

# HYPERSPECTRAL REMOTE SENSING AND ITS APPLICATIONS

CE830

## Course Objectives:

- To understand the concept of hyperspectral remote sensing.
- To learn the image processing of hyperspectral remote sensing dataset.
- To understand the applications of hyperspectral imagery in various applications.

## Course Content:

Introduction: Scanner types and characterization – specifications of various sensors – spectrographic imagers – hyperspectral sensors – Data formats and systems, AVIRIS, CASI, NASA Terra Moderate Resolution Imaging Spectrometer (MODIS), Hyperion

Data redundancy – Problem with dimensionality, Principal Component – Minimum Noise Fraction (MNF), Atmospheric correction – Atmospheric correction measures – Continuum Removal – Spectral Feature Fitting.

Data dimensionality – representation systems - hypercube – red edge – indices - Hughes phenomenon - Multivariate analysis for data reduction - data calibration, normalization – spectral library – response functions – Kalman filters

Spectral library – Library matching – spectral angle mapper – spectral mixture analysis – end member extraction Spectral un-mixing – PCF, PCA spectral transformation – band detection – reduction and selection processes

Application to lithology – mineral exploration – agricultural crop systems – stress detection – plant production – characteristics – degradation status – forest canopy characters

## References:

- Chen I Chang, "Hyperspectral Imaging: Techniques for Spectral Detection and Classification", Kluwer Academic/Plenum Publishers, New York, N.Y., 2003. (ISBN: 0-306-47483-2)
- Marcus Borengasser and William C., Hungate and Russel Watkins Hyper spectral Remote sensing: principles and application" CRC, 2008, ISBN 13: 9781566706544
- Chen I Chang, "Hyperspectral Data Exploitation: Theory and Applications, Wiley Inter Science, 2006 (ISBN: 0-780470124628 )
- Chen I chang, "Recent advances in hyper spectral signal and image processing", Transworld network, 2006 (ISBN: 81-7895-218-1)

## Course Outcomes:

- On the completion of this course, the student should be able to
- Understand the principles and properties of hyperspectral remote sensing
  - Process hyperspectral imagery and extract information
  - Acquire skills in analyzing hyperspectral remote sensing data for its various applications

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GUIDE

*P. K.*  
CHAIRMAN

Not Registered  
this  
time  
Nov. 2017

Senate  
RAG

72