COURSE CURRICULUM

Course Title: Geoinformatics in Environmental Science & 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 teach the students about various techniques of remote sensing and GIS to monitoring of Environmental problems and their management.

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

Student Learning Outcomes: The objective of the course is to impart knowledge about the various Earth and Environmental issues and role of remote sensing and GIS techniques for their monitoring. .The students will be exposed to various Remote Sensing Applications to Environmental Sciences. This course will provide a sound knowledge of application of remote sensing, GIS, GPS and other tools for understanding the changes in environment, monitoring the pollution affected areas and would be able to prepare suitable action plans for its sustainable development.

Course Contents/Syllabus:

	Weightage (%)
Module I Introduction and Land Degradation Monitoring	
Descriptors/Topics Introduction of major environmental issues and Earth Resources and Environmental satellites and sensors, Geostationary environmental satellites and characteristics. Land Use Land Cover Mapping, Wetland Mapping, Wasteland Mapping, Land / Soil Degradation Mapping, Desertification Mapping, Soil Conservation Measures, Soil Erosion Modeling, Land capability Maps, land/ soil irrigability Maps. Soils and land forms - soil erosion- salinity- flood damage-soil degradation mapping using Remote Sensing and GIS.	20

Module II Water Pollution Monitoring	**20**
Descriptors/Topics Mapping and inventorying of surface water bodies, water quality index mapping, point source pollution mapping, non-point source pollution modeling, 3D modeling of dams and reservoirs for estimation of damage to natural resources, oil slicks tracing and monitoring, sedimentation mapping, ground water contamination studies, GIS-Based Subsurface Flow Modeling, Groundwater-pollution hazard assessment and protection planning, evaluation of groundwater vulnerability using GIS techniques; groundwater quality index mapping. RS and GIS technologies for sustainable groundwater management.	
Module III Atmospheric Pollution Applications	**20**
Descriptors/Topics Sensors for environmental monitoring sensors, absorption spectrometers, Air pollution and global climatology, R.S. technique for Air quality monitoring- case studies- weather forecasting and climatology.Measurement of atmospheric temperature- composition- constituent distribution and concentration - Hurricane tracking – meteorological satellite systems. oil slicks tracing and monitoring, sea turbidity and coastal erosion mapping, coastal habitat degradation mapping,	
Module IV Urban Environmental Issues and Sustainability	**20**
Descriptors/Topics Urban environment, - Impact of industrial pollution- chemical effluents, land reclamation- disposal of solid waste-mining pollution. Ecology and ecosystem, Conservation and resource management – spectral reflectance from vegetated surface- Stress monitoring- forest conservation- wild life studies- GIS for monitoring non point source pollution. Concept of sustainability, Integrated Mission for Sustainable Development, Watershed characterization, Acton Plans for Sustainable development, watershed prioritization, developmental impact assessment. Land Resources Information System, Action plans for Sustainable Agriculture.	
Module V Forest Degradation and Monitoring	**20**

Descriptors/Topics	
Mapping and inventorying of forest resources, Forest biomass estimation, carbon sequestration, mapping and monitoring of afforestation,forest depletion and degradation, forest fire mapping and monitoring, forest fire risk zonation, habitat studies, Biodiversity conservation planning. Forest Information System and Management conservation Plans using GIS. Environmental Impact assessment of mining and Industrial activities	

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:

- Land degradation mapping from satellite images.
- Agricultural change detection and damage assessment using satellite data.
- Assessment and monitoring of point and no-point pollution sources from satellite images.
- Groundwater pollution mapping using GIS
- Forest degradation mapping using remote sensing.
- Urban Environmental Pollution mapping using satellite Images.

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:

Components (Drop down	Continuous Assessment/Internal Assessment			End Term Examination			
	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:

- Baretl, E.C. and Culis I.F., (2004), Introduction to Environmental Remote Sensing, Second edition, Chapman and Hall, New York.
- Lintz, J. and Simonent, D.S. ,(1976), Remote Sensing of environment Addision Wesley, Rading mars
- Introduction to Environmental Remote Sensing by Barrett E.C., Curtis, I.F., Chapman and Hall, New York, 1982
- Remote Sensing principles and Interpretations- Sabins, F.F., (Ed) W.H. Freeman and Co., New York, 1986
- Remote sensing and Image interpretation - Thomas M. Lillesand and Ralph W. Kiefer, John Wiley and Sons Inc., New York, 1994.

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