

Objective:

The basic objective of this course is to teach GIS and remote sensing with specific applications in agriculture related statistics

Theory:**UNIT I**

Geographic phenomena: Geographic phenomenon defined, Different types of geographic phenomena, Geographic fields, Geographic objects, Boundaries; Computer representation of geographic information: Regular tessellations, Irregular tessellations, Vector representations, Topology and spatial relationships, scale and resolution, Representations of geographic fields, Representations of geographic objects

UNIT II

Hardware and software trends, Context of GIS usage, GIS software , Software architecture and functionality of a GIS , Spatial data capture and preparation, Spatial data storage and maintenance, Spatial querying and analysis, Spatial data presentation

UNIT III

GIS data, Data quality, Spatial referencing , Measures of location error on maps , Satellite-based positioning, Layer concept in GIS , Geospatial data , Raster and Vector data structure , Topological structures , Examples of topological models , Comparison of raster and vector data formats , Recommendations for choice of data format , Database and DBMS

UNIT IV

Manipulation functions, Analysis functions , Capabilities of raster GIS , Capabilities of vector GIS, Retrieval, classification, and measurement operations, Overlay operation , Neighbourhood operation, Network analysis, Distance and Connectivity operations , Functions for 3D analysis , Error sources in GIS, Issues related to data quality, Accuracy vs. Precision, Integration of Geoinformatics technologies , Data visualization

UNIT V

Concept of GPS, GPS Elements, GPS Satellite Navigation System, GPS Positioning Techniques, GPS applications , Fundamentals of Remote Sensing, Satellite and Sensors, Data Reception, Transmission and processing, Image Interpretation and Analysis, Remote Sensing Applications

Practical :

1. Digitization of a map with the help of a digitizer; Map editing;
2. Geo-referencing and map projections;
3. Creation of attribute database and linking with spatial data;
4. General analysis of the data with the help software;
5. Applications of digital elevation models using GIS;
6. Spatial interpolations using GIS;
7. Visual interpretations of remote sensing data;
8. Geometric corrections of remote sensing digital data;
9. Methods for improving quality of digital data and Techniques of image classifications.
10. Application of GIS

Reference books:

1. Rolf A. de by, Richard A. Knippers, Michael J.C.Weir. 2004 *Principles of Geographic Information System. ITC, Enschede, The Netherlands*
2. Annadurai, S. and Shanmugalakshmi, R. 2007. *Fundamentals of Digital Image Processing*. Pearson Education.
3. Burrough, P.A. 1986. *Principles of Geographic Information System for Land Resources Assessment*. Oxford University Press.
4. Curran, P.J. 1985. *Principles of Remote Sensing*. Longman Inc., New York.
5. Heywood, D. Ian, Murray, M. E. G. and Heywood, Ian. 2002. *An Introduction to Geographical Information Systems*. Prentice Hall.
6. Jensen, J.R. 1996. *Introductory Digital Image Processing*. Prentice Hall.
7. Lillesand, T.M. and Kiefer, R.W. 1987. *Remote Sensing and Image Interpretation*. John Wiley.
8. Peuquet, D. J. and Marble, D. F. 1990. *Introductory Readings in Geographic Information System*. Taylor and Francis, London.