



## Geographic Information Science (GISci) Curriculum

Department of Geology and Geography  
West Virginia University

### The Department of Geology and Geography offers:

- *BA, MA & PhD degrees in Geography, with a GISci Track*
- *Regents BA, with an area of emphasis in GISci & remote sensing*
- *Minor in Geographic Information Science*
  - Requirements
    - Minimum GPA of 2.0
    - 15 hours of coursework
    - Minimum of 9 credit hours at upper division level (300 and above)
    - Required course: Geog 150
    - Choose 1 course from:
      - Geog 102, 106, 107, 108
    - Choose three courses (9 credit hours) from:
      - Geog 300, 350, 452, 453, 455, 456, 462, 494
      - Several Geog 494 are offered in GIS and RS each year - see list below
- *Certificate in GISci and Remote Sensing*
  - Requirements
    - 15 credit hours of coursework
    - Required courses: Geog 150, 350, 455
    - Choose two additional courses from:
      - Geog 300, 452, 453, 462, and 494
      - Several Geog 494 are offered in GIS and RS each year - see list below

### Courses

**GEOG 150 Digital Earth.** (Dr. Conley) Fall. 3 hours.

Recent advances in technology and data availability have increased our knowledge about the world. This class surveys key concepts of geospatial technologies (GIS, remote sensing, spatial analysis) in the context of social and environmental change.

**GEOG 300. Geographical Data Analysis.** (Dr. Conley) 3 hours.

Quantitative techniques for collection, classification, and spatial analysis of geographical data with emphasis on map analysis and application of spatial statistics.

**GEOG/GEOL 350 Introduction to GISci.** (Dr. Elmes) Fall & Spring. 3 hours lect, 1 hour lab. Geographic Information Systems (GIS) in principle and practice spatial data handling in a computer environment: data analysis, production and display for planning and decision-making.

**GEOG 452 Geographic Informational Science: Applications.** (Dr. Harris) Spring. 3 hours. Prerequisite: Geog. 350 or 550. Operational, management and functional issues in the development and application of GIS for analysis, locational decision making and project design.

**GEOG 453 Geographic Information System Design and Implementation.** (Dr. Conley) Spring. 3 hours. Prerequisite: GEOG/GEOL 350. Geographic database design and implementation using contemporary vector software.

**GEOG/GEOL 455/655 Introduction to Remote Sensing.** (Dr. Warner) Fall. 2 hr lect, 1 hr lab. Theory, technology and applications of photo-interpretation and digital image analysis of aerial photography and multispectral images.

**GEOG 456 Remote Sensing Applications.** (Dr. Warner) Spring. 3 hours. Prerequisites: Geog/Geol 455/655, or consent. Survey of remote sensing applications, focusing on the type of information obtained and methods used.

**GEOG 462 Digital Cartography.** (Dr. Elmes) Fall 3 hours. Computer-assisted mapping emphasizing the appropriate uses of software in thematic and topographic map design, annotation, symbolization, color, design, display and reproduction.

**GEOG 494/694 GIS & Environmental Modeling.** (Dr. McNeil) Spring. 3 hours. Prerequisite: GEOG 350. Hands-on research experience applying spatial analytical tools to environmental questions, with a survey of the GIS model structures used in environmental applications.

**GEOG 494/694 Crime Mapping.** (Dr. Elmes). Spring. 3 hours. GIS and spatial analysis are increasingly important in the analysis and modeling of crime events and scenes. New software specific to the analysis of crime events and the dissemination of crime data, maps and related information by police departments provide working examples of advances in spatial approaches to criminal investigations.

**GEOG 550 Geographic Information Science.** (Dr. Elmes) Fall. 3 hours lecture, 1 hour laboratory. Instructor's permission required. Principles and practice of geographical information science. Geospatial data handling for research, planning and decisionmaking. Spatial analysis, information productin and display.

**GEOG 553 Environmental Impact Assessment.** (Dr. Harris). Occasional. 3 hours. Prerequisite: GEOG 350. Use of geospatial technologies combined with EIA methods to understand and explore primary and tertiary order environmental impacts arising from development projects

**GEOG 594 Geographical Data Analysis** (Dr. Conley) 3 hours. Quantitative techniques for collection, classification, and spatial analysis of geographical data with emphasis on map analysis and application of spatial statistics.

**GEOG 651 Geographic Informational Systems: Technical Issues.** (Dr. Conley) Spring. 2 hrs lecture, 1 hour laboratory. Prerequisite: Geog. 350 or 550. Current issues in GIS research. Technical aspects of GIS operations, algorithms, theory of geographical data structures, and error handling. Labs focus on tools, data structures, database languages and macros.

**GEOG/GEOL 655 Remote Sensing Principles.** (Dr. Warner) Fall. 2 hours lecture, 1 hour laboratory. Theory, technology and applications of photo-interpretation and digital image analysis of aerial photography and multispectral images.

**GEOG 694 GIScience & Health.** (Dr. Elmes) Spring alternate years. 3 hours. Prerequisites: Geog 350 or 550. Applications of geographic information in the public health context, environmental epidemiology, healthcare provision and access. Solutions for working with geographically referenced data and analysis.

**GEOG 694. Crime Mapping.** (Dr. Elmes) 3 hours. GIS and spatial analysis are increasingly important in the analysis and modeling of crime events and scenes. New software specific to the analysis of crime events and the dissemination of crime data, maps

and related information by police departments provide working examples of advances in spatial approaches to criminal investigations.

**GEOG 694 Geovizualization & the CAVE.** (Dr. Harris) Occasional. 3 hours.

Exploration of theory, principles, and methods of geovisualization through immersive and experiential visualization, GIS, and virtual reality.

**Geog 694 Qualitative GIS.** (Dr Harris) Spring. 3 hours

Questioning ontological and epistemological issues surrounding geospatial data and analysis. Qualitative spatial data analysis using GIS and related spatial analytical methods. Neogeography and the geospatial semantic web.

**GEOG 701 Advanced Research Methods.** 3 hours. Prerequisite: GEOG 601. Review of quantitative and qualitative methods used in geographic research.

**GEOG 752 Advanced Geographic Information Science.** (Dr. Harris) Fall. 3 hours. Prerequisites: Geog. 350, and Geog. 452 or Geog. 651, or consent. Functional strengths and weaknesses of GIS. Related geographical information science technologies, GPS, remote sensing, spatial multimedia, spatial statistics, neogeography, and expert systems. Multi-dimensionality (4-D GIS), temporality, social implications of GIS.

**GEOG 753 Exploratory spatial data analysis.** (Dr. Harris). Fall. 3 hours.

Innovative hypothesis generation and data analysis using robust and resistant ESDA techniques in an integrated data analytical GIS environment.

**GEOG/GEOL 755 Advanced Remote Sensing.** (Dr. Warner) Spring. 2 hrs lect, 1 hr lab. Prerequisite: Geog/Geol 455/655, or consent. Collection, processing and classification of remotely sensed data, including optical, thermal, radar, and topographic information.

**GEOG 794 Spatial Ecosystem Ecology.** (Dr. McNeil) Fall. 3 hours. Prerequisites: GEOG 550 and GEOG 655, or consent. Survey of key readings on the application of GIS and remote sensing to ecosystem ecology. Applied research for term paper.