GIS 406  Advanced Remote Sensing (3)  
Prerequisite(s): GY 302.  
Advanced techniques, data collection, and analytical methods using various types of remotely sensed data. These will include LiDAR data, Ground Penetrating Radar, and various types of multi-spectral data from satellites such as Landsat, Quickbird, Ikonos, SPOT, and others. Multi-spectral data will include: thermal, natural color (RBG), near to far-infrared and others. This course will use various methodologies for collection, classification (supervised ad unsupervised), and analysis of digital data to accomplish change detection, Normalized difference Vegetation Index (NDVI), land use-land cover (LULC), etc. For graduate students, an additional project(s) to demonstrate mastery of advanced remote sensing skills is required. The student should then give a presentation on their project to the class and give a thorough discussion of the analytics used.

GIS 408  Drone Piloting and Mapping (3)  
Prerequisite(s): GIS 451 or GIS 510 or permission of the department head.  
Undergraduate Prerequisite: GY 307 or equivalent. Graduate This course will teach students the FAA rules regulations with drone aircraft piloting and associated mapping techniques. Students will examine remotely sensed images from various angles, scales, platforms, resolutions, and wavelengths for the purpose of identifying objects, judging their significance. Graduate level credit for this course will require an aerial mapping project. The project must include project layout, data collection, aerial photography, and mapping. A final layout map of the project must be plotted at 24’X 36’.

GIS 419  Geospatial Programming (3)  
Prerequisite(s): GY 307 or equivalent.  
This course explores the use of scripting languages, such as Python and R, to create applications that perform fundamental spatial statistical analysis, such as geoprocessing, spatial autocorrelation, database management, spatial regression, and map creation. Students will explore data analysis and data modeling. Students will demonstrate a knowledge of programming concepts and approaches and develop solutions to problems by automating geoprocessing tasks. Graduate level credit for this course will require a larger research question and dataset that will be analyzed using methods discussed in class. The student will provide their code and data in an open-source platform for reproducibility.

GIS 420  Web-based GIS: Technologies and Applications (3)  
Prerequisite(s): GIS 451 or GIS 510 or equivalent.  
Undergraduate Prerequisite: GY 307 or equivalent. Graduate This course introduces students to the growing field of web-based GIS. The course focuses on the design, development, and implementation of web mapping applications, allowing students to apply techniques in real-world applications. Students taking this course will be required to develop a web GIS application. For graduate credit, a separate GIS application must be hosted by the GIS server and published to the World Wide Web.

GIS 456  Spatial Data, Layout, and Design (3)  
Prerequisite(s): GIS 451 or GIS 510 or permission of the department head.  
Undergraduate Prerequisite: GIS 451. Graduate This course introduces students to the fundamentals of map composition, map layout and design, chart creation, and data classification. The student should be able to produce aesthetically accurate and meaningful maps, charts, and cartograms to display and define results of spatial analytics. For graduate level, an additional project or paper must be completed (at the discretion of the faculty member). The project must incorporate design principles, cartographic layout or a unique approach to Geo-visualization.

GIS 459  Spatial Data Collection and Management (3)  
Prerequisite(s): GIS 451 or GIS 510 or permission of the department head.  
Undergraduate Prerequisite: GIS 451 or equivalent. Graduate This course covers multiple methods of capturing data, acquiring and importing existing spatial data (both raster and vector) into geographic information systems, and deriving spatial information from these data. This includes manipulation and management of spatial data from various platforms, devices, and sources. For graduate credit, the student must develop a project using various data types (vector, raster, LiDAR, etc.) and produce a complete and self-contained project. The student will also be required to present the project to a public forum (class, lecture, colloquium, etc.).