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 (RGB), 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 451 Advanced Geographical Information Systems (3)
Prerequisite(s): GY 307.
Training in advanced Geographic Information Systems (GIS) techniques using spatial data collection, project design, and implementation. This course will require a project to be designed and implemented by the student with pre-approval of instructor. For graduate credit, the the project must be completely self-contained and, as a deliverable, must include final map plotted at 24”x36” containing accurate symbology and registration and follow all general cartographic principles.

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.)

GIS 510 Introduction to Spatial Analysis (3)
An overview of geographic information systems and a foundation in map coordinate systems, map projections, and map scale. (GIS 510 is cross-listed with BY 510, and only one course may be taken for credit.)

GIS 517 Spatial Statistics (3)
Prerequisite(s): GIS 451 or equivalent and MS 204.
Spatial Statistics provides a survey of the methods used to describe, analyze, and model spatial data. This class will explore the application of spatial statistics to everyday issues that might be faced in the field. The major topics of this course will include how to collect, manage, and analyze point pattern data and geostatistical data. In the semester, we will explore regression models, autocorrelation, and Kriging. We will also include Bayesian models throughout the course to review their fit with spatial data.

GIS 520 Spatial Data Collection and Management (3)
Prerequisite(s): GIS 510.
Methods of capturing data, acquiring and importing existing spatial data into geographic information systems, and deriving spatial information from remotely sensed data and storing spatial data.

GIS 530 Analyzing Spatial Networks (3)
Prerequisite(s): GIS 451 or GIS 510 or permission of the department head.
This course offers the opportunity to study and understand topology theory and employ it in GIS network analyst. The Network Analyst allows one to solve common network problems, such as finding the best route across a city, finding the closest emergency vehicle or facility, identifying a service area around a location, or choosing the best facilities to open or close. The student will create a network dataset. The course cover best routes for multi-nodal networks, how to find proximity and closest entity, the creation of models for route analysis and servicing orders for a fleet of vehicles, and will also teach students to perform network analysis using traffic data and restricted attributes.
GIS 540  Site Location Analysis  (3)
Prerequisite(s): GIS 451 or GIS 510 or permission of the department head.
Location is considered one of the most important factors leading to the success of a private- or public-sector organization. In the course, we will emphasize evaluating existing site locations efficiencies, determine appropriate point site and area site locations for organizational entities, and analyze environmental impacts using GIS and business analyst software. Location can help keep fixed and overhead costs low and accessibility high. Public-sector facilities, such as schools, hospitals, libraries, fire stations, and emergency response services centers can provide high-quality service to the community at a low cost when a good location is chosen. Using site location analysis, students will learn to minimize impedance and maximize coverage area, attendance, market share, and target market areas.

GIS 550  Organization and Management of Spatial Systems  (3)
Prerequisite(s): GIS 451 or GIS 510 or permission of the department head.
This course includes the basics for developing a project plan. Defining and confirming the project goals and objectives, identifying tasks and quantifying the resources needed, and determining budgets and timelines for project completion. The program includes the implementation of the project plan and regular controls to ensure that there is accurate and objective information on performance relative to the plan. GIS projects follow stages of development and production for accurate execution.

GIS 560  Spatial Data, Layout, and Display  (3)
Prerequisite(s): GIS 510.
Fundamentals of map composition and layout, chart creation, data classification and map design to produce meaningful maps and charts of the results of spatial analysis.

GIS 570  Advanced Topics in Spatial Analysis  (3)
Prerequisite(s): GIS 451 or GIS 510 or permission of the department head.
Advanced GIS instruction and work in a variety of topics. Topics may include imagery interpretation, imagery classification, surface modeling, spatial manipulation, spatial languages, and statistical analysis of spatial data. This course may be taken twice for credit.

GIS 591  Capstone Project  (3)
Prerequisite(s): permission of capstone advisor.
A GIS capstone project is the final course in the MS in Geographic Information Science and Technology. It gives the student the opportunity to apply the skills learned/refined in the course of studies. A GIS capstone project immerses the student in a wide range of tasks, which are associated with GIS application. The student’s program advisor will review and guide the project. This course may be duplicated for credit for a total of six credit hours, if needed.

GIS 599  Thesis  (3)