**Course Objective:**  
To present an introduction to technological and scientific aspects of remote sensing (RS) of the Earth and its atmosphere

1. **Introduction(7 hours)**
   1. General concepts of remote sensing
   2. History and basics of remote sensing of the Earth and its atmosphere
   3. Classifications

1. **Physical Principles of Remote Sensing(10 hours)**
   1. Basic quantities
   2. Electromagnetic principles
   3. Emission/radiation theory
   4. Radar backscattering theory

1. **Remote Sensing Technology(12 hours)**
   1. Passive remote sensing
      1. Visible and infrared techniques
      2. Microwave radiometry
   2. Active remote sensing
      1. Radar remote sensing
      2. Lider remote sensing
   3. Basics of satellite remote sensing, and ground truths

1. **Applications(10 hours)**
   1. Earth and its atmosphere
      1. Precipitation, winds, clouds and aerosols, temperature and trace gases
      2. Vegetation, forestry, ecology
      3. Urban and land use
      4. Water planet: meteorological, oceanographic and hydrologic RS
      5. Geological: Landforms, structure, topography, mine and resource exploration
      6. Geographic information system (GIS): GIS approach to decision making
   2. Remote sensing into the 21st century: Outlook for the future RS

1. **Remote Sensing Data(6 hours)**
   1. Processing and classification of remote sensing data
   2. Data formats
   3. Retrieval algorithms
   4. Analysis and image interpretations

**Practical:**

1. Familiarization to remote sensing data available from department’s capacity (via web and/or possible collaborations with national/international remote sensing agencies/institutions)
2. Data visualization/graphics
3. Data processing and pattern recognition
4. Computer simulations
5. Technical Writing

**References:**

1. Campbell, J.B., Introduction to Remote Sensing, 2nd Ed., 1996, The Guilford Press
2. Drury, S.A., Image Interpretation in Geology, 2nd Ed., 1993, Chapman & Hall, 243 pp.
3. Drury, S.A., Images of the Earth: A Guide to Remote Sensing, 2nd Ed., 2nd Ed., 1998, Oxford University Press, 212 pp.
4. Kuehn, F. (Editor), Introductory Remote Sensing Principles and Concepts, 2000, Routledge, 215 pp.
5. Lillesand, T.M. and Kiefer, R.W., Remote Sensing and Image Interpretation, 4th Ed., 2000, J. Wiley & Sons, 720 pp.
6. Sabins, Jr., F.F., Remote Sensing: Principles and Interpretation. 3rd Ed., 1996, W.H. Freeman & Co., 496 pp.
7. Siegal, B.S. and Gillespie, A.R., Remote Sensing in Geology, 1980, J. Wiley & Sons (especially Chapters 1 through 11)
8. Swain, P.H. and Davis, S.M., Remote Sensing - the Quantitative Approach, 1978, McGraw-Hill Book Co.
9. Chen, H.S., Space Remote Sensing Systems: An Introduction, 1985, Academic Press, Orlando
10. Jensen J. R., Remote sensing of the environment: An Earth resource perspective” Academic Press, Orlando
11. Ulaby, F. T., R. K. Moore, and A. K. Fung, Microwave Remote Sensing: Active and Passive, 1981, Artech House, Norwood, MA.
12. Periodicals devoted largely to remote sensing methods and applications:
13. IEEE Transactions on Geoscience and Remote Sensing.
14. IEEE Geoscience and Remote Sensing Letters
15. International Journal of Remote Sensing.
16. Photogrammetric Engineering and Remote Sensing.
17. Remote Sensing of the Environment
18. Canadian Journal of Remote Sensing
19. Journal of Remote Sensing Society of Japan

**Evaluation Scheme**  
The questions will cover all the chapters of the syllabus. The evaluation scheme will be as indicated in the table below.

|  |  |  |
| --- | --- | --- |
| **Chapters** | **Hours** | **Marks Distribution\*** |
| 1 | 7 | 10 |
| 2 | 10 | 20 |
| 3 | 12 | 20 |
| 4 | 10 | 20 |
| 5 | 6 | 10 |
| **Total** | **45** | **80** |

\*There could be a minor deviation in the Mark Distribution.