Remote Sensing - CPS (RMS)

RMS 5105. Fundamentals of Remote Sensing. (3 Hours)
Introduces remote sensing principles, datasets, and basic interpretation/analysis. Covers four general categories: physical processes/theories involved in remote sensing, e.g., the nature and properties of electromagnetic radiation and how it is affected by interactions with the atmosphere and earth's surface; different sensor types and platforms, including optical, thermal, and microwave systems, from UAVs to environmental satellites; different applications of remote sensing such as land-use, land-change, vegetation, natural hazards, precision agriculture, and military; and starting methods of remote sensing to analyze images and extract desired information. Software used includes ArcGIS Pro, ArcGIS Online, GIMP, and FOSS.

RMS 6110. Introduction to Machine Learning for Image Data. (3 Hours)
Explores a range of machine learning routines, including image classifications and clustering, PCAs, and data reduction. Students perform exercises corresponding to concepts introduced in weekly lessons. Focuses on computer thinking, algorithms involved in preprocessing, spectral and spatial enhancement, spatial analysis, and linear transformations. Utilizes a variety of data types and an opportunity to experience the journey of geospatial image data from its origin (raw data) to its end (transformation) in the context of the process, scope, and real-world scenarios. Examples provided with GBDX notebooks and customized work flows as entry to Python, cloud-based analytics, and web-based GUI software: ENVI, ArcGIS, and GBDX.

Prerequisite(s): RMS 5105 (may be taken concurrently) with a minimum grade of C-

RMS 6240. Introduction to Radar and LiDAR Remote Sensing. (3 Hours)
Introduces the techniques and methods of active imaging used in radar and Light Detection and Ranging (LiDAR). Covers the underlying principles of the measurement techniques and the interaction of microwaves and LiDAR signals with natural surfaces and the atmosphere. Regarding radar, the course focuses on the role of synthetic aperture radar (SAR) systems and their application to monitoring aspects of the Earth's surface, including 3-D. Regarding LiDAR, the course introduces the different airborne and satellite systems and applications in terrestrial surfaces, principally for urban applications. Students complete a weekly lab project related to the processing and analysis of these data. Software: ArcGIS; ENVI; LIDAR Analyst; ESA SNAP Toolbox; ASF MapReady; ASF SAR Training Processor; USDA FS FUSION; FugroViewer.

Prerequisite(s): RMS 5105 (may be taken concurrently) with a minimum grade of C-

RMS 6280. Automated Feature Extraction for the Geospatial Professional. (3 Hours)
Introduces machine learning and automated feature extraction software and how it is utilized for image interpretation. Explores a variety of techniques and work flows associated with collecting features of interest from multiple data sources, e.g., aerial and satellite imagery, LiDAR, and elevation data. Students use AFE software to solve real-world problems in exercises corresponding to concepts introduced in weekly lessons. Offers students an opportunity to learn how to use feature extraction to create industry-standard analytical products and develop processing models for automation. Discusses the fundamentals of machine learning, supervised and unsupervised classification, hierarchical learning, postprocessing, cleanup, automation, modeling, and publication. Software:Esri ArcGIS 10.5; Feature Analyst for ArcGIS; LIDAR Analyst; ENVI; ENVILiDAR.

Prerequisite(s): RMS 5105 with a minimum grade of C-

RMS 6962. Elective. (1-4 Hours)
Offers elective credit for courses taken at other academic institutions. May be repeated without limit.

RMS 6983. Topics. (1-4 Hours)
Covers special topics in remote sensing. May be repeated without limit.