M.A./M.Sc. Geography
Second Semester
Paper – VI (P) (42365 B)GIS

Unit – I

a) Classification of GIS analytical functions
b) Logic framework: Fuzzy sets vs. crisp sets: basic concepts and applications
c) Raster neighbourhood operators (resampling and convolution)
d) Raster neighbourhood operators (filtering)

Unit – II

Digital terrain analysis and map transformation
a) Digital terrain analysis: Basic operations on DEM
b) Drainage network extraction; slope partitioning
c) Map transformations: Ellipsoids and datum
d) Map transformations: Affine transformation, rubber sheeting, address matching

Unit – III

Spatial autocorrelation
a) Spatial autocorrelation: aspects of spatial autocorrelation;
b) Geary index; Moran coefficient
c) Joint count statistics for other types of features and attributes
d) Semivariogram

Unit – IV

Point pattern and spatial interpolation
a) Point pattern: Exploratory and descriptive methods, modelling approaches;
b) Thiessen polygon - nearest neighbour; triangulation; moving average; inverse distance weighting
c) Kriging
d) Spline; measures for evaluating spatial interpolation

Unit – V

Spatial indices and landscape measures and network analysis
a) Spatial centroids; shape analysis
b) Measures of landscape structures
c) Pathfinding (Shortest path analysis)
d) Neural network

Practical Exercises

Notes:

1. Number of practical classes: 50 hours duration
2. One computer per student must be used for practical training
3. Students are required to perform one experiment from each unit during examination
4. Students will work on either ILWIS or Arc View or TNT Lite

5. Students are required to create spatial database, analysis and visual presentations of each type of analysis

Exercises:

1. Point pattern analysis: 3 exercises
2. Spatial interpolation: 7 exercises
3. Spatial indices and landscape measures: 3 exercises
4. Network analysis: 2exercises

References:

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5. Chang, K.T., Introduction to Geographic Information Systems. McGraw Hill, New York, 2002
6. Chrisman, Nicholas R., Exploring Geographic Information Systems, John Wiley and Sons, New York (Second Edition), 2002
7. Clarke, Keith C., Analytical and Computer Cartography, John Wiley and Sons, New York City, 1990
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9. Dent, Borden D., Cartography: Thematic Map Design, 5th Edition, Wm. C. Brown Publishers, 1999
10. Environmental Systems Research Institute, Inc., Understanding GIS: The Arc/Info Method, Environmental Systems Research Institute, Inc., Redlands, 1992
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12. Fotheringham, A.S, C. Brunsdon, M. Charlton, Geographically Weighted Regression: the analysis of spatially varying relationships, John Wiley and Sons, New York, 2002
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14. Isaaks, Edward, H. and R. Mohan Srivastava, An Introduction to Applied Geo-statistics, Oxford University Press, New York, 1989
15. Lo, C.P. and A.K.W. Yeung, Concepts and Techniques of Geographic Information Systems, Prentice Hall, Upper Saddle River, New Jersey, 2002
16. Longley P.A., M.F. Goodchild, D.J. Maguire, D.W. Rhind, Geographic Information Systems and Science, John Wiley and Sons, New Jersey, 2005
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18. Monmonier, Mark S., Computer Assisted Cartography: Principles and Prospects, Prentice-Hall, Inc., Englewood Cliffs, NJ, 1982
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Software Manuals of ILWIS, Arc View, TNT MIPS etc