

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

## Syllabi for Ph.D Credit Courses

### Spatial Information Technology

#### **Subject Code: 1415      PRINCIPLES OF GEOGRAPHIC INFORMATION SYSTEM**

##### **OBJECTIVE:**

To provide exposure to data models and data structure used in GIS and to introduce various Raster and Vector Analysis capabilities of GIS also expose the concept of quality and errors in GIS.

##### **UNIT I: BASICS**

Maps: Types – Characteristics – Coordinate systems – Map projections – Definition of GIS – Evolution – Components of GIS – Data : Spatial and Non-spatial – Spatial Data: Point, Line, Polygon/Area and Surface – Non-Spatial Data: Levels of measurement – Database Structures.

##### **UNIT II: DATA MODEL AND INPUT**

Raster Data Model – Grid – Tessellations – Geometry of Tessellations — Data Compression – Vector Data Model – Topology – Topological consistency – Vector data input– Raster Vs. Vector comparison – File Formats for Raster and Vector – Vector to Raster conversion- raster formats.

##### **UNIT III: DATA ANALYSIS AND OUTPUT**

Raster Data Analysis: Local, Neighborhood and Regional Operations – Map Algebra – Vector Data Analysis: Non-topological analysis, Topological Analysis, Point-in-Polygon, Line-in-polygon, Polygon-in-polygon – Network Analysis – buffering – ODBC – Map Compilation.

##### **UNIT IV: SPATIAL MODELING**

Modeling in GIS – types – Digital Elevation Models: Generation, Representation, Applications .

##### **UNIT V: DATA QUALITY AND MISCELLANEOUS TOPICS**

Data quality analysis – Sources of Error – Components of Data Quality – Meta Data – Open GIS consortium – Customisation in GIS.

##### **REFERENCES:**

1. Lo. C P and Yeung, Albert K W, “Concepts and Techniques of Geographic Information Systems”, Prentice Hall of India, 2002.
2. Robert Laurini and Derek Thompson, “Fundamentals of Spatial Information Systems”, Academic Press, 1996.
3. Peter A Burrough, Rachael A Mc.Donnell, “Principles of GIS”, Oxford University Press, 2000.
4. Allan Brimicombe, GIS Environmental Modeling and Engineering, Taylor & Francis, 2003.
5. Geographical Information System and Spatial data by Dr. Arun Sexena. Quantum Publishers
6. GIS a visual approach by Bruce K Davis, Onvword Press
7. An Introduction to Geoinformatics by GS Srivatsava, McGraw Hill Education Pvt Ltd.