The study of geography investigates the spatial variation in natural and human phenomena, such as climate, landforms, vegetation, cultural diversity, and resource utilization. Geographers use this understanding to explain the character of regions; to ascertain the ways in which humans—historical and contemporary—have utilized and shaped the earth’s surface; and to predict future patterns and interactions between humans and the natural environment.

Geographic Information Systems (GIS)

Geographic Information System (GIS) is an emerging, powerful technology used to capture, store, transform, manage, analyze, and display spatial information. This technology has a wide range of applications in planning decisions by government agencies, business, and industry. According to an Environmental Sciences Research Institute survey, over 80 percent of the data used for decision-making in government and industry has a spatial component. New areas of rapid growth are in criminal analysis, marketing, retail site location, banking, healthcare planning, insurance, and real estate.

Career Opportunities

Most local, state, and federal government agencies use GIS, as do businesses, planners, architects, foresters, geologists, archeologists, and so on. The growth of GIS has been a marketing phenomenon of amazing breadth and depth and will remain so for many years to come. It is likely that all students, regardless of their particular field of interest, will at least come across and probably use a GIS in some way in the years ahead. The purpose of this program is to prepare students for careers in this expanding technology.

Geographic Information Systems

Two certificates in GIS have been developed. The certificate in GIS (applications emphasis), which was approved by the California Community Colleges Chancellor’s Office in 2001, is offered for students interested in traditional analysis of spatial phenomena using GIS with applications in geography, forestry, natural resource management, economics, marketing, criminology, etc. The certificate in GIS-Web Applications and programming (approval pending from the California Community Colleges Chancellor’s office) emphasizes the computer science aspects of GIS, including database design, database management, programming, web page design, and internet applications.

Requirements for Degree Major 36-40 units

Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>GEOG 330</td>
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<td>ANTH 320</td>
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<td>BIOL 300</td>
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<td>BIOL 310</td>
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<td>GEOG 380</td>
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<tr>
<td>GEOG 498 (1-3 units)</td>
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Concentration Requirements

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<td>GEOG 498 (1-3 units)</td>
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Recommended Electives

CISA 315, 316, 320, 321, 340; CISP 350, 370, 409; DESGN 100
<table>
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<th>Requirements for Certificate</th>
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</tbody>
</table>

Recommended Electives
CISA 315, 316, 320, 321, 340; CSP 340, 350, 370, 409; DESGN 100

General Education Graduation Requirements: In addition to completing the degree requirements, students must also complete the general education graduation requirements for an AA/AS degree. See ARC graduation requirements.

GEOG 300   Physical Geography: Exploring Earth's Environmental Systems  3 Units
Formerly: GEOG 1
Prerequisite: None
Advisory: MATH 100, ENGRD 116, ENGWR 51, or ESLW 310.
Course Transferable to UC/CSU
Hours: 54 hours LEC
This course presents a systematic survey of the physical earth and the natural processes that influence humankind. The course provides an introduction to the use of maps and other tools employed in the analysis of patterns of weather, climate, soils, landforms, and vegetation. (CAN GEOG 2) AA/AS area 3A; CSU area B1; IGETC area 5A.

GEOG 301   Physical Geography Laboratory  1 Unit
Prerequisite: None
Corequisite: GEOG 300.
Course Transferable to UC/CSU
Hours: 54 hours LAB
This course is a laboratory study of basic principles and concepts involved in understanding Earth’s environmental systems. Labs feature observation, collection, analysis and display of data related to the study of energy, weather and climate, vegetation, soils, landforms, and environmental hazards. Additionally, units feature geographic methods and technology, including interpretation of maps and other geographic imagery, weather instrumentation, the global positioning system (GPS), and relevant computer and Internet applications. Field trips may be required. AS area 3A; CSU area B1; IGETC area 5A.

GEOG 306   Weather and Climate  3 Units
Prerequisite: None
Course Transferable to UC/CSU
Hours: 54 hours LEC
This course is an introduction to atmospheric processes including energy and moisture exchanges, atmospheric pressure, global circulation, precipitation processes, weather systems, severe weather, and world, regional, and local climate systems. Course content also includes observation and analysis of atmospheric data using charts, weather maps, and radar and satellite imagery from the Internet and other sources. AA/AS area 3A

GEOG 307   Environmental Hazards and Natural Disasters (same as Geology 325) 3 Units
Formerly: GEOG 13
Prerequisite: None
Course Transferable to UC/CSU
Hours: 54 hours LEC
This course covers the environmental effects and applications of Earth-related processes. It focuses on earthquakes, volcanic eruptions, landslides, and flooding; availability and exploitation of natural resources; waste disposal; and global climate change. Humans as a force in environmental change will be emphasized. The course addresses geology, engineering, environmental studies, geography, and science education. One field trip is required. Not open to students who have completed GEOL 325. AA/AS area 3A; CSU area B1.

GEOG 308   Introduction to Oceanography (Same as Geology 330) 3 Units
Prerequisite: None
Advisory: GEOG 300 or GEOL 300.
Course Transferable to UC/CSU
Hours: 54 hours LEC
This course is an integrated study of water on Earth emphasizing physical oceanography. Topics include ocean and shoreline processes, plate tectonics, sea floor morphology, types and distribution of seafloor sediment, ocean sediment transport, ocean chemistry, ocean currents, marine resources, and environmental concerns. Regional oceanographic features are emphasized and a field trip to gain familiarity with regional physical shoreline features is required. This course is not open to students who have completed GEOL 330. AA/AS area 3A; CSU area B1; IGETC area 5A.

GEOG 309   Introduction to Oceanography Lab (Same as GEOL 331) 1 Unit
Prerequisite: None
Advisory: GEOG 300 or GEOL 300.
Course Transferable to UC/CSU
Hours: 54 hours LAB
This course is a laboratory investigation of water on Earth, emphasizing the shape of the sea floor, marine navigation, plate tectonics, sea floor materials and their utilization, the spatial distribution of ocean sediment, the physical and chemical nature of sea water, currents, tides, and marine weather. This course is not open to students who have completed GEOL 331. CSU area B1; IGETC area 5A.

GEOG 310   Human Geography: Exploring Earth's Cultural Landscapes  3 Units
Formerly: GEOG 2
Prerequisite: None
Advisory: ENGRD 116 or ESLR 320; ENGWR 51 or ESLW 310; MATH 32.
Course Transferable to UC/CSU
Hours: 54 hours LEC
This course considers the diverse patterns of human development, attitudes, and movement on earth. People's various societal and economic systems and their different levels of interaction with nature are studied. World population and world food systems are surveyed and analyzed. The growth of cities and urban areas are considered, as are aspects of regional planning. The goal is to gain an understanding of people's place on earth and, thus, improve human relations and also people's relationship to the earth. (CAN GEOG 4) AA/AS area 3C & 3F; CSU area D3; IGETC area 4.
**GEOG 320  World Regional Geography  3 Units**  
Prerequisite: None  
Course Transferable to UC/CSU  
Hours: 54 hours LEC  
This course is a global survey of the world’s cultural regions. Basic geographic concepts and ideas are used to study and compare people, resources, landscapes, livelihood and economics, and origins across eight major geographic regions. The interaction of countries and regions, their global roles, and the conflicting pressures of cultural diversity versus globalization are presented. The widening gap between more developed and less developed countries is integrated throughout. Cultural and ethnic diversity, as it pertains to the expanding population of the United States, is also a major component. AA/AS area 3C & 3F; CSU area D3; IGETC area 4.

**GEOG 322  Geography of California  3 Units**  
Prerequisite: None  
Course Transferable to UC/CSU  
Hours: 54 hours LEC  
This course is a study of the various natural and cultural environments of California, with special emphasis on the interaction of landforms, climate, natural vegetation, soils and resources with people. Historical, political, and economic development within this diverse environment is presented. The diversity of cultures which make up the state’s expanding population are studied and compared. Analysis of relevant issues of the day including those based on ethnic and cultural differences form an integral part of this course. AA/AS area 3F; CSU area D3; IGETC area 4.

**GEOG 330  Introduction to Geographic Information Systems  3 Units**  
Prerequisite: None  
Advisory: CISC 300.  
Course Transferable to UC/CSU  
Hours: 54 hours LEC  
A Geographic Information System (GIS) is a computer-based data processing tool used to manage and analyze spatial information. Applications of GIS include environmental assessment, analysis of natural hazards, site analysis for business and industry, resource management, and land-use planning. This course introduces the concepts, techniques, and tools of GIS including data acquisition, management, manipulation, and analysis, and cartographic output. AA/AS area 3D.

**GEOG 334  Introduction to Desktop GIS  4 Units**  
Prerequisite: None  
Advisory: CISC 300.  
Course Transferable to CSU  
Hours: 60 hours LEC; 36 hours LAB  
This course provides the foundation for and experience with using desktop geographic information system software. It also provides the conceptual overview and practice needed to take advantage of the software’s display and attribute querying functions. Emphasis is placed on basic GIS software functionality, beginning database construction, spatial analysis/querying, cartographic presentation, and management. Software capabilities for spatial analysis and network analysis are explored. This course may be taken four times on a different software package or version.

**GEOG 340  Cartographic Design for GIS  3 Units**  
Formerly: GEOG 20  
Prerequisite: GEOG 330 with a grade of “C” or better.  
Advisory: CISC 300 (IBM Compatible Computers and Microsoft Windows).  
Course Transferable to CSU  
Hours: 54 hours LEC  
This course provides a comprehensive study of GIS applicable cartographic including cartographic principles. Data acquisition methods used in map production, and methods of base map development. The course will include the study of cartography to include history, principles, map projections, map scale, types of thematic maps, and map accuracy. Techniques used in GIS base map development (scanning, digitizing, and coordinate geometry) will be introduced using hands-on exercises. The course will include the production and presentation techniques of professional quality maps. The course will include hands-on work in computer-assisted mapping projects.

**GEOG 344  Spatial Analysis and Modeling in GIS  3 Units**  
Formerly: GEOG 23  
Prerequisite: GEOG 330 with a grade of “C” or better.  
Advisory: CISC 300 (IBM compatible Computers and Microsoft Windows); STAT 301.  
Course Transferable to CSU  
Hours: 54 hours LEC  
This course provides a general survey of the fundamentals of spatial information systems and a survey of quantitative techniques applicable to spatial data. This course is focused on the functionality of GIS as an effective tool for modeling and analyzing complex spatial relationships quantitative methods, to include measures of central tendency, dispersion, and density, are discussed. Applications of such methods will be presented using empirical data.

**GEOG 350  Data Acquisition in GIS  3 Units**  
Prerequisite: GEOG 330 with a grade of “C” or better.  
Course Transferable to CSU  
Hours: 54 hours LEC  
This course is an introduction to the techniques, theory, and practical experience necessary to acquire, convert, and create spatial data. Topics include acquisition of existing GIS data, metadata, formatting and format conversion of digital GIS data, creating digital data utilizing digital cameras and scanners, the utilization of remotely sensed data, and use of the Global Positioning System.

**GEOG 354  Introduction to the Global Positioning System (GPS)  1 Unit**  
Prerequisite: None  
Advisory: GEOG 300 and 301.  
Course Transferable to CSU  
Hours: 18 hours LEC  
This course introduces the Global Positioning System (GPS). Topics include the basic concepts of GPS and hands-on operation of the technology, computer interfaces, GIS software, and real-world applications.

**GEOG 360  Database Design and Management in GIS  3 Units**  
Formerly: GEOG 22  
Prerequisite: GEOG 330 with a grade of “C” or better.  
Advisory: CISC 300, CISA 320, CISA 321.  
Course Transferable to CSU  
Hours: 54 hours LEC  
This course examines the principles of database management and design including conversion fundamentals, modeling techniques and strategic planning. The needs, alternatives, and pitfalls of database development and conversion are discussed. In addition, this course also includes the examination of various types of data applicable to GIS and examines relevant issues including hardware and software requirements. Particular attention is paid to determining the appropriate methodology, developing a conversion plan, and data quality assurance. This course includes hands-on practical exercises in database management skills.

**GEOG 362  Advanced Database Design and Management in GIS  3 Units**  
Prerequisite: GEOG 360 with a grade of “C” or better.  
Advisory: CISA 320, CISA 321, and CISC 300.  
Course Transferable to CSU  
Hours: 54 hours LEC  
This course extends the concepts presented in GEOG 360. The advanced applications of organizing, inputting, and editing spatial data are examined and implemented, including topology, performance tuning, spatial service management, and data organization. Traditional spatial database topics are rigorously examined in a GIS context, including data integration, warehousing, complex SQL coding, metadata management, and multi-level security.
GEOG 370 Introduction to GIS Programming 2 Units
Prerequisite: GEOG 334 with a grade of “C” or better.
Course Transferable to CSU
Hours: 30 hours LEC; 18 hours LAB
This course is an introduction to GIS programming utilizing such programming languages as Avenue, Map Objects, and Arc Objects. GIS programming allows the user to modify and customize the software’s graphic user interface (GUI), modify GIS tools and commands, create new GIS software tools, automate GIS operations, and integrate GIS functions with other software applications. This course may be taken up to four times on a different software package or version. AA/AS area 3D

GEOG 371 Intermediate GIS Programming 4 Units
Prerequisite: GEOG 370, or GEOG 330 and CISP 370 with a grade of “C” or better.
Course Transferable to CSU
Hours: 62 hours LEC; 30 hours LAB
This course provides skills and concepts necessary to become a proficient GIS applications developer. The course utilizes a programming software (such as ArcObjects or Geoprocessing Tools) in conjunction with a programming language (such as Visual Basic for Applications or VB Script) to develop complex GIS procedures and functions. The course focuses on advanced methods for querying, symbolizing, displaying, and analyzing spatial data. This course may be taken up to four times on a different software package or version.

GEOG 380 Intermediate Desktop GIS with Applications 4 Units
Formerly: GEOG 28A
Prerequisite: GEOG 330 and one course from the following: GEOG 340, 344, 350, or 360 with a grade of “C” or better.
Course Transferable to CSU
Hours: 54 hours LEC; 54 hours LAB
This course provides an overview of a full-feature, powerful desktop GIS software (such as ArcGIS 8.x). Software will be used to apply reprocessing concepts to solving geographic problems. Emphasis is placed on the software’s topological data model, geodatabase model, creating and editing spatial data to produce map displays, working with attribute data, and the basics of grid processing. This course may be taken four times on a different software package or version.

GEOG 385 Introduction to Web Based GIS Application Development 4 Units
Formerly: GEOG 29
Prerequisite: GEOG 330 and CISW 300.
Advisory: CISW 310.
Course Transferable to CSU
Hours: 63 hours LEC; 27 hours LAB
This course introduces the development of web-based GIS solutions. Web-authoring tools and Internet map servers (such as ArcIMS) will be used to teach the techniques of Internet mapping and interactive user interface design for GIS applications. Focus will be on the theories and principles behind Internet mapping to perform spatial analysis, on GIS application development, and on web design for Internet mapping systems.

GEOG 386 Using GIS for Disaster Management 3 Units
Prerequisite: GEOG 330 or 334 with a grade of “C” or better.
Course Transferable to CSU
Hours: 44 hours LEC; 30 hours LAB
This course provides an introduction to the use of GIS as a powerful tool in disaster management. Techniques and skills in the application of spatial information and analysis technologies to the problems of disaster and complex emergency management are investigated. GIS software and GPS technology are used to visualize, analyze, and represent spatial data in the protection of life, property, and critical infrastructure from natural disasters. Key GIS applications include natural hazard identification and mapping, multi-hazard analysis, shelter planning, mitigation, damage assessment, and recovery monitoring.