

## **ST210: PRINCIPLES AND APPLICATIONS OF GIS AND REMOTE SENSING**

(3:1), Dr. T V Ramachandra

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Relevance of the Course: Remote sensing, geographic information system (GIS) and global positioning system (GPS) provides extremely useful tools for environmental and natural resources management. They are widely recognized as supporting tools for the planning, monitoring, and management of the appropriate utilization of resources at the country, regional and global levels. This course provides an overview of the key concepts and principles of remote sensing, GIS and digital image processing. Various tools, which can be used to address environmental problems and the role that the professionals can play in managing environment in their respective areas would be discussed.

### **Course Contents:**

**Principles of Remote Sensing:** Physical aspects of remote sensing, spectral characteristics of earth's surface and of atmosphere. Sensors and their characteristics: multi-spectral scanners Aerial and satellite platforms. Visual and machine interpretation of imagery. Ground truth data. Digital image processing and image classification. Concept of environment, economic benefits of remote sensing, the geographical uses of remote sensing, sensors for environmental monitoring.

**Geographical information systems:** Introduction, historical development, from the real world to GIS, basic data models, Geo-references and co-ordinate systems, basic spatial analysis and modeling, GIS implementation and project management, GIS issues and prospects, open source GIS – concepts, Integrating GIS for environmental modeling. Data models and data quality -Problems and prospects.

**Application of GIS and Remote Sensing:** Remote sensing and GIS integration, Applications to resources inventorying, monitoring and management. Water in environment, Soil and landforms, Ecology, conservation and resource management, Landuse/landcover dynamics, Urban sprawl analysis, Hazards and disasters, Coastal zone management.

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**Laboratory sessions:** Installing open source GIS software, GIS- digitization of vector layers, creation of thematic layers, collection of field data using GPS, remote sensing data analysis – case study.

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### **References**

1. T.M. Lillesand and R.W. Kiefer, **Remote Sensing and Image Interpretation** John Wiley & Sons, Inc., New York
2. James B. Cambell, **Introduction to Remote Sensing**, Taylor & Francis
3. John R Jensen **Introductory Digital Image Processing: A Remote Sensing Perspective**, Prentice Hall, New Jersey
4. Sabins, F. F., Jr. / **Remote sensing Principles and Interpretation**, 2<sup>nd</sup> Edition, New York,
5. P.A. Burrough, **Principles of Geographical Information System for Land Resource Assessment**, Oxford University Press
6. P.A. Longley, M.F. Goodchild, D.J. Manguire, D.W. Rhino, **Geographical Information System, Volume I: Principal and Technical Issues, Volume II: Management Issues and Applications**, John Wiley & Sons