About the course

This foundational course familiarizes learners with the fundamental ideas and technology of remote sensing, emphasizing the interaction of electromagnetic radiation with the Earth's surface and atmosphere to yield important data. Students will comprehend sensor kinds, platforms, resolutions, and their practical applications across diverse industries, such as agriculture, disaster management, urban planning, and environmental monitoring. The course establishes a robust conceptual foundation for students, researchers, and professionals seeking to engage in geospatial disciplines or utilize satellite data for informed decision-making.

Learning Objectives

- Learn about remote sensing from energy emission to data analysis.
- Study remote sensing's electromagnetic radiation (EMR).
- Investigate EMR, atmosphere, and Earth's surface interactions.
- Separate active, passive, and spaceborne, airborne, and ground-borne sensors.
- Learn the four sensor resolutions: spatial, spectral, temporal, radiometric.
- Find remote sensing applications in several fields.
- Recognize remote sensing's monitoring and analysis benefits.

Target Audience:

- Students and researchers in **geography, earth sciences, agriculture, forestry, geology, and environmental studies.**
- Professionals in **urban planning, disaster management, and infrastructure development.**
- Government agencies and NGOs working in **resource management or climate monitoring**
- Beginners aiming to start careers in **remote sensing, GIS, or geospatial technologies**
- Engineers and analysts using spatial data for **monitoring or modeling projects**

Course Duration: 8-10 hours

Course Title - Fundamentals of Remote Sensing

Module 1: Introduction to Remote Sensing

- Definition and Basic Concepts
- Importance and Applications
- Elements of Remote Sensing:
    - Energy Source
    - Atmosphere
    - Earth's Surface Interaction
    - Sensor Recording
    - Data Transmission & Processing

Module 2: Electromagnetic Radiation & Spectrum

- Nature and Properties of EMR
- Sources of EMR (Sun, Active Sensors)
- Wavelength, Frequency, and Energy Concepts
- Electromagnetic Spectrum:
    - UV, Visible, Infrared, Microwave, and Radio Waves
- Practical Importance of Each Region in Remote Sensing

Module 3: Interaction of Radiation with Atmosphere & Earth's Surface

- Interaction with the Atmosphere:
    - Absorption, Scattering, Transmission
- Interaction with Earth’s Surface:
    - Reflectance, Absorption, and Transmission
    - Spectral Reflectance Curves
    - Specific Interactions with Soil, Vegetation, and Water

Module 4: Platforms, Sensors, and Resolutions

- Types of Sensors: (Slide no - 6 will take position slide no -16)
    - Passive vs. Active
- Platforms:
    - Ground-borne, Airborne, Spaceborne
- Sensor Resolutions:
    - Spatial, Spectral, Temporal, and Radiometric

Module 5: Applications & Advantages of Remote Sensing

- Environmental Monitoring
- Agriculture & Forestry
- Urban Planning & Infrastructure
- Disaster Management
- Geological & Hydrological Studies
- Benefits:
    - Wide-Area Coverage
    - Accessibility

High Efficiency and Repeatability