

<b>Course title:</b> Geoinformatics for Resource Management				
<b>Course code:</b> NRE 175	<b>No. of credits:</b> 4	<b>L-T-P:</b> 30-07-46	<b>Learning hours:</b> 60	
<b>Pre-requisite course code and title (if any):</b> A good knowledge of principles of geoinformatics is expected from each of the student attending this course work. Interests in spatial data and applications will help. Fundamentals of computers and different packages are expected for the practical component of the course work.				
<b>Department:</b> Natural and Applied Sciences				
<b>Course coordinator(s):</b>		<b>Course instructor(s):</b>		
<b>Contact details:</b>				
<b>Course type:</b> Elective		<b>Course offered in:</b> Semester 3		
<b>Course description</b> The course is conceptualized to provide competency in remote sensing (RS), geographic information systems (GIS), global positioning system (GPS), and related technologies. The course is designed as an elective to take up research work (at M.Sc./M.Phil/Ph.d. level) in the sub- fields of environmental studies, resource management and climate change studies. This elective course will be offered to students of M.Sc. (Environmental Studies and Resource Management and Climate Science & Policy) and pre-Ph.D. Students from other programs are also encouraged to attend this. This course is extension of the Principles of Geoinformatics. It is to develop skills of the students in field of RS/GIS/GPS. The course is not limited to the topics given below. The students are suggested to read different books, magazines and peer reviewed journals.				
<b>Course objectives</b>				
<ul style="list-style-type: none"> <li>▪ Understanding digital image processing</li> <li>▪ Understand the characteristics of spatial databases (raster and vector)</li> <li>▪ Understand unlined principles of spatial data analysis</li> </ul>				
<b>Course content</b>				
<b>Module</b>	<b>Topic</b>	<b>L</b>	<b>T</b>	<b>P</b>
1.	<b>Geoinformatics for NRM</b> (Vegetation, water, urban landscape, soils, mineral, geomorphology)	4	0	4
2.	<b>Digital Image Processing</b> (Rectification, enhancements, classification–unsupervised, supervised, hybrid, accuracy assessment)	8	0	14
3.	<b>Geographical Information System</b> (Introduction, Data and Data Entry, Data Structure, Data Compression, Spatial Analysis, Spatial Modeling, Terrain Modeling)	8	3	14
4.	<b>Applications of Remote Sensing (Case Studies)</b> National Initiatives (NNRMS/NRDMS, ISRO-DOS), Forest Cover/ Type Mapping, Degradation, Biomass estimation, Habitat Analysis, Biodiversity Characterization, Environmental Monitoring, Geo-hazard Assessment, Urban Sprawl, Solid Waste Management, Water Resources (flow direction & accumulation), Runoff and Soil Erosion Modeling, Sea Surface Temperature, Earth Observation Programme)	10	4	14
	<b>Total</b>	<b>30</b>	<b>7</b>	<b>46</b>
<b>Evaluation criteria</b>				
<ul style="list-style-type: none"> <li>▪ Test 1: 10%</li> <li>▪ Test 2: 10%</li> <li>▪ Practical: 40%</li> <li>▪ Test 3: 40%</li> </ul>				
<b>Learning outcomes:</b> At the end of the course, students will have:				
<ol style="list-style-type: none"> <li>1. Theoretical and practical experience of digital image processing</li> <li>2. Knowledge to analyze spatial data</li> </ol>				

3. Gained practical skill to apply basic remote sensing and GIS skills for natural resource management

**Pedagogical approach:** The course will be delivered through class lectures, lab exercise and tutorials

**Materials**

**Required text**

1. Burrough, P.A. and McDonnell, R.A. (1998) *Principles of geographical information systems*. Oxford University Press, Oxford, 327 pp.
2. Campbell, J.B. (2002) *Introduction to remote sensing, 3rd ed., The Guilford Press. ISBN 1-57230-640-8.*

**Suggested readings**

1. Heywood I., Cornelius S. and Carver S. (2006) *An Introduction to Geographical Information Systems*, Prentice Hall, 3rd edition.
2. Jensen J.R. (2000) *Remote Sensing of the Environment: An Earth Resource Perspective*, Prentice Hall, ISBN 0-13-489733-1.
3. **Joseph G. (2003) *Fundamentals of Remote Sensing***, Universities Press, Hyderabad.
4. Lillesand T.M., Kiefer R.W. and Chipman J.W. (2003) *Remote Sensing and Image Interpretation, 5th ed., Wiley. ISBN 0-471-15227-7.*
5. Longley P.A., Goodchild M.F., Maguire D.J. and Rhind D.W. (2005) *Geographic Information Systems and Science*, Chichester: Wiley, 2nd edition.
6. Malczewski J. (1999) *GIS and Multicriteria Decision Analysis*, New York, John Wiley and Sons.

**Case studies**

**Websites**

**Journals**

1. Advances in Water Resources
2. Agricultural and Forest Meteorology
3. Asian Journal of Geoinformatics
4. Ecological Modelling
5. Geocarto International
6. International Journal of Geoinformatics
7. International Journal of Remote Sensing
8. ISPRS Journal of Photogrammetry and Remote Sensing
9. Journal of Indian Society of Remote Sensing
10. Remote Sensing of Environment

**Additional information (if any)**

**Magazines**

1. Coordinates
2. GIM International
3. GIS World
4. GIS@development
5. Goespatial today
6. GPS World

**Student responsibilities**

The students are expected to submit assignments in time and come prepared with readings when provided.

## **Course Reviewers**

The course is reviewed by the following experts.

1. Prof. P.S. Roy, Deputy Director (RS & GIS-AA), National Remote Sensing Agency, Balanagar, Hyderabad.
2. Prof. P.K. Garg, Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee.
3. Dr. Milap Punia, Associate Professor, Room Number 317, CSRD, Jawaharlal Nehru University, New Delhi.