

Area: Science and Engineering
 Dean: Rina Roy (Interim)
 Phone: (916) 484-8107
 Counseling: (916) 484-8572

Degree: A.S. - Geography
 A.S. - Geographic Information Systems
 Certificate: Geographic Information Systems (GIS) -
 Interdisciplinary Applications

Geography Degree

The A.S. degree provides students with a solid foundation in geography as well as the standard prerequisites for upper division coursework leading to the baccalaureate degree. The required and elective coursework surveys a broad spectrum of physical geography, cultural geography, geographic information sciences, and related disciplines.

Career Opportunities

The opportunities for geographers are as varied as the scope of geography itself. Geographers are found throughout the public and private sector, though rarely in positions with the title of Geographer. When combined with appropriate internships and/or other work experience, a baccalaureate degree in geography is excellent preparation for careers such as natural resource management, environmental consulting, urban and regional planning, and elementary and secondary teaching.

Requirements for Degree	19-20 Units
GEOG 300 Physical Geography: Exploring Earth's Environmental Systems	3
GEOG 301 Physical Geography Laboratory	1
GEOG 310 Human Geography: Exploring Earth's Cultural Landscapes	3
GEOG 330 Introduction to Geographic Information Systems (3)	3 - 4
or GEOG 334 Introduction to Desktop GIS (4)	
or CISC 310 Introduction to Computer Information Science (3)	
PSYC 330 Introductory Statistics for the Behavioral Sciences (3)	3
or STAT 301 Introduction to Probability and Statistics (3)	
<i>And a minimum of 6 units from the following:</i>	6 ¹
ANTH 310 Cultural Anthropology (3)	
BIOL 352 Conservation Biology (3)	
or BIOL 310 General Biology (4)	
or BIOL 305 Natural History (4)	
ECON 304 Principles of Microeconomics (3)	
or ECON 302 Principles of Macroeconomics (3)	
GEOG 306 Weather and Climate (3)	
GEOG 320 World Regional Geography (3)	
GEOG 322 Geography of California (3)	
GEOG 390 Field Studies in Geography (0.5 - 4)	
GEOL 300 Physical Geology (3)	
GEOL 301 Physical Geology Laboratory (1)	
GEOL 330 Introduction to Oceanography (3)	
GEOL 331 Introduction to Oceanography Lab (1)	
HIST 300 History of Western Civilization (3)	
or HIST 302 History of Western Civilization (3)	
or HIST 327 History of the Chicano/Mexican American (3)	
or HIST 325 History of Asian/Pacific Americans (3)	
or HIST 320 History of the United States: African-American Emphasis (3)	
or HIST 311 History of the United States (3)	
or HIST 310 History of the United States (3)	
HUM 320 Asian Humanities (3)	
PHIL 350 Philosophy of Religion (3)	
POLS 310 Introduction to International Relations (3)	
SOC 300 Introductory Sociology (3)	

¹A maximum of 2 units from GEOG 390 will be counted toward the degree requirement.

Associate Degree Requirements: The Geography Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

Geographic Information Systems (GIS) Degree

Geographic Information Systems (GIS) is a technology used to capture, sort, transform, manage, analyze, model, and display spatial information. This technology has a wide range of applications in planning and management decisions by government agencies, business, and industry. The Associate of Science degree in GIS combines technical GIS coursework with courses in subject areas to which GIS is commonly applied such as biology, natural resources, marketing, and real estate. Refer to the department web site (<http://www.arc.losrios.edu/~earthsci/GIS/GISindex.html>) for a suggested sequence of courses

Career Opportunities

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 in GIS include criminal justice, homeland security, marketing, retail site location, resource allocation, banking, health-care planning, disease control, insurance, real estate, and disaster preparedness, management, and response.

Requirements for Degree	37-40 Units
GEOG 330 Introduction to Geographic Information Systems	3
GEOG 334 Introduction to Desktop GIS	4
GEOG 340 Cartographic Design for GIS	3
GEOG 344 Spatial Analysis and Modeling in GIS	3
GEOG 350 Data Acquisition in GIS	3
GEOG 354 Introduction to the Global Positioning System (GPS)	1
GEOG 360 Database Design and Management in GIS	3
GEOG 362 Advanced Database Design and Management in GIS (3)	3
or GEOG 386 Using GIS for Disaster Management (3)	
GEOG 375 Introduction to GIS Programming (4)	3-4
or GEOG 376 Intermediate GIS Programming (3)	
GEOG 380 Advanced Desktop GIS	4
GEOG 498 Work Experience in Geography	1 - 4
<i>And a minimum of 6 units from the following:</i>	6
ANTH 320 Introduction to Archaeology and World Prehistory (3)	
BIOL 300 The Foundations of Biology (3)	
BIOL 303 Survey of Biology (4)	
BIOL 310 General Biology (4)	
BIOL 352 Conservation Biology (3)	
BUS 110 Business Economics (3)	
CHEM 320 Environmental Chemistry (4)	
FT 300 Fire Protection Organization (3)	
GEOG 300 Physical Geography: Exploring Earth's Environmental Systems (3)	
GEOG 308 Introduction to Oceanography (3)	
GEOG 310 Human Geography: Exploring Earth's Cultural Landscapes (3)	
GEOL 300 Physical Geology (3)	
GEOL 305 Earth Science (3)	
GEOL 330 Introduction to Oceanography (3)	
MKT 300 Principles of Marketing (3)	

NATR 300	Introduction to Natural Resource Management (3)
NATR 302	Introduction to Wildlife Biology (3)
NATR 304	Introduction to Forestry (3)
NATR 320	Principles of Ecology (3)
PS 300	Introduction to Physical Science (3)
RE 300	California Real Estate Principles (3)

Associate Degree Requirements: The Geographic Information Systems (GIS) Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

Geographic Information Systems (GIS) - Interdisciplinary Applications Certificate

Geographic Information Systems (GIS) is a powerful technology used to capture, sort, transform, manage, analyze, and display spatial information. This technology has a wide range of applications in planning and management decisions by government agencies, business, and industry. The certificate provides a solid technical background in GIS concepts, including spatial analysis, database design, the global positioning system (GPS), and cartography. Completion of the certificate requires an internship in GIS. Refer to the department web site (<http://www.arc.losrios.edu/~earthsci/GIS/GISindex.html>) for a suggested sequence of classes.

Career Opportunities

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 justice, homeland security, marketing, retail site location, resource allocation, banking, health-care planning, disease control, insurance, real estate, and disaster preparedness, management, and response. Most local, state, and federal government agencies use GIS and maintain a staff of GIS technicians, analysts, and professionals. GIS is also commonly used in the private sector by businesses, planners, architects, foresters, geologists, environmental scientists, archaeologists, real estate professionals, marketers, sociologists, and bankers. The growth in application areas of GIS and of GIS as a specialized discipline represents a new way for individuals, agencies, and businesses to view the world. The expansion of jobs in GIS is anticipated to continue for many years to come. It is likely that all students, regardless of their particular field of interest, will at least be exposed to and probably use a GIS in some capacity in the years ahead. The purpose of American River College's GIS program is to prepare students for careers in this expanding technology field.

Requirements for Certificate		31-34 Units
GEOG 330	Introduction to Geographic Information Systems	3
GEOG 334	Introduction to Desktop GIS	4
GEOG 340	Cartographic Design for GIS	3
GEOG 344	Spatial Analysis and Modeling in GIS	3
GEOG 350	Data Acquisition in GIS	3
GEOG 354	Introduction to the Global Positioning System (GPS)	1
GEOG 360	Database Design and Management in GIS	3
GEOG 362	Advanced Database Design and Management in GIS (3)	3
or GEOG 386	Using GIS for Disaster Management (3)	
GEOG 375	Introduction to GIS Programming (4)	3-4
or GEOG 376	Intermediate GIS Programming (3)	
GEOG 380	Advanced Desktop GIS	4
GEOG 498	Work Experience in Geography	1 - 4

GEOG 300 Physical Geography: Exploring Earth's Environmental Systems 3 Units

Advisory: MATH 100, ENGRD 116, ENGRW 51 or ESLW 310, or placement though assessment process.

General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A

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.

GEOG 301 Physical Geography Laboratory 1 Unit

Corequisite: GEOG 300

General Education: AA/AS Area IV; CSU Area B1; CSU Area B3; IGETC Area 5A

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.

GEOG 306 Weather and Climate 3 Units

General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A

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.

GEOG 307 Environmental Hazards and Natural Disasters 3 Units

Same As: GEOL 325.

General Education: AA/AS Area IV

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.

GEOG 308 Introduction to Oceanography 3 Units

Same As: GEOL 330

Advisory: GEOG 300 or GEOL 300

General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A

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 sea-

floor 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.

GEOG 309 Introduction to Oceanography Lab 1 Unit

Same As: GEOL 331

Corequisite: GEOG 308 or GEOL 330

Advisory: GEOG 300 or GEOL 300

General Education: CSU Area B3; IGETC Area 5A

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.

GEOG 310 Human Geography: Exploring Earth's Cultural Landscapes 3 Units

Advisory: ENGRD 116 or ESLR 320; ENGWR 51 or ESLW 310;

MATH 32; or placement through assessment process

General Education: AA/AS Area V(b); AA/AS Area VI; CSU Area D5; IGETC Area 4E

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.

GEOG 320 World Regional Geography 3 Units

General Education: AA/AS Area V(b); AA/AS Area VI; CSU Area D5; IGETC Area 4E

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.

GEOG 322 Geography of California 3 Units

General Education: AA/AS Area V(b); AA/AS Area VI; CSU Area D5; IGETC Area 4C; IGETC Area 4E

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.

GEOG 330 Introduction to Geographic Information Systems 3 Units

Advisory: CISC 300

General Education: AA/AS Area II(b)

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.

GEOG 334 Introduction to Desktop GIS 4 Units

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

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 cartography 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 342 Introduction to Remote Sensing and Digital Image Processing 3 Units

Course Transferable to CSU

Hours: 48 hours LEC; 18 hours LAB

This course introduces the principles and concepts of remote sensing and digital image processing as it relates to Geographic Information Systems (GIS). Fundamentals of remote sensing, aerial photography, satellite imagery, photogrammetry, Radio Detection and Ranging (RADAR) and Laser Incidence Detection and Ranging (LIDAR) are taught. A variety of digital image processing techniques are presented to analyze various remote sensing platforms.

GEOG 344 Spatial Analysis and Modeling in GIS**3 Units***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***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***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 375 Introduction to GIS Programming**4 Units***Prerequisite: GEOG 330 with a grade of "C" or better**General Education: AA/AS Area II(a)**Course Transferable to CSU**Hours: 60 hours LEC; 36 hours LAB*

This course is an introduction to GIS programming using Visual Basic for Applications (VBA) and ArcObjects. These tools allow the user to customize the graphical user interface of popular GIS applications, to automate GIS tasks, and to create new GIS functionality. This course may be taken up to four times on a different software package or version.

GEOG 376 Intermediate GIS Programming**3 Units***Prerequisite: GEOG 375 with a grade of "C" or better.**Course Transferable to CSU**Hours: 45 hours LEC; 27 hours LAB*

This course provides concepts and skills necessary to become a proficient GIS applications developer. It utilizes the Visual Basic for Applications (VBA) and Python scripting languages, in conjunction with ArcObjects, to develop complex GIS procedures and functions. Additionally, the course focuses on advanced methods for controlling feature display, querying, working with selection sets, creating dynamic layouts, editing tables, and performing geoprocessing operations. 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***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***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.

GEOG 390 Field Studies in Geography .5-4 Units

Same As: GEOL 390

Course Transferable to CSU

Hours: 3-24 hours LEC; 18-144 hours LAB

This course involves field study of selected locations of geographic interest. Course content varies according to field trip destination but may include topics in physical geography (e.g., plant and animal communities, climate and weather, geology and geomorphology, natural hazards, environmental impacts, etc.), human geography (e.g., cultural landscapes, economic activities, transportation issues, land use patterns, etc.), and/or introduction to tools and techniques used for geographic field research (e.g., map and compass, the Global Positioning System (GPS), Geographic Information Systems (GIS), etc.). Field excursions are required and field trip expense fees may be required. This course may be taken 4 times using different field trip destinations.

GEOG 498 Work Experience in Geographic Information Systems 1-3 Units

Prerequisite: Placement in an agency, private business, non-profit organization, or other entity.

Corequisite: GEOG 330 and student must be enrolled in a minimum of 7 units, including this course.

Course Transferable to CSU

Hours: 18 hours LEC; 75-225 hours LAB

This course is a directed field study program that provides students with an opportunity to apply classroom instruction in geographic information systems to real-world GIS projects in the community. Students will be under the supervision of an advisor from the college while participating in a short-term work experience program in business or government agency.