Skill Enhancement Courses Msc (Geography and Disaster Management)

Name of the Course	Course Code	Name of the Programme	Year of introduction
Remote Sensing	GG18104CR	Msc Geography	2014
Advanced Surveying & GPS Applications	GG18404CR	Msc Geography	2017
Total Station	GG18404CR	Msc Geography	2017
Digital Cartography	GG18104CR	Msc Geography	2014
Disaster Management			
Remote Sensing, GIS, and GPS-I	DM18103CR	Msc Disaster Management	2014
GIS & GPS Training			2014
Internship in Disaster Management			2014
Preparation of Disaster Management Plan			2014
Remote Sensing, GIS, and GPS-II	DM18104CR	Msc Disaster Management	2014

GG18104CR ADVANCED QUANTITATIVE AND CARTOGRAPHIC TECHNIQUES

The course focuses on the theoretical understanding of statistics and cartographic techniques and provides opportunities for advanced research by using GIS and SPSS software. The advanced cartographic techniques combines science and technical ability that is capable of communicating information effectively and quickly. The students would be adequately trained in map making, statistical analysis using advanced software's.

Credit-I

1. Multiple Correlation
2. Partial Correlation
3. Linear Regression Analysis
4. Multiple Regression
5. Principle Component Analysis
6. Lorenz Curve and Gini's Coefficient
7. Location Quotient

8. Time series: Moving Average, Least Square Method and Drawing of Line of Best Fit, Second Degree Equation

9. The Exponential Curve, Logistic Curve

10. Interpolation

1. Sampling: Its Laws & Types

2. Hypothesis and its Types

3. Hypothesis Testing: T -Test, Z Test, Chi -Square Test

4. Mann Kendall and ANOVA Test

5. Mann Whitney Test

1. Use of Software for Statistical Analysis : SPSS, Mini Tab & " R"

2. Wentworth, Robinsons and Smiths Slope Analysis

3. Crop Combination Analysis (Weaver's, Thomson's, and Rafiullah's, method)

4. Mapping of Socio–Economic Data (Construction of Composite Index)

5. Principles of Thematic Map Making – Choro-Chromatic & Choro-Schematic

GG18002OE **GLOBAL POSITIONING SYSTEM**

This course aims to provide learners an understanding of satellite based navigation system (GPS). It covers deliberations on the structure, functioning mechanism, and applications of the technology in varied fields.

Credit-I

1. GPS-Fundamentals
2. GPS- Functioning
3. GPS –Segments
4. GPS- Positioning types
5. DGPS – Functions

Credit-II

1. Limitations of GPS Positioning
2. Sources of Error in GPS positioning
3. Land Survey- Location and Measurement
4. GPS- Applications in Traffic and Navigation
5. DGPS- Applications in Surveying

Suggested Readings

1. C. Panda., Remote Sensing- Principles and Applications, Viva Books, 2008.
2. Gopal Singh., Map World and Practical Geography, Vikas Publishing House, 2000.
3. Jensen, R., Fundamentals of Remote Sensing, Shree Maitree Printech Pvt. Limited Noida, 2007.
4. Kali Charan Sahu., Textbook of Remote Sensing and Geographic Information System, Atlantic Publishers and Distributors, 2008.

GG18203CR **REMOTE SENSING AND GIS**

This comprehensive course has been devised to provide the students the theoretical understanding of various geospatial technologies like Remote Sensing and GIS. It deals with the fundamental aspects and at the same time discusses the various applications of these technologies in various applied fields. The students are prepared to carve a place for themselves in the ever expanding world of opportunities that these technologies have to offer at the global level.

Credit-I

1. Fundamentals of Remote Sensing –EMR & EMS
2. Interaction of EMR with the Atmosphere & Earth Surface Features
3. Resolution in Remote Sensing - Spatial, Spectral, Temporal and Radiometric
4. Sensors and Platforms: Their Types and Characteristics
5. Mechanism of Remote Sensing data Acquisition

1. Aerial Photographs and Their Types
2. Fundamentals of Aerial Photograph and Image Interpretation and its Elements
3. Image Interpretation keys; Items, Subject, Regional and Analogous Key
4. Search Methods: Fishing Expedition Method and Logical Search method
5. Multi Concept in Remote Sensing

1. High Resolution and Hyper Spectral Remote Sensing
2. Microwave Remote Sensing : RADAR Basics
3. Digital Images Processing
4. Pre Processing: Radiometric & Geometric Errors
5. Image Enhancement Techniques

1. Definition, Scope and Development of GIS
2. Components of GIS

3. Geographic Data: Types and Characteristics

4. Data Models: Raster and Vector, Processing and Analysis

5. GIS DBMS: Concepts, Components and Quality

Suggested Readings:

1. Campbell, J.B., Introduction to Remote Sensing, (2nd ed.), Taylor and Francis, London, 1996.
2. Curran, P., Principles of Remote Sensing, Longman, London, 1985.
3. Fazal S. and Rahman A., GIS Terminology, New Age International Publishing, New Delhi, 2007.
4. Jenson, J.R., Remote Sensing and Environment. Pearson India, 2013.
5. Joseph George., Fundamentals of Remote Sensing, (2nd ed.) University Press, Hyderabad, 2005.
6. Kumar, S., Basics of Remote Sensing and GIS, Laxmi Pub, 2005.
7. Lo, C.P. and Yeung AKW., Concepts and Techniques of GIS (2nd ed.), Prentice Hall of India, New Delhi, 2006
8. Leick. A., GPS Satellite Surveying (2nd ed.), John Wiley and Sons, New York, 2003.
9. Lillesand T.M and Keifer R.W., Remote Sensing and Image Interpretation (6th ed.) John Wiley and Sons, New York, 2008.
10. N. K. Agarwal., Essentials of GPS, Spatial Network Pvt. Ltd, 2004.
11. Sabins, J.F.F., Remote Sensing: Principles and Interpretation, W.H. Freeman & Co., New York, 1997
12. Sabins, F.F., Remote Sensing: Principles and Interpretation. Freeman, New York, 1986.
13. Siegal, B.S. and A.R Gillespie., Remote Sensing in Geology, Wiley, New York, 1980.

GG18204CR REMOTE SENSING & GIS (PRACTICAL)

This course provides the necessary skills, aptitude and trainings to the students in various geospatial technologies. It prepares the students adequately in different techniques of image interpretation and analysis. The practical course provides hands on exposure to our students in various remote sensing and GIS softwares. The student is professionally well equipped to work independently or in team for providing solutions to problems in a GIS environment

Credit-I

1. Aerial Photographs: Understanding Marginal Information of Photographs,
2. Determining Scale of Aerial Photographs, Photo (stereo-pair) Interpretation using Stereoscopes.
3. Image Processing: Pre-processing- Geometric Correction, Geo-referencing
4. Image Enhancements: Spatial (Resolution Merge), Spectral (Principal Components Analysis), and Radiometric (Histogram Equalization), Filtering
5. Visual Interpretation of Remote Sensing Data

Credit-II

1. Image Classification (Supervised, Unsupervised)
2. Comparing Classifier Results
3. Accuracy Assessment
4. LULC Change Detection
5. Using Indices-NDVI, NDSI and NDWI

Credit-III

1. Creating Vector Layers- Point, Line, Polygon
2. GIS Data Format Conversions
3. Spatial Zonation
4. Overlay and Suitability Analysis
5. Map Designing and Layout

1. Generating Digital Elevation Model (DEM)
2. Spatial Interpolation
3. Topographic Analysis: Hypsometry, Bathymetry, Slope, Aspect
4. Morphometric Analysis: Watershed Delineation, Drainage Generation, Stream Order Calculation
5. Landslide Hazard Zonation

Suggested Readings:

1. Campbell, J.B., Introduction to Remote Sensing (2nd ed.) Taylor and Francis, London, 1996.
2. Curran, P. Principles of Remote Sensing, Longman, London, 1985.
3. Fazal S. and Rahman A. GIS Terminology., New Age International Publishings, New Delhi, 2007.
4. Jenson, J.R., Remote Sensing and Environment, Pearson India, 2013.
5. Joseph George., Fundamentals of Remote Sensing, University Press, Hyderabad, 2005.
6. Kumar, S., Basics of Remote Sensing and GIS, Laxmi Pub, 2005.
7. Lo, C.P. and Yeung AKW., Concepts and Techniques of GIS, Prentice Hall of India, New Delhi, 2006
8. Leick. A., GPS Satellite Surveying (2nd ed.), John Wiley and Sons, New York, 2003.
9. Lillesand, T.M and Keifer, R.W., Remote Sensing and Image Interpretation (6th ed.), John Wiley and Sons, New York, 2008.
10. N.K. Agarwal., Essentials of GPS, Spatial Network Pvt. Ltd, 2004
11. Sabins, J.F.F., Remote Sensing: Principles and Interpretation. W.H. Freeman & Co., New York, 1997.
12. Sabins, F.F., Remote Sensing: Principles and Interpretation. Freeman, New York, 1986.
13. Siegal, B.S. and A.R Gillespie., Remote Sensing in Geology, Wiley, New York, 1980.

GG18006OE **ADVANCED LAND SURVEYING**

Course outcome: In this course students are expected to get theoretical knowledge of the advanced surveying equipments. Moreover, students would be given basic hands-on training to use the surveying equipments like GPS and Total Station which would enhance their skills and employment opportunities.

Credit-I

1. Introduction to Global Positioning System (GPS)
2. GPS Segments
3. Fundamentals of GPS Positioning
4. Sources of Errors and Limitations
5. Applications

Credit-II

1. Total Station (TS)
2. Total Station - Characteristics and Functions
3. Handling and Setting-up TS: Leveling, Centering and Orientation
4. Area Calculation, Measuring, Distances, Angles, and Heights

References

- Elliott Kaplan, Christopher Hegarty (2006). Understanding GPS: Principles and Applications.
- Ahmed El-Rabbany (2002). Introduction to GPS: The Global Positioning System.
- Alfred Leick, Lev Rapoport, Dmitry Tatarnikov (2015). GPS Satellite Surveying.
- Gobi et al, 2007. Advanced Surveying: Total Station, GIS and Remote Sensing.

GG18404CR ADVANCED SURVEYING AND GPS APPLICATIONS

The course has been planned to provide practical training of various advanced instruments i.e., Total Station and Global Positioning System. In addition to setting-up of the instruments, the students are expected to make some fundamental measurements (distance, angle, height, area) of land surveying and layout designing in GIS.

Credit-I

1. Surveying Instruments –Total Station (TS)
2. Total Station -Functions and Characteristics
3. Handling and Setting-up TS: Leveling, Centering and Orientation
4. Measuring Angles, Distances, and Heights
5. Land Parcel Area Calculation

1. Global Positioning System (GPS)
2. GPS Structure (Segments)
3. Fundamentals of GPS positioning
4. Types of GPS Survey
5. Sources of Errors

1. Collecting Waypoints (Point, Line, and Polygon)
2. Adding Attributes to the Points
3. Preparation of Road Maps
4. Landscape/Land use Mapping
5. Data Transfer

1. Real-time kinematic GPS Survey
2. Establishing GPS Base Station
3. Creating a Link Between Base and Rover
4. Creating River Profile and Cross-Sections
5. Generating Digital Elevation Model

Suggested Readings:

1. Kali Charan Sahu., Textbook of Remote Sensing and Geographic Information System, Atlantic Publishers and Distributors, 2008.

2. B.C. Panda., Remote Sensing- Principles and Applications, Viva Books, 2008.

3. Jensen., R Fundamentals of Remote Sensing. Shree Maitree Printech Pvt Limited Noida, 2007.
4. Gopal Singh., Map World and Practical Geography, Vikas Publishing House, 2000.

GG18007GE **FUNDAMENTALS OF REMOTE SENSING & GIS**

The course aims to make students understand basic theoretical concepts of Geographic Information System (GIS). The students would gain understanding of quality, types, components and characteristics of GIS data. In addition to that this course would include study of remote sensing systems and digital image processing.

Credit-I:

1. Definition, Scope and Development of GIS
2. Components of GIS
3. Geographic Data: Types and Characteristics
4. Data Models: Raster and Vector, Processing and Analysis
5. GIS DBMS: Concepts, Components and Quality

1. High Resolution and Hyper Spectral Remote Sensing
2. Microwave Remote Sensing : RADAR Basics
3. Digital Images Processing
4. Pre Processing: Radiometric & Geometric Errors
5. Image Enhancement Techniques

Suggested Readings:

1. B.C. Panda., Remote Sensing- Principles and Applications, Viva Books, 2008.
2. Gopal Singh., Map World and Practical Geography, Vikas Publishing House, 2000.
3. Jensen, R., Fundamentals of Remote Sensing. Shree Maitree Printech Pvt Limited Noida, 2007.
4. Kali Charan Sahu., Textbook of Remote Sensing and Geographic Information System, Atlantic Publishers and Distributors, 2008.

GG18007GE FUNDAMENTALS OF REMOTE SENSING & GIS

The course aims to make students understand basic theoretical concepts of Geographic Information System (GIS). The students would gain understanding of quality, types, components and characteristics of GIS data. In addition to that this course would include study of remote sensing systems and digital image processing.

Credit-I:

1. Definition, Scope and Development of GIS
2. Components of GIS
3. Geographic Data: Types and Characteristics
4. Data Models: Raster and Vector, Processing and Analysis
5. GIS DBMS: Concepts, Components and Quality
6. High Resolution and Hyper Spectral Remote Sensing
7. Microwave Remote Sensing : RADAR Basics
8. Digital Images Processing
9. Pre Processing: Radiometric & Geometric Errors
10. Image Enhancement Techniques

Suggested Readings:

5. B.C. Panda., Remote Sensing- Principles and Applications, Viva Books, 2008.
6. Gopal Singh., Map World and Practical Geography, Vikas Publishing House, 2000.
7. Jensen, R., Fundamentals of Remote Sensing. Shree Maitree Printech Pvt Limited Noida, 2007.
8. Kali Charan Sahu., Textbook of Remote Sensing and Geographic Information System, Atlantic Publishers and Distributors, 2008.

REMOTE SENSING, GIS AND GPS-I DM18103CR

Course Outcome: Here course aims to make students understand basic theoretical concepts of Remote Sensing, Geographic Information System (GIS) and Global Positioning System (GPS). The students would gain understanding of electromagnetic spectrum, Image Interpretation, and image processing. In addition to that this course would include study of the GIS components, data models, GPS segments and applications.

Credit-I

1. Fundamentals of Remote Sensing

2. Electromagnetic Spectrum (EMS)
3. Energy Interactions with Earth Surface Features and Atmosphere
4. Image Interpretation
5. Digital Image Processing

Credit-II

1. Remote Sensing Systems
2. E-O-Space Programmes
3. Platforms – Spaceborne / Airborne
4. Sensors-Active/ Passive. Multispectral and Hyperspectral Systems
5. RADAR and LIDAR Systems

Credit-III

1. Introduction to Geographic Information System

2. Components of GIS
3. Spatial and Non-spatial Data
4. Data Models- Raster and Vector, Processing and Analysis/Modelling
5. Data Dissemination

Credit-IV

1. Introduction to Global Positioning System (GPS)
11. GPS Segments
12. Fundamentals of GPS Positioning
13. Sources of Errors and Limitations
5. Applications

Suggested Readings

1. Andrew Skidmore, 2003, Environmental Modelling with GIS and Remote Sensing,
2. Floyd F. Sabins Jr. 1987, Remote Sensing, Principles and interpretation. W.H. Freemanes & Co., New York, 2nd Edition.

3. Integration of GIS and Remote Sensing Victor Mesev–2008
4. James B. Campbell, Randolph H. Wynne, Introduction to Remote Sensing, Fifth Edition.
5. N. Peterson,2009, GIS Cartography: A Guide to Effective Map Design, Gretchen
6. Sam J. Purkis and Victor V. Klemas, 2011, Remote Sensing and Global Environmental Change.
7. Stan Marany, 1999, GIS Solutions in Natural Resource Management, Onward Press, USA.

8. Thomas Martin Lillesand, Ralph W. Kiefer and Jonathan W. Chipman, 2004,Remote Sensing and Image Interpretation, Remote Sensing and GIS in Ecosystem Management.

REMOTE SENSING, GIS, AND GPS-II DM18104CR

Course Outcome: This is a practical course aimed at imparting proactive training to the students. The students will be given basic understanding about the types and characteristics of spatial data. Learners would be exposed to various softwares (e.g., Erdas Imagine; ArcGIS) to handle, edit, integrate, and analyze geographic data for decision making. The students are also expected to be able to extract information from satellite data, map designing, and use 3D data for various applications. Moreover, practical training would be given to students for collection, transfer, and processing of GPS data in different application.

Credit-I

6. Introduction to Remote Sensing Softwares
7. Data- Formats and Exchange
8. Image Enhancement
9. Interpretation of Satellite Data, Classification - Supervised and Unsupervised
10. Accuracy Assessment.

Credit-II

6. Introduction to GIS Softwares
7. GIS Mapping- Vector Layer Creation (Point, Line, Polygon)
8. Attaching Attribute Data
9. Overlay Analysis (Multi-Criteria Analysis)
10. Map Designing

Credit-III

1. Working with 3D terrain data
2. Data Sources, Interpolating Point/Line Elevation Data
3. Digital Elevation Model (DEM) - Creation Methods
4. Terrain Analysis using DEM- Landform Analysis, Hypsometry, Derivation of Slope/Aspect
5. Watershed Delineation, Drainage Morphometric Analysis and Bathymetry

Credit-IV

1. Introduction to Global Positioning System (GPS) Survey

2. Handling and Operation of GPS

3. Data Collection using -Autonomous & Differential Mode

4. Post- Processing of GPS Data

Suggested Readings:

1. Andrew Skidmore, 2003, Environmental Modelling with GIS and Remote Sensing.

2. Floyd F. Sabins Jr. 1987, Remote Sensing, Principles and interpretation. W.H. Freemanes & Co.,

3. Victor Mesev, 2008, Integration of GIS and Remote Sensing

4. James B. Campbell, and Randolph H. Wynne, Introduction to Remote Sensing, Fifth Edition.

5. N. Peterson, 2009, GIS Cartography: A Guide to Effective Map Design, Gretchen New York, 2nd Edition.

6. Sam J. Purkis and Victor V. Klemas, 2011, Remote Sensing and Global Environmental Change.

7. Stan Marany, 1999, GIS Solutions in Natural Resource Management, Onward Press, USA.