CE820 Advanced Spatial Analysis Techniques

Course Description:

This is an elective course at the M Tech level.

The students should revise the basics of Remote Sensing and geo-informatics.

The course focuses primarily on the application of geo-informatics in various Civil Engineering applications.

Course objectives:

1. To learn the data needs and database development for doing Geospatial analysis in GIS environment.
2. To understand the concepts of topographical and surface algorithms and how they are incorporated into GIS.
3. To understand the concepts of networks, acrial and 3D algorithms and how they are incorporated into GIS.
4. To understand various applications of GIS in Geospatial modeling and learn from some case studies.

Introduction to Spatial Analysis: Fundamental Spatial Analysis Spatial Query, Spatial Join, Overlay Operations, Buffering, Neighborhood analysis.

Point Pattern Analysis: Geometric Measurements, Quadrat, Count Analysis, Kernel Density Analysis, Nearest Neighbor Analysis. **Line Data Analysis:** Line Density, Line, Direction, Line Orientation, lineament density, road density analysis. **Areal Analysis:** Spatial Autocorrelation, Joint Count.

Network Analysis: Network development and management, Network properties, shortest path algorithms, Transit network and paths, Routing, Service Area, Closest Facilities, O-D Cost Matrix.

Surface Analysis: Spatial Interpolation, Distance, Analysis, Density Analysis, Surface, Analysis Operations, slope, Aspect. 3-D Analysis: Draping, Extrusion, Line-of-Sight, Viewshed Analysis, Volumetric, Analysis.

Application of Spatial Techniques: Case Studies for various Civil Engineering Applications

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