

Geospatial Analysis

LOWER DIVISION

GSP 101. Geospatial Concepts (2). Overview: scale, coordinates, geodesy, direction, projections, surveying, global positioning systems (GPS), remote sensing, geographic information systems (GIS), cartography; historical context illustrating how maps depict spatial relationships, chart power, convey authority. [Coreq: GSP 101L. Rec: basic computer literacy. D-LD.]

GSP 101L. Geospatial Concepts Lab (1). Traditional and computer lab activities to develop understanding of scale, coordinate systems, geodesy, direction, projections, surveying, global positioning systems (GPS), remote sensing, geographic information systems (GIS), cartography. [Rec: basic computer literacy. D-LD.]

GSP 216. Introduction to Remote Sensing (3). Introductory course in remote sensing focusing on broad topics pertaining to nature of radiation, aerial photography and interpretation, multispectral scanners, and image data and processing. [Prereq: GSP 101 and GSP 101L. Weekly: 2 hrs lect, 3 hrs lab.]

GSP 270. Geographic Information Science (GIS) (3). Introductory course in Geographic Information Science and spatial analysis involving collection, manipulation, display, and analysis of geographically referenced data. Raster and Vector data, overlays, buffer, proximity analysis and SQL queries. [Prereq: GSP 101 and GSP 101L. Weekly: 2 hrs lect, 3 hrs lab.]

GSP 280. Special Topics in GSP (3). Topics vary. [Rec: GSP 101 and GSP 101L. Rep with different topics.]

UPPER DIVISION

GSP 316. Cartography (4). Cartographic visualization and map design principles through GIS and illustration programs, the selection of appropriate map projections, data classification, color, visual variables, charts, graphs, and diagrams. [Prereq: GSP 101(C) and GSP 101L(C). Weekly: 3 hrs lect, 3 hrs lab.]

GSP 318. Geospatial Programming I (3). Introduction to programming for geospatial students. Covers problem decomposition, control structures, simple data structures, testing, and documentation, using the Python programming language and geospatial-oriented examples. [Prereq: GSP 101 and GSP 101L. Weekly 2 hrs lect, 3 hrs lab.]

GSP 326. Intermediate Remote Sensing (3). Intermediate level course focusing on digital image processing involving image enhancements, image rectifications, classification, and accuracy assessments. Additional topics include image processing techniques involving thermal, hyperspectral, Radar, and LiDAR data. [Prereq: GSP 216 and junior standing or greater. Rec: MATH 105. Weekly: 2 hrs lect, 3 hrs lab.]

GSP 330. Mobile Mapping (3). Concepts and techniques of data collection using mapping-grade

GPS units. Topics include understanding data collection protocols, data processing, GIS integration, error sources, differential correction, and other advanced capabilities. [Prereq: GSP 101, GSP 101L, and GSP 216 (C) or GSP 270 (C). Weekly: 2 hrs lect, 3 hrs lab.]

GSP 370. Intermediate Geographic Information Science (GIS) (3). Data accuracy and quality, standard and advanced geospatial data models, data integration and analysis, constraint analysis, location-allocation analysis, metadata standards and documentation, geospatial ethics, industry applications of geospatial analysis. [Prereq: GSP 270 or GSP 280 or GSP 510; sophomore standing or greater. Weekly: 2 hrs lect, 3 hrs lab.]

GSP 416. Advanced Cartography Design Seminar (4). Build on fundamentals through cartographic visualization: the map as a tool for both exploring and representing geographic information. Greater depth in cartographic design theory. Discuss weekly readings; complete major map project. [Prereq: GSP 316. Rep.]

GSP 418. Geospatial Programming II (3). Creating enterprise-level geospatial infrastructures for analysis, monitoring, and modeling. Web and mobile development of geospatial applications. Use of enterprise-level databases, object-oriented programming and design methods, and professional software development processes. [Prereq: 318. Weekly: 2 hrs lect, 3 hrs lab.]

GSP 426. Cartography Practicum (1-4). Practical mapping experience as a cartographic intern with the Institute for Cartographic Design. Supervised individual and group work experience in geospatial sciences. This course is intended for those pursuing advanced cartographic training. Permission of the instructor needed for registration. [Prereq: GSP 270, GSP 316, and IA.]

GSP 436. Advanced Remote Sensing (3). Advanced course in remote sensing. Topics include advanced image enhancements involving project design, image fusion, higher levels of image classification techniques including object-oriented classifications, machine learning techniques, geostatistics, etc. [Prereq: GSP 326; senior standing or greater. Rec: MATH 105. Weekly: 2 hrs lect, 3 hrs lab.]

GSP 470. Advanced Geospatial Analysis & Modeling (3). Analysis of uncertainty, autocorrelation, trend-surfaces, and random processes. Modeling using point-process, generalized linear, generalized additive, and machine learning methods. Selecting appropriate alternative modeling methods including cellular automata, agent-based, neural networks, and stimulation. Validating and characterizing models using Monte Carlo and other methods. [Prereq: GSP 370; junior standing or greater. Weekly: 2 hrs lect, 3 hrs lab.]

GSP 480. Selected Topics in Geospatial Science (1-3). Selected topics in geospatial science; GIS, remote sensing, cartography, mobile mapping, web-based applications, databases, programming. May require additional prerequisites. [Prereq: GSP 101 and GSP 101L; sophomore standing or greater. Rep with different topics.]

GSP 480L. Selected Topics in Geospatial Lab (1-2). [Prereq: GSP 101 and GSP 101L; sophomore standing or greater. Rep.]

GSP 499. Directed Study (1-3). Directed study in geospatial science. Independent undergraduate study or research project supervised by geospatial science faculty. [Prereq: junior standing or greater; IA. Rec: GSP 101, GSP 101L and one additional GSP course. Rep.]

GRADUATE

GSP 510. Research Methods in Geospatial Science (3). Applications of GIS, remote sensing, cartography, mobile mapping, web-based applications, and geospatial databases to research. Designed to enable new graduate students to incorporate geospatial data and methods into their research. [Prereq: graduate standing.]

GSP 570. Advanced Geospatial Analysis & Modeling (3). See description of GSP 470 for specific topics. Also includes project-based course applying advanced geospatial analysis and modeling to natural resource research applications. Management of a research project to include setting and meeting goals, managing schedules, and leading a team. [Prereq: GSP 370; senior or graduate standing. Weekly: 3 hrs seminar, 3 hrs lab.]

GSP 580. Selected Graduate Topics in Geospatial Science (1-3). Selected topics in Geospatial Science offered at the graduate level; GIS, remote sensing, cartography, mobile mapping, web-based applications, databases, programming. [Prereq: (GSP 101 and GSP 101L) and (GSP 216 or GSP 270 or GSP 316); junior standing or greater. May require additional prerequisites. May be repeated with different topics.]

GSP 580L. Selected Graduate Topics in Geospatial Science Lab (1-2). Lab for selected topics in Geospatial Science offered at the graduate level; GIS, remote sensing, cartography, mobile mapping, web-based applications, databases, programming. [Prereq: (GSP 101 and GSP 101L) and (GSP 216 or GSP 270 or GSP 316). Junior standing or greater. May require additional prerequisites. May be repeated with different topics.]