

# Spatial Information Systems (SIS) Courses

## **SIS 1001 Introduction to Spatial Information Systems (SIS)**

**1 Credit: 1 hour lecture**

Prerequisites: None

Introduction to computer systems, geographic information systems (GIS), global positioning systems (GPS), remote sensing, surveying, and the Spatial Information Systems Program. Students will be introduced to spatial technology terminology.

## **SIS 2014 Boundary Surveying**

**4 Credits: 3 hours lecture, 3 hours laboratory**

Corequisite: MATH 1033 or 1175

History of Public Land Survey Systems (PLSS), evolution of the rectangular system of land subdivision, description and computation of land areas, past and current monumentation procedures, use of surveying instruments in field determination of property boundaries.

## **SIS 2023 Computer Assisted Cartography**

**3 credits: 2 hours lecture, 3 hours laboratory**

Prerequisites: CIS 2223 and (MATH 1033 or 1175)

This course provides a technical introduction to spatial information design and thematic mapping. Lectures will cover principles of scientific visualization, graphical design and mapping. In labs, students will design digital, static maps using computer aid design (CAD) software available on Windows workstations. By the end of this course, students will be capable of producing high quality cartographic displays of cartographic data for geographic visualization.

## **SIS 2114 Plane Surveying I**

**4 credits: 3 hours lecture, 3 hours laboratory**

Corequisites: CIS 2223 and SIS 2023

Prerequisites: SIS 2014 and (MATH 1033 or 1175)

Measuring horizontal and vertical distances and angles, collection and adjustment of traverse data, area calculations, differential and trigonometric leveling, topographic surveys, and the creation of plats - manually and computer aid design (CAD) generated.

## **SIS 3153 Survey Plats and Deeds**

**3 credits: 2 hours lecture, 3 hours laboratory**

Prerequisites: SIS 2014, SIS 2114 and (MATH 1073 or 2255)

Writing deeds and preparing plats. Terminology used in metes and bounds, condominium, coordinate, and subdivision descriptions. Legal definitions, Arkansas state code for filing plats, required plat and deed information, deed and plat searches in county records.

## **SIS 3264 Route and Construction Surveying**

**4 credits: 3 hours lecture, 3 hours laboratory**

Prerequisites: SIS 2023, SIS 2114 and (MATH 1073 or 2255)

Construction of horizontal, vertical and spiral curves, cuts and fills, volume determination, road layout and construction, building layout, design and layout of a subdivision; all computer assisted.

**SIS 3814 (FOR 3814, WLF 3814) Introduction to GIS & GPS, and Remote Sensing**

**4 credits: 3 hours lecture, 3 hours laboratory**

Prerequisites: CIS 2223 and (MATH 1043 or 1175)

Introduction to geographic information systems (GIS) using both raster and vector spatial data models, with hands on experience utilizing computers to aid problem solving. Applications to be mastered include data entry, verification, data base construction, cartographic modeling, and mapping of spatial data. Application of global positioning systems (GPS) in resource management, and integration of GIS and GPS are described and utilized. Introduces the basic concepts of remote sensing of the environment. It provides background material necessary to successfully use remote sensed imagery in conjunction with GIS and GPS technology to solve problems.

**SIS 3843 Advanced Geographic Information Systems (GIS) I**

**3 credits: 2 hours lecture, 3 hours laboratory**

Prerequisites: GB 3713 and SIS 3814

This course will cover advanced GIS and GPS software to further enhance the student=s spatial skills. The use of different map projections and coordinate systems in GIS is examined in depth along with their effects on data positional accuracy. The first part of the course will cover network analysis for routing and transportation issues, and spatial analysis as a decision support tool. The second portion of the course will cover the use of advanced GIS/GPS software and hardware. The final portion will cover the use, management, creation and storage of spatial data and metadata in GIS.

**SIS 3913 Data Base Design and Management**

**3 credits: 2 hours lecture, 3 hours laboratory**

Prerequisites: GB 3713, SIS 3814, and (MATH 1073 or 2255)

This course is designed to provide a comprehensive understanding of database management systems. Particular emphasis will be placed on the management of spatial data and associated applications. Logical vector and raster data structure organization, analysis, and design will be investigated in depth. Relational database systems and object oriented databases will both be studied. Database design techniques using entity-relationship diagrams for data modeling will be introduced as well as database access and manipulation using structure query language (SQL).

**SIS 3923 Remote Sensing**

**3 credits: 2 hours lecture, 3 hours laboratory**

Prerequisites: GB 3713, and SIS 3814

Remote Sensing concepts including, both electronic and analog sensor systems, land cover classification, rectifying and registering images, and digital mapping will be discussed.

**SIS 3933 Spatial Statistics**

**3 credits: 2 hours lecture, 3 hours laboratory**

Prerequisites: GB 3713 and SIS 3843

This is an analytical, problem-based course that explores the field of spatial statistics. In lectures and laboratory exercises students will use statistical tools to determine patterns of spatial variability across a wide variety of data sets. Some of the topics that will be explored include

universal kriging, cokriging, inverse distance weighting, trend surface analyses, and three dimensional analysis for terrain and surface modeling.

**SIS 4183 Mapping Law and Professionalism**

**3 credits: 3 hours lecture**

Prerequisites: (PHIL 3523 or 3623) and SIS senior

Interpretation of legal statutes pertaining to surveying and mapping, cadastral and riparian rights, adverse possession, legal authority of spatial information systems personnel, preparation for court appearances, and conduct in court. Discussion of the moral and ethical principles guiding the professional conduct of spatial information system personnel, professional societies codes of ethics, moral and legal obligation to clients and community. Arkansas surveyor's code of ethics.

**SIS 4454 Plane Surveying II**

**4 credits: 3 hours lecture, 3 hours laboratory**

Prerequisites: GB 3713, SIS 3264, SIS 2114 and MATH 2255

Partitioning of land, introduction to vector and matrix algebra, least squares adjustment of data, map projections and state plane coordinates, coordinate transformations, triangulations, standards of accuracy and error propagation. Global positioning systems (GPS) surveying.

**SIS 4633 Digital Photogrammetry**

**3 credits: 2 hours lecture, 3 hours laboratory**

Prerequisites: GB 3713, SIS 3814, and SIS 3923

Image mosaicing, digital orthophoto creation, aerial triangulation, single image and block triangulation, ground control, digital terrain modeling extraction, orthorectification, and mono and stereo terrain model editing.

**SIS 4713 Advanced Geographic Information Systems (GIS) II**

**3 credits: 2 hours lecture, 3 hours laboratory**

Prerequisites: SIS 3843 and CIS 3443

This course will focus on the use of advanced GIS and object oriented programming language software for the development of algorithms to customize Geographic Information Systems to solve problems. Third party and Component Object Model (COM) compliant programming languages will be used to build and customize GIS applications. Customized applications will be incorporated into existing GIS Internet packages for display and presentation on the Internet.

**SIS 475V Advanced Topics**

**Variable credit**

Prerequisites: Junior standing, consent of instructor, and approval of School Dean

Lectures and discussions in selected Spatial Information System topics.

**SIS 479V Independent Study in Spatial Information Systems (SIS)**

**Variable credit**

Consult the Independent Study Courses subheading in Academic Regulations section of this catalog for prerequisites and description.

**SIS 4886 SIS Practicum**

**6 credits: 1 hours lecture, 15 hours laboratory**

**Prerequisites: SIS 3843, SIS 3913, SIS 4183, SIS 4633, and SIS senior**

Integrated problem solving to apply geographic information systems (GIS), remote sensing, global positioning systems (GPS), and surveying to solve real world problems. Students will work with a federal, state, private, or a non-profit agency using spatial technologies in their area of specialization to solve a real world problem for that agency.