GIS 5101. Introduction to Geographic Information Systems. 3 Hours.
Introduces the use of a geographic information system. Topics include applications of geographic information; spatial data collection; data accuracy and uncertainty; data visualization of cartographic principles; geographic analysis; and legal, economic, and ethical issues associated with the use of a geographic information system.

GIS 5102. Fundamentals of GIS Analysis. 3 Hours.
Explores the practical application of GIS to support geographic inquiry and decision making. Focuses on technical knowledge of the common tasks that a GIS analyst faces in applying GIS to a variety of spatial problems. Offers students an opportunity to gain hands-on experience with a leading commercial GIS software package.

GIS 5201. Advanced Spatial Analysis. 3 Hours.
Provides an in-depth evaluation of theoretical, mathematical, and computational foundations of GIS. Topics include spatial information theory, database theory, mathematical models of spatial objects, and GIS-based representation. Examines advanced concepts and techniques in raster-based GIS and high-level GIS modeling techniques.

GIS 5976. Directed Study. 1-4 Hours.
Offers independent work under the direction of members of the department on a chosen topic.

GIS 5978. Independent Study. 1-4 Hours.
Offers independent work under the direction of members of the department on a chosen topic.

GIS 5984. Research. 1-4 Hours.
Offers students an opportunity to conduct research under faculty supervision.

GIS 6320. Use and Applications of Free and Open-Source GIS Desktop Software. 3 Hours.
Offers students an opportunity to become familiar with free open-sourced software (FOSS) GIS desktop applications (QGIS and GRASS) and implementations. This includes authoring and managing vector and raster data; performing cartographic output utilizing QGIS Desktop, QGIS Browser, and QGIS Print Composer; performing basic, intermediate, and advanced spatial analysis within QGIS and GRASS utilizing a variety of plug-ins and tools; creating geoprocessing models using the QGIS Graphical Modeler; and interacting with and managing spatial databases using QGIS DB Manager and PostGIS. The geospatial domain has seen an explosion in the availability of FOSS and data, so much so that geospatial intelligence use is encouraged by the United States Geospatial Intelligence Foundation (USGIF).

GIS 6340. GIS Customization. 3 Hours.
Offers an in-depth introduction to the customization of Esri ArcGIS using Python. Focuses on how Python is integrated into ArcGIS 10. Offers students an opportunity to gain a working knowledge of how to apply Python in ArcMap. Weekly assignments are designed to provide hands-on experience with ArcGIS, ModelBuilder, Python, geoprocessing, and ArcPy. Uses ESRI Virtual Campus classes to enhance the materials being explored in the text and exercises. Requires a basic understanding of ArcGIS.

GIS 6350. Planning a GIS Implementation. 3 Hours.
Emphasizes the process of planning a geographic information system (GIS) implementation so that the organization ends up with the “right” GIS. Focuses on understanding the planning process and the issues involved in preparing for the implementation of a GIS within a multiuser environment. GIS has the potential to benefit many different types of organizations in many different ways. Assignments seek to help students grasp the various stages of the process, including the understanding of organization strategy, needs assessments, capability definition, data design, system requirements, and organizational impacts. While the class uses enterprise-level GIS as the context for the planning process, the process discussed can also be applied to smaller-scale organizations and systems. Requires basic understanding of GIS and of basic information technology concepts.

GIS 6360. Spatial Databases. 3 Hours.
Offers students an opportunity to develop skills in acquiring and building spatial data and maintaining spatial databases. Analyzes fundamental theoretical knowledge about information systems and the unique demands created by geographic information. Includes data modeling and knowledge representation for spatial data, database schemas and models, and architectural principles for geographic information systems.

GIS 6370. Internet-Based GIS. 3 Hours.
Introduces the basic concepts associated with publishing spatial data and serving maps on the Internet. Examines the use of Internet mapping software, as well as the basics of designing and operating an effective map publishing and customization environment.

GIS 6380. Global Positioning Systems and Geographic Information Systems. 1 Hour.
Introduces both geographic information systems and global positioning systems technology, theory, and operation. Offers students an opportunity to gain hands-on experience collecting and integrating field positional data into a GIS, as well as learning how to prepare for and complete a field-based GPS survey.

GIS 6385. GIS/Cartography. 3 Hours.
Introduces the principles and concepts essential to thoughtful, informative, aesthetic, and effective map composition and layout. Topics include color theory, typography, data classification and symbology, cartographic design, critique, and production. Offers students an opportunity to focus on foundational cartographic concepts in order to improve their ability to create geographic visualizations that are able to communicate GIS information effectively.

GIS 6390. Business Applications of Geographic Information Systems. 3 Hours.
Explores the use of a geographic information system for business applications. Introduces spatial data analysis as it applies to sales, marketing, and demographic analysis; service and sales territories; call planning and routing; and reporting and presentation mapping. Offers students an opportunity to gain hands-on experience with the basic functionality of industry standard business mapping software.
GIS 6391. Healthcare Applications of Geographic Information Systems. 3 Hours.
Illustrates key applications, methods, and techniques of health incidence and management through the use of geographic information systems (GIS) software. Examines the uses and applications of GIS in the health industry as it is used by local agencies, such as public health units, and larger entities, such as the Center for Disease Control (CDC) and the World Health Organization (WHO). Offers students an opportunity to integrate GIS methods with a variety of situational tutorials, exploring issues such as the advantages and limitations of health data, culminating in a final course project.

GIS 6394. Crisis Mapping for Humanitarian Action. 3 Hours.
Uses theories and methods drawn from political science and GIS to introduce students to key trends and challenges faced in the humanitarian field today. Training modules are designed to familiarize students with (1) commercial satellite imagery analysis applied in a conflict setting; (2) digital crowd-sourced methods to map real-time SMS and social media-based geographic information; and (3) mobile data collection survey tools to generate population, health, and event-based information. The objective is to learn how to perform crisis mapping in the real world and reflect on ethical, political, and practical challenges that come from working in this field. This is an interdisciplinary endeavor involving GIS, collective action and information theory, human rights, development issues, conflict theory, urbanization, and climate change.

GIS 6395. Geospatial Analysis of Crime. 3 Hours.
Analyzes different methods and techniques of representing spatial crime data through the use of various computer-based technologies. Examines crime at the national, state, and local level using geotechnology with different geostatistical tools and lab work. Also discusses some of the problems and challenges of dealing with spatial crime data.

GIS 6396. GIS for Defense, Homeland Security, and Emergency Response. 3 Hours.
Illustrates key applications, methods, and techniques relating to situations involving defense, homeland security, and emergency response. Offers students an opportunity to explore applications of GIS as it relates to communication and collaboration, warning, protection, minimum essential data sets, grid reference, digital terrain, and response, as well as imagery integration and analysis. Such exploration is delivered through tutorials and case studies involving planning, response, and collaboration.

GIS 6961. Internship. 1-4 Hours.
Provides students with an opportunity for internship work. May be repeated without limit.

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

GIS 6964. Co-op. 0 Hours.
Provides eligible students with an opportunity for work experience.

GIS 6966. Practicum. 1-4 Hours.
Provides eligible students with an opportunity for practical experience.

GIS 6970. Seminar. 1-4 Hours.
Offers an in-depth study of selected topics.

GIS 6980. Capstone. 1-4 Hours.
Offers students an opportunity to integrate their course work, knowledge, and experiences into a capstone project.

GIS 6983. Topics. 1-4 Hours.
Covers special topics in geographic information systems. May be repeated without limit.

GIS 6995. Project. 1-4 Hours.
Focuses on in-depth project in which a student conducts research or produces a product related to the student’s major field. May be repeated without limit.