Semester II

Paper 202: Spatial Analysis on Statistical Methods

Unit 1: Introduction to Spatial analysis and Statistical Methods 15 Lectures

1. Sources, types, discrete and continuous series, scales of measurements, measures of central tendency and dispersion**.** Normal, Binomial and Poison Probability & Residual mapping, Methods of Interpolation by Lagrange's and Newton's.
2. Multivariate regression and correlation. Principal Component Analysis (PCA), Correlation and spatial autocorrelation, Regression Analysis. Scatter Diagram
3. Mathematical operations: Image overlay, scalar image operations, image attribute transformation.
4. Distance operators: Distance analysis (spherical distance, cost distance), buffer analysis, direction variable cost distance, dispersion distance, least cost path analysis, spatial allocation and reallocation, Thiessen Polygon. Context operators: Surface analysis, filtering pattern analysis, grouping watershed, determination, hinterland determination.

Unit 2: Spatial analysis –Vector based and Raster based 15 Lectures

1. Overlay operations: Point-in-polygon, Linein-polygon, polygon-inpolygon. Single layer operations: Feature identification, extraction,classification manipulation.

2. Multilayer operation: Union, intersection, symmetrical difference, update,merge, append and dissolve

3. Map algebra, grid-based operations, local, focal, zonal and globalfunctions, cost surface analysis, optimal path and proximity search

Unit 3: Network, Point &Surface analysis 15 Lectures

1. Concepts, evaluation of network complexity using Alpha-gamma indices.C-matricesfor evaluating connectivity of the network.
2. Network data model. Path analysis.
3. Linear referencing and segmentation. Types of network analysis: Optimum cyclic path, vehicle routing, path determination and costpath analysis.
4. Spatial Sampling techniques- Interpolation methods: Trend surface analysis, IDW, kriging, measures of arrangement and dispersion, autocorrelation, semi-variogram, DEM, TIN, slope, aspect, hillshade and view shed

Unit 4: Spatial modeling 15 Lectures

1. Role of spatial model, explanative, predictive and normative models.
2. Correlation-regression analysis in model building.

3. Handling complex spatial query and case, Object oriented models: advantages and disadvantages.

References:

1. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information

Systems, Oxford University Press, New York

2. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGrawHill, New York

3. Demers, M. N. (2000): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi

4. Makrewski, J. (1999): GIS Multi-criteria Analysis, John Wiley and Sons, New York

5. Longley, P. A., Goodchild, M. F., Maguire, D. J. Rhind, D. W. (2002): Geographical Information Systemsand Science, John Wiley & Sons, Chichester

6. Lo, C. P. Yeung, A. W. (2002): Concepts Techniques of Geographical Information Systems, Prentice-Hallof India, New Delhi