GEOGRAPHIC INFORMATION SCIENCE (GISC)

GISC 1301 Physical Geography
3 Semester Credit Hours (3 Lecture Hours)
The goal of this course is to encourage you to think geographically, examining the interactions between physical systems and human activities. Introduction to topics covered include elements of Physical Geography (studies of atmosphere, ocean and land surface environments), Geographic Information Systems (computer systems that capture, analysis, and display of geographic information), and human environmental interactions. Cross listed with GEOG 1301.
TCCNS: GEOG 1301

GISC 1336 Digital Drafting and Design
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
An introduction to graphic and drafting principles and practices in surveying and mapping science. This course includes the development of the basic drafting skills needed to produce surveying plats and graphical presentations. The elements of descriptive geometry are addressed. A major component of the course is an introduction to the fundamentals of computer-aided drafting and design (CADD). Spring.

GISC 1470 Geospatial Systems I
4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)
Introduction to geographic information systems (GIS) and its theoretical foundations. Topics covered include vector and raster data models, acquisition and manipulation of data, cartography, current topics, data quality, and basic spatial analysis. Principles and uses of GIS software also covered. Fall and Spring.

GISC 2250 Field Camp I
2 Semester Credit Hours (6 Lab Hours)
A one-week field camp with intensive field data collection and computations. Traversing between control points. Digital contour data and leveling control. Detail spatial data by total station. Construction set out using total station and steel band. Taken during the sophomore or junior year. Spring.
Prerequisite: GISC 2470.

GISC 2301 Geospatial Systems II
3 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)
An intermediate level course in the concepts and applications of geographic information systems (GIS). Topics covered include spatial database design and management, raster analysis, terrain mapping, analysis, and applications. Spring.
Prerequisite: GISC 1470.

GISC 2438 Geospatial Software Systems I
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
Introduction to the design and development of GIS software to solve spatial problems. Topics covered include programming basics, design and implementation common tasks in GIS applications. Fall.
Prerequisite: GISC 1470 and COSC 1435 or COSC 1330.

GISC 2470 Geospatial Plane Measurement I
4 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)
Historical introduction to field measurement and mapping; distance measurement using electronic distance meters; calibration and reduction. Leveling instruments; principles, construction, testing and adjustment; ancillary equipment. Optical and electronic theodolites. Traverse computations and adjustment. Coordinate systems. Map projections. Fall.
Prerequisite: MATH 1316 or 2413.

GISC 3300 Geospatial Mathematical Techniques
3 Semester Credit Hours (3 Lecture Hours)
Characteristics of geographic/spatial information; overview of relevant sections of numbers, algebra and geometry, plane and spherical trigonometry, matrices, determinants and vectors, curves and surfaces, integral and differential calculus, partial derivatives, with an emphasis on geospatial applications. Concepts of geospatial coordinate systems and geospatial coordinate transformations; overview of spatial statistics and best-fit solutions with geospatial applications.
Prerequisite: GISC 2470.

GISC 3325 Geodetic Science
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
Prerequisite: GISC 2470.

GISC 3412 Geospatial Plane Measurement II
4 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)
Principles and reduction of observations and errors in spatial measurement. Techniques of horizontal and vertical angle measurement for precise positioning. Trigonometric heighting and vertical staff tacheometry. Setting out of structures. Design and computation of horizontal and vertical curves. Spring.
Prerequisite: (GISC 2470 and 1336).
*May be taken concurrently.

GISC 3420 Geospatial Software Systems II
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
Advanced programming course focusing on the design and implementation of GIS scripts and GIS web applications. Topics covered include GIS web applications, web mashups, GIS scripts, GIS tool creation, and advanced user interface design and implementation. Spring.
Prerequisite: GISC 2301 and (COSC 1435 or 1330).

GISC 3421 Visualization for GIS
4 Semester Credit Hours (3 Lecture Hours, 3 Lab Hours)
Basic elements of thematic cartography, cartographic theory, and cartographic projections. Integration of cartographic principles with GIS visualization. Principles of map design with GIS data. Spring.
Prerequisite: GISC 2301.

GISC 4180 Geospatial Systems Internship
1 Semester Credit Hour (1 Lecture Hour)
Internship education requires work with approved Geospatial Systems related industry employer. Students provide weekly written reports and final presentation to program at the end of internship. Must have completed 60 semester hours before attempting. Fall, Spring, and Summer.
GISC 4305  Legal Aspects of Spatial Information
3 Semester Credit Hours (3 Lecture Hours)
Legal ownership of spatial data and information collected in the public
sector. Public access to large digital databases. Copyright law as applied
to spatial data. Legal issues related to property boundaries, statutory
boundaries, voter district boundaries, and jurisdictional boundaries.
Government fees and charges for access to spatial data. Social and
economic value of spatial data. Spring.
Prerequisite: GISC 2470.

GISC 4315  Satellite Positioning
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
Global reference systems. Use of satellite for navigation and positioning
systems. History and review of satellite positioning systems.
Measurement techniques using GPS. Point, differential, and kinetic
positioning techniques. Error sources in satellite positioning. Future
trends in satellite positioning technology. Fall.
Prerequisite: GISC 2470 and MATH 2413.

GISC 4318  Cadastral Systems
3 Semester Credit Hours (3 Lecture Hours)
Land ownership recording systems used in Texas and U.S. Investigation
and research for artificial and natural boundaries. Title searches at the
county courthouse, title plants, and other sources for cadastral research.
Riparian and littoral boundaries. Boundary marking and preparation of
cadastral plans. Metes and bounds descriptions. Writing field notes.
Urban and rural cadastral issues. Use of coordinate systems in cadastral
mapping. Fall.
Prerequisite: GISC 3412.

GISC 4320  Hydrography
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
Introduction to offshore and inshore hydrographic mapping. Tidal
datum and their computation. Review of hydrographic and nautical
charts. Electronic position finding and bathymetric data collection. Echo
 sounding, side scan sonar. Seafloor mapping and underwater locating.
Beach (combined land and hydrographic) mapping. Spring even years.
Prerequisite: GISC 2470 and MATH 2413.

GISC 4326  Geomatics Professional Practice
3 Semester Credit Hours (3 Lecture Hours)
An intensive one-week summer course presented by practicing
geomatics professionals covering many of the aspects of operating
a professional surveying practice in the State of Texas. Topics cover
surveyor responsibility and liability, the surveyor in court, standards of
practice, surveying mathematics, Texas coordinate system, celestial
observations, and project control.
Prerequisite: GISC 2250.

GISC 4335  Geospatial Systems III
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
Advanced spatial analysis and modeling in GIS. Topics covered
include exploratory analysis of spatial data, network analysis, spatial
point patterns, area objects and spatial autocorrelation, and spatial
interpolation. Also covers new approaches to spatial analysis. Fall.
Prerequisite: GISC 2301 and MATH 3342.

GISC 4340  Geospatial Computations and Adjustment
3 Semester Credit Hours (3 Lecture Hours)
Theory of least squares adjustment of spatial data. Use of matrices for
the solution of equations. Propagation of variances and statistical testing
of adjustment solutions. Error ellipses and confidence intervals. Spring.
Prerequisite: GISC 2470 and 3300.