AMITY UNIVERSITY
UTTAR PRADESH

COURSE CURRICULUM

Course Title: Spatial Data Analysis & Modeling
Course Code:

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
2	1	-	-	3

Credit Units: 4

Course Level: PG

Course Objectives: The objective is to provide the student with the ability to analyze GIS data of all sorts, and to understand the uses and limitations of GIS data. Emphasis is placed on both theoretical aspects of GIS data analysis and geo-computation, as well as hands-on familiarity with basic GIS software applications.

Pre-requisites: Graduates from science or geography and should have understanding of GIS and Database

Student Learning Outcomes: On successful completion of this course, students will be able to:

- An understanding of the nature of spatial data and the principles of GIS
- Ability to define a problem in terms of its spatial analytical context
- Specify models and methodology for spatial analysis
- Demonstrate specific methods of spatial analysis including interpolation, overlay analysis, multivariate analysis such as principle components analysis and clustering, descriptive spatial statistics and spatial regression models

Course Contents/Syllabus:

	Weightage (%)
Module I GIS Analyses and Modeling	**10 %**
Descriptors/Topics **Analysis** Spatial Data: Definition, Analyses, Processes & Steps, Software and Tools for Performing Spatial Data Analyses **Spatial Modeling** Introduction, Raster-Based and Vector-Based GIS Modeling, Binary Models, Index Models, Regression Models,	

Process Models	
Module II Geodatabase Models **Descriptors/Topics** Basics of Geodatabase Model (Object-oriented Concepts), Role of Databases in GIS, Creating, Editing and Managing Geo-databases, Creating and Editing Linearly Referenced Features, Case Study of Geodatabase Model	**10 %**
Module III Spatial Data Analyses Techniques **Descriptors/Topics** Classification Scheme of Vector-Based and Raster-Based GIS Operations **Raster–Based Techniques** Methods of Reclassification, Overlay Analysis, Slope and Aspects, Buffering, Viewshed Analysis (Inter-Visibility Analysis), Cost-Distance Calculation **Vector-Based Techniques** Map Manipulation Techniques, Buffering, Overlay Analysis, Network Analysis Digital Terrain Analyses and Modeling**:**TIN and DEM, Surface Representation & Analysis	**20 %**
Module IV Geostatistical Analysis Techniques (Elementary Concepts) **Descriptors/Topics** Geostatistical Analysis: Introduction, Descriptive Statistics: Central Tendency, Dispersion , Spatial Autocorrelation: Geary's Index, Moran's Index , Quadrant Count and Nearest-Neighbour Analysis , Trend Surface Analysis, Gravity Models	**20 %**
Module V Geostatistical Analysis Techniques (Advanced Concepts) **Descriptors/Topics** Spatial Interpolation: Introduction, Control Points, Global Methods: Trend Surface Analysis, Regression Models, Local Methods: Thiessen Polygons, Density Estimation, Inverse Distance Weighted Interpolation, Kriging: Ordinary Kriging (Semivariance, Semivariogram), Universal Kriging, Other Kriging methods Comparison among the Local Methods	**20 %**
Module V I Spatial Modeling Model Conceptualization and Formulation, Network Analysis & Dynamic Segmentation , Watershed Analysis and Universal Soil Loss Equation (USLE), Cartographic Modeling: Descriptive and Prescriptive Cartographic Modeling , Error Propagation in Cartographic Modeling, Conflict Resolution	**20 %**

Pedagogy for Course Delivery: : The course is designed to be taught through the lecture and practical mode. However, during tutorial sessions group discussions and seminar presentations on various themes related to the course may be organized. Class room and case study interaction will definitely have to be an integral part of the learning experience.

Lab/ Practicals details: NA

List of Experiments:

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
30 %		70 %

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**Class Test**	**Home Assignment**	**Presentation**	**Attendance**	
Weightage (%)	10	05	10	05	70

Lab/ Practical/ Studio Assessment: NA

	Continuous Assessment/Internal Assessment			End Term Examination			
Components (Drop down							
Weightage (%)							

TEXT BOOKS

1) Burrough, Peter A. and Rachael McDonnell.,(1998), Principles of Geographical Information Systems. Oxford University Press, New York
2) Laurini, Robert and Derek Thompson. ,(1992), Fundamentals of Spatial Information Systems. Academic Pr., London
3) Kluwer Fotheringham A S, O'Kelly M E., (1998), Spatial Interaction Models: Formulations and Applications.

REFERENCE BOOKS

1) Paul Longley, Michael Goodchild, David Maguire and David Rhind:, (Editors) (2005), Geographical Information Systems. Principles, Techniques, Applications and Management. John Wiley & Sons,.