HEALTH GEOINFORMATICS (HGIS)

Courses

HGIS 421. Cartography and Map Design. 3 Units.
Cartographic principles and guidelines, including geodesy, map projections, coordinate and locational systems, scale and distance, direction, vertical factors, mapping methods and techniques, and graphic representation of Earth patterns. Provides the foundation for understanding advanced geospatial technologies, including GIS, remote sensing, and global positioning systems.

HGIS 422. Principles of Geographic Information Systems. 4 Units.
Comprehensive overview of the concepts, functions, applications, technologies, and trends pertaining to automated geographic information systems (GIS). Framework for understanding the design, development, implementation, and management of GIS. Topics include: GIS hardware and software considerations, data resources, technical issues and applications in GIS.

HGIS 423. Practical Issues in GIS. 4 Units.
Key tasks and issues faced by GIS managers and practitioners responsible for implementing and managing health GIS systems in government or private sector organizations. Presents sound principles and approaches for GIS implementation, as well as project management and organizational issues, to provide the necessary foundation of information on alternatives and pitfalls. Main topics include: GIS needs assessment, software/hardware considerations, financial and staffing requirements, project scope delineation, project planning and control, pilot projects.

HGIS 424. Desktop GIS Software Applications. 4 Units.
Introduces state-of-the-art, PC-based GIS applications. Student acquires the conceptual knowledge as well as the hands-on experience needed to optimally utilize available functions within desktop GIS technology for display, editing, analysis, and presentation of spatial and thematic data. Focuses on ArcView GIS and its analytical extensions.

HGIS 434. Advanced GIS Software Applications. 3 Units.
Comprehensive overview of the concepts, functions, skills, applications, technologies, and trends of modern remote sensing in environmental and health data acquisition and analysis; as well as applications in related public health issues. Topics include GIS-based image interpretation and data generation, satellite remote sensing, introduction to IDRISI Kilimanjaro and ERDAS Imagine; as well as other modeling tools, such as ArcGIS Modler, Stella, ArcPAD, GPS, CARTALink, etc.

HGIS 435. Sources, Capture, and Integration of GIS Data. 3 Units.
Provides overview of some of the technologies and methods used in capturing, processing, integrating, and displaying GIS data. Topics include: global positioning systems, satellite digital imagery, image processing, aerial photography, digital orthophotography, GIS applications for the World Wide Web, and GIS data sources on the Internet. Fundamentals of conceptual and physical design, construction, currency, and integrity of geospatial databases.

HGIS 436. Spatial Analysis with GIS. 4 Units.
Focuses on GIS functionality suited for modeling and analyzing complex spatial relationships. Basic functions for the selective retrieval of spatial information and the computation or mapping of statistical summaries. Advanced quantitative methods of spatial statistics for analyzing different data feature types and data structures, and investigating patterns in spatial data. Main topics include: feature manipulation, distance measurement, spatial overlay, proximity analysis, spatial correlation analysis, point pattern analysis, spatial interaction, surface analysis, network analysis, grid analysis, and spatial modeling within GIS.

HGIS 437. GIS in Public Health. 2 Units.
Reviews GIS methods and analytical techniques with potential for improving public health research and practice. Fields of public health considered individually. Identifies specific GIS approaches and techniques. Considers specific disciplines, including: epidemiology, health promotion, international health/development, health care administration, environmental health and contamination, and emergency management. Current applications of GIS technology and methods at the international, national, and local levels. Prerequisite: HGIS 436.

HGIS 438. Introduction to Web GIS. 4 Units.
Introduces basic Web-based techniques, design and publication of maps, and geographic analysis through the Internet. Students learn to design Web maps and implement geographic analysis via the Internet. Includes lectures, laboratory exercises, and a final project. Discusses understanding REST Web services, building geospatial mashup applications, optimizing Web map services, creating and using geoprocessing Web services, and mobile GIS. Students develop and present an Internet mapping service to the class using application of their choice.

HGIS 498. Health Geographics Senior Project. 2,4 Units.
Three-quarter senior research or applications project conducted during the student's final academic year. Student demonstrates mastery of spatial analysis skills by assessing relevant public and oral presentations. May be repeated for additional credit. Must have a total of 12 units. Paper and oral presentation required during final quarter of registration.

HGIS 499. Directed Study/Special Project. 1-4 Units.
Individual arrangements for undergraduate, upper division students to study under the guidance of a program faculty member. May include readings, literature review, or other special projects. Minimum of thirty hours required for each unit of credit. A maximum of 4 units applicable to any undergraduate degree program.

HGIS 521. Cartography and Map Design. 2 Units.
Map design and content, design procedures, production techniques, color selection, use of text, creation of visual hierarchy and visual balance. Explores thematic and general mapping with use of GIS data for mapping purposes. Discusses ArcGIS software. Map critiquing. Provides the foundation for understanding advanced geospatial technology, including GIS, remote sensing, and global positioning systems.

HGIS 522. Principles of Geographic Information Systems and Science. 3 Units.
Comprehensive overview of the concepts, functions, applications, technologies, and trends pertaining to automated geographic information systems (GIS). Topics include: GIS hardware and software considerations, data resources, technical issues and applications in GIS.
HGIS 523. Practical Issues in GIS. 3 Units.  
Key tasks and issues faced by GIS managers and practitioners responsible for implementing and managing health GIS systems in government or private sector organizations. Presents sound principles and approaches for GIS implementation, as well as project management and organizational issues, to provide the necessary foundation of information on alternatives and pitfalls. Main topics include: GIS needs assessment, software/hardware considerations, financial and staffing requirements, project scope delineation, project planning and control, pilot projects.

HGIS 524. GIS Software Applications and Methods. 3 Units.  
Project-oriented course introduces state-of-the-art, PC-based GIS technology and applications. Provides the conceptual knowledge and hands-on experience needed to optimally utilize available functions within desktop GIS technology for modeling, displaying, editing, analyzing, and presenting spatial and thematic data. Focuses on ArcGIS and its analytical extensions, as well as Leica Geosystems ERDAS Imagine.

HGIS 525. Seminar in Geographic Information Systems. 1 Unit.  
Covers various aspects of GIS technology and its applications to health that might otherwise be excluded from the usual and customary health geoinformatics academic curriculum. Topics of interest include metadata creation and management, health geoinformatics spatial data infrastructure, data interoperability, and mobile mapping technology. Presenters with specific expertise invited to cover areas of interest.

HGIS 526. Geospatial Technologies for Emergency Preparedness and Management. 3 Units.  
Applies geospatial data, tools, and methods to preparedness and emergency management. Examines the current status of the use of geospatial data, tools, and infrastructure in preparedness and disaster management. Explores approaches for the effective integration of existing geospatial tools into the framework of emergency preparedness and management; strategies for improving geospatial decision support in this field; and various other issues related to data availability, security, and policies. Emphasizes technology application. Prerequisite: HGIS 524; prior knowledge of GIS.

HGIS 527. Integration of Geospatial Data in GIS. 3 Units.  
Surveys capturing, processing, integrating, and displaying GIS data. Focuses on public health applications of global positioning systems, satellite digital imagery, image processing, aerial photography, digital orthophotography, GIS applications for the World Wide Web, and GIS data sources on the Internet.

HGIS 528. Introduction to Web GIS. 3 Units.  
Introduces basic Web-based techniques, design and publication of maps, and geographic analysis through the Internet. Students learn how to design Web maps and implement geographic analysis via the Internet. Includes lectures, laboratory exercises, and a final project. Emphasizes understanding of REST Web services, building geospatial mashup applications, optimizing Web map services, and mobile GIS.

HGIS 529. GIS Applications in Environmental Health. 2,3 Units.  
GIS display, modeling, and analysis of environmental hazards/toxicants, as well as population's exposure to environmental contaminants. Includes geography and modeling of hazard sources, hazard surveillance, spatial characterization/modeling of contamination and GIS-enhanced risk assessment/management. Considers the use of GIS for managing public health safety problems. Presents current applications of GIS in environmental health and disaster/emergency response. Third unit requires additional GIS project that includes substantial analysis of environment data and discussions of results through written and oral presentation. Prerequisite: HGIS 524 or HGIS 536; or consent of instructor.

HGIS 530. Advanced Remote Sensing Application and Systems Modeling in Health and Earth Science. 3 Units.  
Introduces systems science as both a conceptual approach to analysis and as a methodology for enhancing research and application within the environment, health, and earth systems. Provides students with fundamental knowledge of dynamic modeling tools, particularly focused on using STELLA and Think (from Isie Systems); as well as other tools that integrate spatial and nonspatial datasets, e.g., ArcModeler, Geode, TerraVIVA, Netweaver, and various SAS tools, etc. Applies systems thinking and analysis to specific interdisciplinary issues within public health and other applied sciences.
HGIS 557. Geographical Techniques for Health and Environmental Analysis. 3 Units.
Geographic tools for graphic display and spatial analysis of domestic and international health, epidemiological health services, and environmental health problems and issues. Uses of geographic information systems (GIS), desktop mapping, medical geographical applications, and geocoded, computerized databases in health and environmental planning, decision making, and research.