K L UNIVERSITY

SPATIAL DATA ANALYSIS AND MODELLING   (09-OE401)

SYLLABUS

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3	0	0	3

UNIT – 1
Introduction of Remote sensing
Definition, History of Remote Sensing. Basic components of Remote sensing, Electromagnetic Remote sensing process, Passive and active remote sensing. Electromagnetic Spectrum, Spatial Resolution, Spectral Resolution and Radiometric Resolution, Characteristics of Various sensors and satellites: IRS, Fundamentals of Image Processing.
Fundamentals of GIS: Map – scale, projection and symbolism. GIS - Introduction, definition and terminology, categories, components, fundamental operations, functional elements. Data structures, data models, GIS data, acquisition, input, storage, output generation. Data preprocessing, database management, integrated analysis of spatial and attribute data.

UNIT – 2
Spatial Analysis: Introduction, Defining spatial objects - point, line and area objects based on their attributes, higher level point, line and area objects. **Measurement:** Measuring length of linear objects, measuring polygons, measuring shape, measuring distance. Classification – Principles, Neighborhood functions, Polygonal neighborhoods, Buffers.

UNIT – 3
Statistical Surfaces: Surface mapping, sampling the statistical surface, Digital Elevation Model (DEM). Interpolation- linear and non-linear, uses and problems. Terrain reclassification – steepness of slope, aspect, shape or form. Discrete surfaces - dot distribution maps, choropleth maps. **Spatial Arrangement:** Spatial Arrangement - Point patterns, Theissen Polygons, Area patterns, Linear patterns, Directionality of Linear and Areal objects, Connectivity of Linear objects, Routing and allocation.

UNIT – 4
Overlay Analysis: Cartographic overlay, point-in-polygon and line-in-polygon operations, Polygon overlay, Automating point-in-polygon and line-in-polygon procedures in Raster, Automating Polygon overlay in Raster, Automating vector overlay, types of overlay.

UNIT – 5
Data Modelling: The Role of Software Venders in Integrating GIS and Modeling, Cartographic Modeling, Scope of GIS and relationship to environmental modeling, data models and data quality. Hydrological Modeling - water quality modeling, watershed management and modeling, saltwater intrusion models. Land-surface-subsurface Process Modeling - pipeline alignment studies, solid and hazardous waste disposal site selection, zoning atlas for industrial siting, environmental information system development, risk and hazard modelling.

TEXT BOOKS:

1. Fundamentals of GIS by MICHAEL N DEMERS. Published By john Wiley & Sons Inc.
2. M.Anji Reddy , Text book of Remote sensing and GIS by, BSP Publications, Hyderabad, 2001.

REFERENCE BOOKS:

1. Environmental Modelling with GIS, Michael F. Goodchild, Bradley O. Parks, Louis T. Steyaert
2. M. Anji Reddy, Geoinfomatics for Environmental Management, BS Publications, 2004
3. Introduction to Geographic Information Systems By Kang-Tsung Chang   (TATA McGRAW-HILL EDITION).