THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Advanced Machine Learning for Remote Sensing Image Interpretation

ECE 7402

Credit Hours:
3.00 - 3.00

Course Levels:
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
Introduces basic high-resolution remote sensing concepts with focus on optical remote sensing, and computational solutions for typical remote sensing problems. Students are assumed to know basic knowledge in statistical estimation, linear algebra and numerical methods for engineering. Students with prior experiences on remote sensing/machine learning/computer vision will find this easier to follow

Prerequisites and Co-requisites:
Prereq: Grad standing, or permission of instructor.

Course Goals / Objectives:
- The students understand both the geometric and spectrum characteristics of common remote sensing data
- The students understand the basic concepts in statistical learning and deep learning.
- The students should be able to design algorithmic flows for typical remote sensing problems such as object detection, semantic segmentation, and change detection, and will be able to implement their own system with state of the art packages.
- Students will be able to understand image formation, spectral analysis, segmentation, and machine learning based object recognition.
- Students will be able to incorporate relevant knowledge into their Ph.D. or Master Research topics.

Course Topics:

- Introduction to remote sensing
- Image geometry and spectroscopy
- Spectroscopic analysis with remote sensing images
- Statistical learning, SVM and applications to land cover classification of remote sensing images (optical and SAR)
- Decision-tree and random forest, for application of landcover classification of low-to-high resolution satellite images
- Neural networks and backpropagation
- Feature engineering using remote sensing multispectral images remote sensing linear indices
- Feature Engineering Spatial and geometric features on remote sensing dataset
- Deep learning for semantic segmentation of satellite images
- Common architectures for satellite images
- GAN for remote sensing image synthesis and super-resolution
- Deep learning for multi-source data fusion

Designation:

Elective