not get employment opportunities	0	0
Total	50	100

V. Summary of the Results

The result of the need assessment obviously indicate that there is a strong desire from the side of many scholars towards the opening of the programme.

Adigrat University

Department of Geography & Environmental Studies

Questionnaire prepared for Field Survey and Consultations as a part of Need assessment and Curriculum preparation for Postgraduate Programme in GIS and Remote Sensing.

Part 1B (to be completed by Alumni and other potential trainees to be enrolled in post-graduate program of Geography and Development Studies)

July 2015

Adigrat

Note: Department of Geography and environmental studies of Adigrat University (AU) is planning to commence a postgraduate studies program in 2008/9. Now we are at ***curriculum document preparation and need assessment phase***. Very soon, we will have in campus and National curriculum review workshop at Adigrat University. For the opening of the program and designing of relevant curriculum for the anticipated program, survey is basic in order to collect important information from important stakeholder. For this purpose we have designed a very brief questionnaire to be completed by you. In any circumstances, it is our professional responsibility to contain your (individual) information secrete.

We are very much grateful for your assistance in completing this questionnaire by sharing us your invaluable time.

Date of Consultation: _____

Institution/department/section consulted: _____

1. When did you complete your BA or undergraduate program?

- a) one year ago
- b) two years ago
- c) three years ago
- d) four years ago
- e) Before four years ago

2. In your current professional engagement do you deal with Geographical, Environmental & Developmental issues of Ethiopia? Yes No

3. If the answer to question 2 is yes: What percent of your work is focusing in this area?
 - a) Less than 25%
 - b) 25-50%
 - c) 50-75%
 - d) Greater than 75%
4. Do you have a plan to have a post-graduate study?
 - a) Yes, very shortly
 - b) Yes, but after 1 year
 - c) Yes, but after 2-3 years
 - d) Yes, but after 4 years
 - e) Not at all
5. If your answer to question 4 is “a” to “d”, do you want to enroll in the post graduate program of Geography and Development Studies?
 - a) Strongly disagree
 - b) Disagree
 - c) Neither agrees nor disagrees
 - d) Agree
 - e) Very agree
6. If your answer for question 4 is “e” would you please indicate your reason(s)?

7. If your answer to question 4 is “a” to “d”, What courses do you think to be included in **Postgraduate Programme in GIS and Remote Sensing? Would you please rank the courses in order of their importance (rank 1st = very important and Rank 21st = least important from the courses indicated in the list. Please give ranking for all courses listed.**

SN	TENTATIVE COURSE LIST	RANKING
1	Fundamentals of GIS & Remote Sensing	
2	Population & Natural resource management	
3	Advanced Quantitative Methods in Geography & Environmental Studies	
4	Global Positioning System	
5	Geodatabase Management in GIS - Common	
6	Data Analysis in GIS	
7	Web GIS	
8	GIS and remote sensing for urban planning	
9	Advance remote sensing	
10	<i>GIS and Remote sensing in Land cover, land use change analysis</i>	
11	Terrain Analysis	
12	Town Planning with GIS	
13	Watershed development	
14	Municipal GIS	
15	Climate Change and adaptation with GIS and Remote Sensing	
16	Natural Resource Assessment with GIS and Remote sensing	
17	Hydrological analysis with GIS and remote sensing techniques	

8. If not mentioned in the above list of courses, as a professional, would you please, indicate important courses to be included in the curriculum of **Postgraduate Programme in GIS and Remote Sensing/Regional development & Planning**, which would particularly be relevant to Ethiopian and Tropical Highland development?

1. _____
2. _____
3. _____
4. _____

9. Opening of **Postgraduate Programme in GIS and Remote Sensing/Regional development & Planning** in the department of Geography, AU with the above suggested courses (curriculum) will contribute in producing important professionals required by the country to participate in development areas?

- a) Strongly agree
 - b) Agree
 - c) Neither agree nor disagree
 - d) Disagree
 - e) Very disagree
10. In your judgment, graduates with **Postgraduate Programme in GIS and Remote Sensing/Regional development & Planning**:
- a) Certainly will get employment opportunity
 - b) Likely will get employment opportunity
 - c) Difficult to predict whether or not they will get employment
 - d) Unlikely will get employment opportunity
 - e) Certainly will not get employment opportunity

Thank you very much once again for your cooperation!

Adigrat University

Department of Geography & Environmental Studies

*Questionnaire prepared for Field Survey and Consultations as a part of Curriculum preparation for **Postgraduate Programme in GIS and Remote Sensing.***

Part 1A (to be completed by institutions/departments, sections that involve in the area of Geography and Development issues)

July 2015

Adigrat

Note: Department of Geography and environmental studies of Adigrat University (AU) is planning to commence a postgraduate studies program in the session 2015-16. Now we are at curriculum document preparation phase. First we will have in campus curriculum review and later National curriculum review will be held at Adigrat University. For the purpose of designing relevant curriculum for the anticipated program, survey is basic in order to collect important information from important stakeholder. For this purpose we have designed a very brief questionnaire to be completed by your good institution/department/section.

In any circumstances, it is our professional responsibility to contain your (individual) information secrete.

We are very much grateful for your assistance in completing this questionnaire by sharing us your invaluable time.

Date of Consultation: _____

Institution/department/section consulted: _____

1. Is your Institution/department/section dealing with GIS and Remote Sensing issues of Ethiopia? Yes No

2. If the answer to question 1 is yes: What percent of your work is focusing in this area?

- a) Less than 25%
- b) 25-50%
- c) 50-75%
- d) Greater than 75%

3. What courses do you think to be included in the post graduate study of M.A. in ***Geography and Development Studies?*** ***Would you please rank the courses in order of their importance (rank 1st = very important and Rank 21st = least important from the courses indicated in the list. Please give ranking for all courses listed.***

SN	TENTATIVE COURSE LIST	RANKING
1	Fundamentals of GIS & Remote Sensing	
2	Population & Natural resource management	
3	Advanced Quantitative Methods in Geography & Environmental Studies	
4	Global Positioning System	
5	Geodatabase Management in GIS - Common	
6	Data Analysis in GIS	
7	Web GIS	
8	GIS and remote sensing for urban planning	
9	Advance remote sensing	
10	<i>GIS and Remote sensing in Land cover, land use change analysis</i>	
11	Terrain Analysis	
12	Town Planning with GIS	
13	Watershed development	
14	Municipal GIS	
15	Climate Change and adaptation with GIS and Remote Sensing	
16	Natural Resource Assessment with GIS and Remote sensing	
17	Hydrological analysis with GIS and remote sensing techniques	

4. As a professional, would you please, indicate important courses to be included in the curriculum of MA studies in **Geography and Development Studies**, which would particularly be relevant to Ethiopian and Tropical Highland development?

1. _____
2. _____
3. _____
4. _____

5. Department of Geography and Environmental Studies of AU would like to form institutional link to your institution particularly in the area of this Post Graduate Studies (***Geography and Development Studies***). What is your agreement/disagreement from your side/institution to form institution linkage to our department?

- a) Strongly agree
- b) Agree
- c) Neither agree nor disagree
- d) Disagree
- e) Strongly disagree

6. In question 5 if your choice is “a” or “b”, in which of the following area(s) your institution/department/section can form the institutional linkage?

- a) Staff exchange in course deliberation
- b) Co-advising of MA Theses
- c) Research collaboration
- d) Teaching and research material exchange

7. In question 6 if your indication is (are) “a”, “b”, and/or “c”, how many staff (professionals) do you have with qualification of Ph.D or equivalent? _____

8. For the purpose of our data-bank and immediate contact and correct selection, whenever we need to ask you cooperation in the area (s) your positive indication in question 6, would you

please give us field of specialization of your professionals with qualification of Ph.D or equivalent and above?

- a) _____
- b) _____
- c) _____
- d) _____

9. Opening of MA program in *Geography and Development Studies* in the department of Geography, MU with the above suggested courses (curriculum) will contribute in producing important professionals required by the country to participate in development areas?

- a) Strongly agree
- b) Agree
- c) Neither agree nor disagree
- d) Disagree
- e) Very disagree

10. In your judgment, graduates with *MA in Geography and Development studies*:

- a) Certainly will get employment opportunity
- b) Likely will get employment opportunity
- c) Difficult to predict whether or not they will get employment
- d) Unlikely will get employment opportunity
- e) Certainly will not get employment opportunity

Thank you very much once again for your cooperation!