



Training Program:
Introduction to Remote Sensing

INTRODUCTION:

This course introduces students to the basics of remote sensing, characteristics of remote sensors, and remote sensing applications in academic disciplines and professional industries. Emphasis is placed on image acquisition and data collection in the electromagnetic spectrum and data set manipulations. This course is designed for geographic information systems (GIS) Specialist interested in imagery analysis.

COURSE GOALS:

Upon completion of the course, students will be able to....

- Define and describe remote sensing and explain its applications and history.
- Define and describe basics of electromagnetic spectrum and interactions with various types of media.
- Describe sensors and image acquisition methods.
- Analyze and explain remote sensing purposes, advantages, and limitations.
- Describe basic characteristics of remote sensing imagery.
- Describe industry-specific image sources.

COURSE OUTLINE

- Remote Sensing Defined B. Applications of Remote Sensing C. Basic Processes I. A brief history of remote sensing for earth observation
- History of photography B. Digital images C. Evolution of platforms D. Sensor Characteristics
- Remote Sensing Basics
- Remote Sensing Data Collection B. Remote Sensing Process C. Earth Observations D. Electromagnetic Radiation E. Atmospheric Energy-Matter Interactions

III. Frame Captured Sensors and Line Scanners

Frame Capture 1. Photographic Cameras 2. Digital Cameras 3. Videography A. Scanners 1. Across-track Scanners 2. Along-track Scanners 3. Hyperspectral Scanners B.

- Satellite-based Sensors in Visible and Infrared Wavelengths
- Low-spatial Resolution Sensors B. Medium-spatial Resolution Sensors C. High-spatial Resolution Sensors
- Active Sensors: Radar and Lidar
- Active Microwave (RADAR) Remote Sensing B. Radar Interferometry C. Passive Microwave Radiometers Lidar 1. Lidar Principles 2. Lidar-derived Vegetation Information 3. Lidar-derived Urban Information D.
- Sonar
- Side-scan sonar B. Multibeam sonar C. Global Seafloor Topography

VII. Aerial Imagery – Visual Interpretation

- Nature of Aerial Images Ground Verification and Processing 1. Control Points 2. Ground Truthing B.

VIII. GIS Integration

- Raster to Vector B. Image Formats
- Remote Sensing Applications
- Agriculture B. Forestry C. Geology D. Oceanography E. Archaeology F. Military G. Urban Infrastructure

Discussion

- There will be weekly discussion sessions that will serve as question and answer periods and for technical assistance. Each discussion session will be a virtual office hour hosted by the professor, and will allow students the opportunity to earn credit for

participating, assisting other students, and showing progress in both reading assignments and laboratory exercises.

Assessment

- Imagery analysis and image data processing assignments. II. Written responses on tests, quizzes, essay questions and assignments. III. Participation in class discussions, online chats, and group projects. IV. A culminating project presented in class. V. Class participation.