Geospatial Information Sciences

**GISC 2302** Geodesy and Geospatial Analysis (3 semester credit hours) Introduction to the basic concepts of geodetic datums (horizontal and vertical), coordinate systems, and map projections. Applications in the Earth Sciences will be discussed to reinforce concepts. (3-0) Y

**GISC 2305** Spatial Thinking and Data Analytics (3 semester credit hours) This course explores the role that Spatial Thinking plays across a variety of subject areas in science, engineering, mathematics, arts and humanities. We will introduce rich resources of geospatial data from government agencies, social media, and semantic web. Students will be exposed to introductory methods in Spatial Data Analytics afforded by Global Positioning Systems (GPS), Remote Sensing (RS), Geographic Information Systems (GIS), Spatial Analysis, and Mapping technologies and learn how to bring spatial considerations into research and applications. The course is intended to empower students with spatial intelligence (one of the nine intelligences on Howard Gardner's Theory of Multiple Intelligences) and with experiences of applying spatial thinking and data analytics to problem solving. (Same as EPPS 2305 or GEOS 2305) (3-0) Y

**GISC 3304** Principles of Geospatial Information Sciences (3 semester credit hours) An introduction to the primary Geospatial Information Sciences (GIS) methods for manipulating, querying, analyzing, and visualizing spatial-based data. Topics include spatial data models, data acquisition and editing, cartography, and spatial analysis. This course is designed to provide a foundation for all other upper level GISC courses. (Same as GEOG 3304 and GEOS 3304) (3-0) Y

**GISC 4310** Environmental and Health Policy in East Asia (3 semester credit hours) Rapid development in East Asia has brought economic wealth to individuals in this region but has also created serious environmental and health problems such as pollution, resource depletion, pandemics, climate change, and so on. This course explores the environmental and human health challenges in East Asia as well as how governments and other actors are addressing them through various approaches to "sustainable development." East Asia is defined for this course as the region encompassing China, Japan, Korea, Taiwan, and some countries in Southeast Asia, but we will also focus on the role of the United States as it has been extensively involved in this region, when necessary. To help build the fundamental background of students' understanding of current environmental and health issues in East Asia, the course begins with an overview of historical, geographic, socioeconomic, political, and cultural issues in East Asia, and then examines ongoing policy actions to address various environmental and health problems in the region. Students are expected to take an active role in reviewing and discussing the material and, more importantly, in thinking critically about the interrelations of environment and human health in East Asia. (Same as IPEC 4310) (3-0) T

**GISC 4317** GeoComputation (3 semester credit hours) Introduction to fundamental computational skills and their implementation in GIS software development. Topics covered include geoprocessing functions, geospatial modeling, visual programming, scripting and application development. Students are expected to design and implement a project. Prerequisite: GEOG 3304 or GEOS 3304 or GISC 3304. (3-0) Y

**GISC 4325** Introduction to Remote Sensing (3 semester credit hours) Topics include principles of remote sensing and sensors, image visualization and statistics, radiometric and geometric correction, enhancement, classification, change detection, and innovative image processing approaches. (Same as GEO S 4325) (3-0) Y
GISC 4326 Cartography and GeoVisualization (3 semester credit hours) Examines the theoretical concepts and practical applications of cartographic and geographic visualization. Topics covered include concepts for geographic data representation, symbolization and map design, and methods for geographic visualization and display. 3D visualization, cartographic animation, and web-based mapping may also be included. Lab sessions explore the implementation of cartographic and geographic visualization with industry standard GIS software. Prerequisite: GEOS 2305 or GISC 2305 or GEOG 3304 or GEOS 3304 or GISC 3304. (3-0) Y

GISC 4363 Internet Mapping and Information Processing (3 semester credit hours) Provides a conceptual overview and hands-on experiences in Internet mapping and web-based geospatial information processing with a wide range of state-of-the-art software, including both open-source and commercial packages. Topics covered include cloud computing, client/server configuration, distributed data access and display, web-based user interaction and customization. (3-0) T

GISC 4380 Spatial Concepts and Organization (3 semester credit hours) Examines the recurring patterns of physical objects and human beings on the Earth's surface, the flows or circulations among them, and the spatial concepts and theories which have been advanced to help understand and explain these spatial arrangements. Provides a fundamental understanding of spatial processes, concepts, and theories. (Same as GEOG 4380) (3-0) Y

GISC 4381 Spatial Data Science (3 semester credit hours) Introduces data science for spatial problem solving. Course topics cover all five stages of the data science life cycle: capture, maintain, process, analyze, and communicate, with emphases on spatial data. Spatial data is critical to solving problems or developing applications for energy planning, emergency management, environmental sustainability, public health, smart city, public safety, business logistics, autonomous vehicles, ecological conservation, and many other problem domains. Besides an overview of cyberGIS and spatial semantics web, the course discusses the essential characteristics of spatial data, types of spatial problems, relevant spatial concepts, and key spatial data science methods. Computer lab exercises offer hands-on practices on spatial data analytics with both structured data from government statistics or systematic data collections as well as unstructured data from social media, location-aware mobile devices (such as smart phones), and/or web scrapping. This course aims to help students develop fundamental knowledge and basic skills to ask spatial questions, find, process, and analyze spatial data, solve spatial problems, and communicate their findings. (3-0) Y

GISC 4382 Applied Geographic Information Systems (3 semester credit hours) Further develops hands-on skills, such as spatial analysis, pattern analysis and statistical analysis of GIS data, with industry-standard GIS software for application in a wide variety of areas including urban, transportation, marketing and location analysis, environmental management, geologic and geophysical analysis, and the economic, political and policy sciences. Prerequisite: GEOG 3304 or GEOS 3304 or GISC 3304 or equivalent with instructor consent required. (3-0) Y

GISC 4384 Health and Environmental GIS: A Global Perspective (3 semester credit hours) This course covers emerging issues in global health and environmental policy, with special emphasis on applications of Geographic Information System (GIS) and spatial analytic tools in identifying and responding to physical and social environmental risk factors that impact the health and well-being of peoples throughout the world. This introductory but interdisciplinary course examines contemporary issues in global health and environmental policy and practices. This course helps students understand various social, economic, political and environmental determinants of health, and consider evidences that inequalities in education, income and accessibility to resources influence health status. Emphasis is placed on issues of global health inequality and environmental justice at various levels. Ample hands-on laboratory experiences will be provided on how to utilize various geospatial methods such as spatial analysis, modeling, simulation and
mapping with real-world data using state-of-the-art commercial and open source software. Students will also develop skills in cost-effectiveness analysis and health outcome measurement, using a variety of contemporary global health case studies which focus on content areas such as maternal and child health, environmental health, infectious diseases (HIV/AIDS, malaria, diarrheal diseases, etc.) and global healthcare delivery. Students may need some quantitative skills to analyze global public health problems, but the level of the analytical components of the course will be determined by the background of the enrolled students. (Same as IPEC 4384) (3-0) T

**GISC 4385** Advanced Applications in GIS (3 semester credit hours) This course covers advanced applications in contemporary geographic information system and sciences. The course discusses a wide range of GIS principles, concepts, functions and algorithms and how they can be applied to a specific application area such as real estate, urban planning, crime, and transportation. May be repeated for credit as topics vary (9 semester credit hours maximum). Prerequisite: GEOS 2305 or GISC 2305 or GEOG 3304 or GEOS 3304 or GISC 3304. (3-0) Y

**GISC 4386** Global Change and Its Challenges (3 semester credit hours) Introduction to global environmental change with a focus on the physical processes and patterns of terrestrial, atmospheric, and climatic changes, and the social causes and implications of these changes. Topics covered include impacts of human activities on land, water and atmosphere, including land-use and land-cover change, water pollution, the greenhouse effect, and climate change. Remote sensing and GIS data and models are used to illustrate examples of and track change. (3-0) Y

**GISC 4V96** Special Topics in Geospatial Information Science (1-3 semester credit hours) Subject matter will vary from semester to semester. May be repeated for credit (9 semester credit hours maximum). ([1-3]-0) R

**GISC 4V97** Independent Study in Geospatial Information Science (1-6 semester credit hours) Independent study under a faculty member's direction. Credit/No Credit only. May be repeated for credit (6 semester credit hours maximum). Instructor consent required. ([1-6]-0) R

**GISC 4V98** Internship (1-6 semester credit hours) Credit/No Credit only. May be repeated for credit (6 semester credit hours maximum). Instructor consent required. ([1-6]-0) S

**GISC 4V99** Senior Honors in Geospatial Information Science (1-6 semester credit hours) For students conducting independent research for honors thesis or projects. May be repeated for credit (6 semester credit hours maximum). Instructor consent required. ([1-6]-0) S

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