AMITY UNIVERSITY
UTTAR PRADESH

COURSE CURRICULUM

Course Title: GIS & Remote Sensing in Water Resources Management
Course Code:
Credit Units: 4
Course Level: PG

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
2	1	1	-	4

Course Objectives:

To understand the concept of water and land resources and their analysis using remote sensing and GIS techniques. Utility of RS/GIS software and various modeling tools in integrated water resources management. This course introduces the basics of hydrology and various remote sensing and GIS applications in the field of hydrology and water resources assessment and management.

Pre-requisites: Student should have the basic of geological science and remote sensing. .

Student Learning Outcomes:

- Analyses of remote sensing data and finding the problems encountered in professional practice and develop appropriate methods for studying and/or solving the problems.
- Development of appropriate methods for geospatial framework for data collection and processing.
- Use of remote sensing and earth observation technology to generate, integrate, analyse and visualize spatial 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 **Descriptors/Topics** Basic concepts of water resources: Importance and Hydrological cycle. Issues in water resources development, management and utilization. Overview of GIS and Remote Sensing in Water Resource assessment and management. Spectral characteristics of water and parameters for hydrological mapping.	**20**
Module II **Descriptors/Topics** Remote sensing in Ground water exploration and factors affecting ground water occurrence. Aquifer Characterization and mapping using Remote Sensing and GIS Techniques. Significance of geological mapping of rocks & structure and their hydrological properties in groundwater exploration. Hydrogeomorphological Evaluation and groundwater management: Role of Remote Sensing	**20**
Module III **Descriptors/Topics** Remote Sensing in evaluating hydrogeological features. Ground water potential modeling in hard rock terrain. Water harvesting structures and optimum site selection for rain water harvesting. Role of Remote Sensing and GIS in selection of artificial groundwater recharge Structures. Significance of geological mapping of rocks and structures and their hydrological properties in groundwater exploration.	**20**

Module IV **Descriptors/Topics** Watershed management- introduction, philosophy and concept Role of Remote Sensing in watershed conservation, planning and management Watershed characterisation and mapping Runoff estimates from watersheds GIS database for watershed management	**20**
Module V **Descriptors/Topics** Snow – Snow in visible spectrum, middle infrared and microwave regions, Snow Mapping Flood and flood plain mapping and zoning Water quality monitoring and Hydrogeological modeling using RS and GIS Groundwater resources estimation and production	**20**

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:

- Delineation of river catchments on satellite image- topographical sheets and Watershed delineation.
- Evaluation of various drainage morphometric parameters for watershed characterization.
- Hydrogeomorphological mapping for ground water exploration
- Flood inundation mapping in alluvial plain areas using satellite images
- Locating surface water harvesting structures like check dams, desiltation tanks, and nala bunds etc. using satellite image
- Creation of flow direction, flow length, flow accumulation in a watershed based on contours using GIS software.
- Rainfall run-off modeling using GIS approach.
- Groundwater potential mapping using GIS softwares.

Assessment/ Examination Scheme:

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

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)					
Weightage (%)	10	05	10	05	70

Lab/ Practical/ Studio Assessment:

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

Text & References:

- Watershed Management, J.V.S. Murthy - Publishers; New Age International (P) Ltd., New Delhi.
- Space Technology Applications for Sustainable Developments at Watersheds, Technical Report, ISRO-HQ-TR-104-95, ISRO, Bangalore.
- Frederic k. lutgens, kennth G.pinzke and Edward J. tarbuck (2008) Applications and Investigation in Earth science.
- Skidmore, A. (2002) Environmental modeling with GIS and Remote Sensing.
- Baretl, E.C. and Culis I.F., (2004), Introduction to Environmental Remote Sensing.
- Lintz, J. and Simonent, D.S. ,(1976), Remote Sensing of environment.

Research Journals

- International Journal of Goeinformatics
- International Journal of Remote Sensing
- Environmental Earth Science
- Hydrogeology Journal
- Hydrological Science Journal
- Journal of Earth System Science
- Current Science
- Journal of Indian Society of Remote Sensing
- Remote Sensing of Environment
- IEEE Geoscience and Remote Sensing
- Applied Earth Observation and Geoinformation