AMITY UNIVERSITY

UTTAR PRADESH

COURSE CURRICULUM

L	T	P/ S	SW/F W	TOTAL CREDIT UNITS
2	1	2	-	5

Course Title: Geographic Information System

Course Code:

Credit Units: 5

Course Level : PG

Course Objectives: To provide exposure to spatial data; data models and data structure used in GIS. Details of various Raster and Vector Analysis capabilities of GIS and introduction to GIS data integration and project management

Pre-requisites: Student should have basic of geography and computers.

Student Learning Outcomes:

- Have a basic understanding of concepts, components, structures, and functionalities of GISs
- Be able to use common GIS techniques to collect, analyze, process, and present spatial or geographic data.
- Formulate and carry out independent research in the general field of remote sensing possibly as part of a multi-disciplinary research and development project.

Course Contents/Syllabus:

	Weightage (%)
Module I	**20**
Descriptors/Topics • Definition, Philosophy & Historical evolution of GIS • Difference between GIS and CAD	

• Basic concepts about spatial information, Spatial vs. non-spatial data • Components of GIS, Hardware/software requirements for GIS	
Module II	**20**
Descriptors/Topics • Spatial data models – Raster and Vector • Sources of spatial data (raster and vector) • Raster Data & its Representation: Data Structure, Data Compression (block code, chain code, run length code, quadtree) Data Files, Data Conversions • Vector data representation: Data Structure, Data Files, Data Conversions • Comparison between Raster & Vector Data	
Module III	**20**
Descriptors/Topics • Data acquisition through scanners and digitizers, methods of digitization (manual Vs. automated) • Topology and topological models • Topological & Non-topological Vector Data, Map scale, Spatial Resolution, Spatial Data Accuracy and sources of errors. • Difference between Accuracy and Precision • Geometric transformations of raster and vector data (affine transformation and geometric transformation coefficients) • Vector data editing: Topological editing (correcting topological errors, edge matching) Non-topological editing (delete, move, reshape, split & merge)	
Module lV	**20**
Descriptors/Topics • Advantage of DBMS in context of GIS, hierarchical, network and relational models • RDBMS: components and concepts • Database design & normalization • Linkage between spatial and non-spatial data • Integration of RS & GIS • GIS for natural resources monitoring & management, Health GIS • Current issues and trends in GIS :AM/FM, Virtual 3D GIS, Internet GIS, Open GIS	

Module V	**20**
Descriptors/Topics • Raster data analysis tools – local, focal, zonal and global • Vector data analysis –measuring compactness of the distribution, identifying patterns , analyzing geographic relationship, overlay analysis, distance measurements, measuring and mapping change, Buffering, interpolation (DEM generation) • Difference between 2D,2.5D , 3D and 4D GIS • Vector data query: Logical expressions ,Types of operations , Relational database query • Raster data query, Query by cell value, Query using graphical methods • Geographic visualization & Map comparison	

Pedagogy for Course Delivery: The course is designed to be taught through the lecture mode and laboratory exercises. However seminar presentations on various themes related to the course and discussion on various case studies. Class room interaction will definitely have to be an integral part of the learning experience.

Lab/ Practicals details, if applicable:

List of Experiments:

- Georeferencing of Spatial data (Vector & Raster).
- Topology creation and correcting topological errors & Non-topological editing.
- Non-spatial database creation and normalization & Linking spatial with non-spatial data.
- Spatial and Attribute query.
- Vector analysis I (Clipping, Intersection and Union, Dissolving and Merging).
- Vector analysis II (density map generation, Buffering techniques).
- Raster analysis I (reclassification, overlay).
- Raster analysis II (DEM generation, slope & aspect).
- Layout generation (designing a map, cartographic elements, thematic mapping).
- Alternative forms of output (3D views).

Assessment/ Examination Scheme:

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

Theory Assessment (L&T):

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

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment			End Term Examination			
Components (Drop down	**Class Test (Practical Based)**	**Mid Term Viva**	**Attendance**	**Major Lab Exercises**	**Minor**	**Practical Record**	**Viva**
Weightage (%)	15	10	05	35	15	10	10

Text & References:

- Kang-tsung Chang, (2007),'Introduction to Geographic Information Systems' Tata McGraw Hill, New Delhi.
- C.P.Lo and Albert K.W.Yeung (2006) "Concepts and Techniques of Geographic Information Systems" Prentice Hall of India, New Delhi.
- Burrough, Peter A. and Rachael McDonnell, (1998), ' Principles of Geographical Information Systems' Oxford University Press, New York.
- Magwire, D. J., Goodchild, M.F. and Rhind, D. M. (2005),'Geographical Information Systems: Principles and Applications', Longman Group, U.K.

Research Journals

- International Journal of Goeinformatics
- International Journal of Remote Sensing
- IEEE Geoscience and Remote Sensing
- Applied Earth Observation and Geoinformation