

Area: Science and Engineering  
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Degree: A.S. - Geography  
 A.A. for Transfer - Geography  
 A.S. - Geographic Information Systems  
 A.S. - General Science  
 Certificate: Geographic Information Systems (GIS)

## DEGREES AND CERTIFICATES

### Geography Degree

**Major Code: 011536A01**

This degree provides students with a solid foundation in Geography as well as the standard prerequisites for upper-division coursework leading to a baccalaureate degree. The required and elective coursework covers a broad spectrum of Physical Geography, Human Geography, and GIS.

This is not an official transfer degree, such as the Geography AA-T, which guarantees admission to any California State University. However, this degree has been designed with an emphasis on University of California (UC) transferability. With two exceptions, all courses satisfy the Intersegmental General Education Transfer Curriculum (IGETC) that meets freshman/sophomore level general education requirements at a UC. This degree can also be used to prepare students for transfer to geography programs at private institutions, but in all cases students are strongly encouraged to research the lower division requirements at all programs they might be interested in.

### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- describe the general content and scope of collegiate level geography studies.
- compare and contrast the general biophysical and sociocultural differences and similarities among world regions.
- interpret maps and mapped data utilizing basic map elements including scales, coordinate systems, and symbols.
- compare and contrast common geographic information technologies such as Geographic Information Systems (GIS), Global Positioning System (GPS), and remote sensing.
- evaluate and analyze geographic problems and their solutions.
- list and describe at least three career options for geographers.

### 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. Geographic skills and knowledge are also quite valuable in diverse fields such as real estate, marketing, and demography.

Requirements for Degree	20 - 26 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 <sup>1</sup>
or GEOG 331	Exploring Maps and Geographic Technologies (3)
or GEOG 334	Introduction to GIS Software Applications (3)
GEOG 391	Field Studies in Geography: Mountain Landscapes (1 -4) ..... 1 - 4
or GEOG 392	Field Studies in Geography: Coastal Landscapes (1 -4)
or GEOG 393	Field Studies in Geography: Arid Landscapes (1 -4)
or GEOG 394	Field Studies in Geography: Volcanic Landscapes (1 -4)
PSYC 330	Introductory Statistics for the Behavioral Sciences (3) ..... 3 - 6
or STAT 300	Introduction to Probability and Statistics (4)
or STAT 305	Statway, Part II (6)
<b>A minimum of 6 units from the following:..... 6</b>	
GEOG 305	Global Climate Change (3)
or GEOL 320	Global Climate Change (3)
GEOG 306	Weather and Climate (3)
GEOG 307	Environmental Hazards and Natural Disasters (3)
or GEOL 325	Environmental Hazards and Natural Disasters (3)
GEOG 308	Introduction to Oceanography (3)
or GEOL 330	Introduction to Oceanography (3)
GEOG 309	Introduction to Oceanography Lab (1)
or GEOL 331	Introduction to Oceanography Lab (1)
GEOG 320	World Regional Geography (3)
GEOG 322	Geography of California (3)

<sup>1</sup> GEOG 331 is recommended for students who plan to transfer to a California State University.

**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.

### Geography A.A. for Transfer Degree

**Major Code, CSU GE: 011535A01**

**Major Code, IGETC: 011535A02**

The Associate in Arts in Geography for Transfer degree provides students with a major that fulfills the general requirements of the California State University for transfer. Students with this degree will receive priority admission with junior status to the California State University system. The Associate in Arts in Geography for Transfer (AA-T) degree may be obtained by the completion of 60 transferable, semester units with a minimum 2.0 GPA, including (a) the major or area of emphasis described in the Required Program outlined below (earning a C or better in these courses) and (b) either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education Breadth Requirements.

In addition to fulfilling transfer requirements, this degree exposes students to the core principles and practices of Geography. Students interested in transferring to a CSU campus to pursue a bachelor's degree in geography should meet with a counselor to confirm the courses required for lower division preparation in the major. Although additional preparatory courses are not required for this degree, a careful review of the requirements at your chosen CSU will increase the likelihood that your transfer experience is smooth and successful.

## Student Learning Outcomes

Upon completion of this program, the student will be able to:

- describe the general content and scope of baccalaureate-level geography studies.
- compare and contrast the general biophysical and sociocultural differences and similarities among world regions.
- interpret maps and mapped data utilizing basic map elements, including scales, common coordinate systems, and map symbols.
- compare and contrast common geospatial technologies such as Geographic Information Systems (GIS), Global Positioning System (GPS), and remote sensing.
- evaluate and analyze common geographic problems and their solutions.
- list and describe at least three career options for geographers.

## 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 in natural resource management, environmental consulting, urban and regional planning, and elementary and secondary teaching. Geographic skills and knowledge are also quite valuable in diverse fields such as real estate, marketing, and demography.

Requirements for Degree		19 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
<b>A minimum of 6 units from the following:.....</b>		<b>6</b>
GEOG 306	Weather and Climate (3)	
GEOG 320	World Regional Geography (3)	
GEOG 322	Geography of California (3)	
GEOG 331	Exploring Maps and Geographic Technologies (3)	
GEOG 391	Field Studies in Geography: Mountain Landscapes (1 - 4)	
GEOG 392	Field Studies in Geography: Coastal Landscapes (1 - 4)	
GEOG 393	Field Studies in Geography: Arid Landscapes (1 - 4)	
GEOG 394	Field Studies in Geography: Volcanic Landscapes (1 - 4)	
<b>A minimum of 6 units from the following:.....</b>		<b>6<sup>1</sup></b>
ANTH 310	Cultural Anthropology (3)	
GEOG 305	Global Climate Change (3)	
GEOG 307	Environmental Hazards and Natural Disasters (3)	
GEOG 330	Introduction to Geographic Information Systems (3)	
GEOG 300	Physical Geology (3)	

<sup>1</sup>Students may also substitute any course from the previous list not already taken to fulfill degree requirements.

**Associate in Arts for Transfer Degree Requirements:** The Geography Associate in Arts for Transfer (A.A.T.) Degree may be obtained by completion of 60 transferable, semester units with a minimum 2.0 GPA, including (a) the major or area of emphasis described in the Required Program, and (b) either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education-Breadth Requirements.

## Geographic Information Systems (GIS) Degree

**Major Code: 011364A01**

Geographic Information Systems (GIS) are collections of computers, software applications, and personnel used to capture, store, transform, manage, analyze, and display spatial information. This powerful technology has a wide range of applications in planning and management by government agencies, business, and industry. The A.S. Degree provides a solid technical background in GIS concepts and applications including database design, the Global Positioning System (GPS), cartography, GIS programming, spatial analysis, and interdisciplinary applications of the technology. The degree also includes ARC General Education and elective courses, which are required for graduation. Completion of the degree requires practical work experience in GIS.

## Student Learning Outcomes

Upon completion of this program, the student will be able to:

- assess and describe fundamental aspects of geographic information and scale, with specific reference to raster and vector digital spatial data models used to represent such information.
- evaluate and compile various types of spatial data, with specific attention to geospatial metadata, data quality, and identification of the most appropriate data type for use in a specific GIS application.
- compare and contrast the variety of available coordinate systems, map projections, and datums, and choose the appropriate variety for a specific GIS application.
- originate, classify, edit, and manage digital spatial data using various techniques (e.g., manual, scan, and on-screen digitizing, computer-assisted drafting, GPS, etc.).
- design, synthesize, validate, optimize, and manage spatial attribute tables and databases.
- apply appropriate data normalization and classification schemes to attribute data.
- formulate geoprocessing and analysis functions that are appropriate for specific applications, and be able to perform and evaluate the results of such processes (such as buffering, overlay, reclassification, address matching, and statistical analysis).
- compare and contrast the effectiveness of various GIS output products, including maps, tables, charts, and other digital output for specific applications.
- describe, assess, and compare common map elements and the cartographic design process.
- synthesize, design, apply, and manage a GIS project, including estimates of time and labor requirements.
- propose at least three examples of GIS applications that document spatial distributions or solve spatial problems.
- list and describe at least three career options for GIS professionals.
- design, create, and disseminate high-quality maps in both hard-copy (paper) and digital (on-screen) forms.
- compare and contrast the effectiveness of hard-copy and digital maps.
- analyze problems encountered in the study of other disciplines, and formulate appropriate GIS solutions.

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**(Geographic Information Systems (GIS) Degree continued)**

**Career Opportunities**

According to an Environmental Systems 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 technological field.

Requirements for Degree	32.5-35.5 Units
GEOG 330	Introduction to Geographic Information Systems .....3
GEOG 334	Introduction to GIS Software Applications .....3
GEOG 340	Cartographic Design for GIS .....3
GEOG 342	Introduction to Remote Sensing and Digital Image Processing .....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) ..... 1.5
GEOG 360	Database Design and Management in GIS .....3
GEOG 362	Advanced Database Design and Management in GIS .....3
GEOG 375	Introduction to GIS Programming .....3
GEOG 385	Introduction to Web Based GIS Application Development .....3
GEOG 498	Work Experience in Geography ..... 1 - 4

**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.

**General Science Degree**

**Major Code: 011229A01**

This program provides a broad study in the fields of biological and physical sciences in preparation for transfer to a four-year program and continuation of studies in upper division science courses.

**Student Learning Outcomes**

*Upon completion of this program, the student will be able to:*

- evaluate new and accepted ideas about the natural universe using scientific methods.
- analyze a wide variety of natural phenomena using basic definitions and fundamental theories of biological or physical sciences.
- apply appropriate quantitative and qualitative methods to interpret and analyze pertinent data.

- outline the basic concepts and fundamental theories of a natural science.
- articulate orally and/or in writing the importance of continuous examination and modification of accepted ideas as a fundamental element in the progress of science.
- discuss ethical components of scientific decision making and apply personal and social values within the process of decision making in scientific endeavors.

**Requirements for Degree 18 Units**

A minimum of 18 units from the following: ..... 18<sup>1</sup>

**Physical Science Courses:**

ASTR	300, 310, 320, 330, 400, 481, 495, 499
CHEM	305, 306, 309, 310, 400, 401, 420, 421, 423, 495, 499
GEOG	300, 301, 305, 306, 307, 308, 309, 391, 392, 393, 394, 495, 499
GEOL	300, 301, 305, 306, 310, 311, 320, 325, 330, 331, 345, 390, 495, 499
PHYS	310, 311, 312, 350, 360, 410, 421, 431, 495, 499
PS	300, 301, 495, 499

**Biological Science Courses:**

ANTH	300, 301, 303, 370, 372, 480, 495, 499
BIOL	300, 301, 303, 305, 310, 322, 332, 342, 352, 370, 375, 390, 400, 410, 415, 420, 430, 431, 440, 442, 482, 495, 499
BIOT	301, 305, 307, 311, 312, 499
NATR	300, 302, 303, 304, 305, 306, 307, 310, 320, 322, 324, 330, 332, 346, 495, 499
PSYC	310, 311, 495, 499

<sup>1</sup>must be transfer-level and must include one laboratory course in a physical science and one laboratory course in a biological science

**Associate Degree Requirements:** The General Science 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) - Certificate**

**Major Code: 011364C01**

Geographic Information Systems (GIS) are collections of computers, software applications, and personnel used to capture, store, transform, manage, analyze, and display spatial information. This powerful technology has a wide range of applications in planning and management by government agencies, business, and industry. The certificate provides a solid technical background in GIS concepts and applications including database design, the Global Positioning System (GPS), cartography, GIS programming, spatial analysis, and interdisciplinary applications of the technology. Completion of the certificate requires practical work experience in GIS.

**Student Learning Outcomes**

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- evaluate and compile various types of spatial data, with specific attention to geospatial metadata, data quality, and identification of the most appropriate data type for use in a specific GIS application.
- compare and contrast the variety of available coordinate systems, map projections, and datums, and choose the appropriate variety for a specific GIS application.

- originate, classify, edit, and manage digital spatial data using various techniques (e.g., manual, scan, and on-screen digitizing, computer-assisted drafting, GPS, etc.).
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- apply appropriate data normalization and classification schemes to attribute data.
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- compare and contrast the effectiveness of various GIS output products, including maps, tables, charts, and other digital output for specific applications.
- describe, assess, and compare common map elements and the cartographic design process.
- synthesize, design, apply, and manage a GIS project, including estimates of time and labor requirements.
- propose at least three examples of GIS applications that document spatial distributions or solve spatial problems.
- list and describe at least three career options for GIS professionals.
- design, create, and disseminate high-quality maps in both hard-copy (paper) and digital (on-screen) forms.
- compare and contrast the effectiveness of hard-copy and digital maps.
- analyze problems encountered in the study of other disciplines, and formulate appropriate GIS solutions.

### Career Opportunities

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See [losrios.edu/gainful-emp-info/gedt.php?major=011364C01](http://losrios.edu/gainful-emp-info/gedt.php?major=011364C01) for Gainful Employment Disclosure.

Requirements for Certificate	29.5-32.5 Units
GEOG 330	Introduction to Geographic Information Systems.....3
GEOG 334	Introduction to GIS Software Applications.....3
GEOG 340	Cartographic Design for GIS.....3
GEOG 342	Introduction to Remote Sensing and Digital Image Processing.....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) ..... 1.5
GEOG 360	Database Design and Management in GIS.....3
GEOG 498	Work Experience in Geography..... 1 - 4
<b>And a minimum of 6 units from the following:</b> .....6	
GEOG 362	Advanced Database Design and Management in GIS (3)
GEOG 375	Introduction to GIS Programming (3)
GEOG 385	Introduction to Web Based GIS Application Development (3)

## Geography

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

*Advisory: MATH 32 or MATH 42, AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.*  
*General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC*

This course explores the processes and interrelationships which shape Earth's natural landscapes. Key topics include solar energy balance, weather and climate, water resources, landforms, natural hazards, soil, and vegetation. Relevant application of these concepts is used to explain the evolving relationship between humans and Earth's natural systems. Field trips may be required to relate course content to the real world. (C-ID GEOG 110)

### **GEOG 301 Physical Geography Laboratory** **1 Unit**

*Corequisite: GEOG 300*  
*Advisory: MATH 32 or 42 with a grade of "C" or better; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.*  
*General Education: CSU Area B3; IGETC Area 5C*  
*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. (C-ID GEOG 111)

### **GEOG 305 Global Climate Change** **3 Units**

*Same As: GEOL 320*  
*Advisory: MATH 100 or 104 with a grade of "C" or better; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.*  
*General Education: AA/AS Area IV; CSU Area B1; IGETC Area 5A*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC*

This course explores the history and mechanisms of climate change in Earth's past, as well as the methods that scientists use to investigate climate change. It also focuses on climate change in Earth's recent history (the past few million years) and the role that humans have had in climate change, especially since the industrial revolution. Additionally, it investigates the effects of climate change in today's world and discusses possible technological and political solutions to this vast and increasingly important problem, and how societies may adapt to the changes. Field trips may be required. This course is not open to students who have completed GEOL 320.

**GEOG 306 Weather and Climate 3 Units**

*Advisory: MATH 32 or 42; and Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.*

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

*Course Transferable to UC/CSU*

*Hours: 54 hours LEC*

This course introduces atmospheric processes including energy and moisture exchanges; atmospheric pressure; global circulation; precipitation processes; weather systems; severe weather; and world, regional, and local climate systems. It also includes observation and analysis of atmospheric data using charts, weather maps, and radar and satellite imagery from the Internet and other sources. Field trips may be required to reinforce course content. (C-ID GEOG 130)

**GEOG 307 Environmental Hazards and Natural Disasters 3 Units**

*Same As: GEOL 325*

*Advisory: MATH 100, 104, or 132; AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.*

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

*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, flooding, hurricanes, as well as covering related current events. Topics also include the availability and exploitation of natural resources, waste disposal, and global climate change. Humans as a force in environmental change are emphasized. This course addresses geology, engineering, environmental studies, natural resources, geography, and science education. One field trip is required. This course is not open to students who have completed GEOL 325.

**GEOG 308 Introduction to Oceanography 3 Units**

*Same As: GEOL 330*

*Advisory: GEOG 301 or GEOL 301*

*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 the world's oceans, including the physical, chemical, biological and human-made processes that affect the oceans. Topics include plate tectonics, ocean basins and sediments, water chemistry, waves, tides, shoreline processes, ocean currents and its biosystems. Humans have impacted nearly all aspects of the oceans, which are critical to our species. 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 301 and GEOL 301*

*General Education: CSU Area B3; IGETC Area 5C*

*Course Transferable to UC/CSU*

*Hours: 54 hours LAB*

This course is a laboratory investigation of Earth's oceans, emphasizing coastal processes of California. Most laboratory exercises are incorporated into field studies of California's coast, which involves visiting and comparing several distinct coastal environments. Camping is required, and a small fee is to be paid by the student. This course is not open to students who have completed GEOL 331.

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

*Advisory: MATH 32 or 42 with a grade of "C" or better or placement through the assessment process; AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.*

*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 investigates the diverse patterns of human settlement, development, and movement on earth, which evolved as a result of cultural and environmental factors. Emphasis is placed on understanding global population and migration patterns, language, religion, ethnicity, political and economic systems, development issues, agriculture, and urbanization. (C-ID GEOG 120)

**GEOG 320 World Regional Geography 3 Units**

*Advisory: MATH 32 or 42; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.*

*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 major geographic regions. Basic geographic concepts and ideas are used to study and compare cultures, resources, landscapes, economies, and political structures across all geographic regions. The interaction of countries and regions, their global roles, and the conflicting pressures of cultural diversity and globalization are presented. The widening gap between more developed and less developed countries and regions is integrated throughout the course, with a particular focus on comparing and contrasting conditions in North America and the United States with those in the rest of the world. (C-ID GEOG 125)

**GEOG 322 Geography of California 3 Units**

*Advisory: MATH 32 or 42 with a grade of "C" or better; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.*

*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 study of the various natural and cultural environments of California, with special emphasis on the interaction of people with landforms, climate, natural vegetation, soils and resources. Historical, political, and economic development within this diverse environment is presented. The diversity of cultures which make up the state's expanding population is studied and compared. Analysis of current relevant issues, including those based on ethnic and cultural differences, forms an integral part of this course. (C-ID GEOG 140)

**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*

This course provides an introduction to the concepts, methods, and applications of Geographic Information Systems (GIS). It emphasizes the techniques used to capture, store, query, analyze, and display spatial data. Specific topics include applications of GIS, geographic information and scale, coordinate systems, geospatial data models, data classification and symbolization, query and selection, cartographic design, data acquisition, data quality, geoprocessing, relational databases, metadata, spatial analysis, and GIS software.

**GEOG 331 Exploring Maps  
and Geographic Technologies 3 Units**

*Advisory: CISC 300 and GEOG 300*

*General Education: AA/AS Area IV (effective Summer 2017)*

*Course Transferable to UC/CSU*

*Hours: 50 hours LEC; 12 hours LAB*

This course introduces students to the world of maps (both hard-copy and digital) and the geographic techniques and technologies that are utilized in the creation of modern cartographic documents. Examination of cartographic design, basic statistics, the Global Positioning System (GPS), Internet mapping, remote sensing, and Geographic Information Systems (GIS) are covered. (C-ID GEOG 150)

**GEOG 334 Introduction to  
GIS Software Applications 3 Units**

*Advisory: CISC 300 and GEOG 330*

*Course Transferable to CSU*

*Hours: 50 hours LEC; 12 hours LAB*

This course provides the conceptual and practical foundations for using Geographic Information Systems (GIS) software. It emphasizes basic GIS software functionality including map display, attribute and spatial query, address geocoding, spatial database management, spatial analysis, cartographic presentation, and spatial data management. (C-ID GEOG 155)

**GEOG 340 Cartographic Design for GIS 3 Units**

*Prerequisite: GEOG 330 with a grade of "C" or better*

*Course Transferable to CSU*

*Hours: 54 hours LEC*

This course provides an introduction to map design and production in the context of Geographic Information Systems (GIS). It emphasizes the concepts and methods associated with designing and producing thematic maps. Specific topics include data standardization and classification, symbolization, map projections, map elements, typography, cartographic design, thematic mapping techniques (choropleth, proportional symbol, dot, isarithmic, and multivariate), color in cartography, history of cartography, and map reproduction. Map critique sessions are also held.

**GEOG 342 Introduction to Remote Sensing  
and Digital Image Processing 3 Units**

*Prerequisite: GEOG 330 with a grade of "C" or better*

*Course Transferable to CSU*

*Hours: 50 hours LEC; 12 hours LAB*

This course introduces the principles and concepts of remote sensing and digital image processing as they relate to Geographic Information Systems (GIS). Topics include the fundamentals of remote sensing, aerial photography, satellite imagery, and unmanned aerial vehicle (UAV) imaging systems. It covers a variety of digital image processing techniques to analyze data from various remote sensing platforms.

**GEOG 344 Spatial Analysis  
and Modeling in GIS 3 Units**

*Prerequisite: GEOG 330 with a grade of "C" or better*

*Course Transferable to CSU*

*Hours: 54 hours LEC*

This course provides a survey of the various concepts, approaches, and tools involved in the analysis and modeling of spatial data using Geographic Information Systems (GIS). It emphasizes the use of spatial and statistical analysis, geoprocessing, and spatial modeling in order to investigate spatial distributions and relationships, answer spatial questions, and solve spatial problems. Specific topics include distance and density surfaces, cluster analysis, network analysis, map algebra, surface interpolation and resampling, hydrologic analysis, 3D display/animation, and regression analysis.

**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 introduces the techniques, theory, and practical experience necessary to acquire, convert, and create digital spatial data. Topics include acquisition of existing Geographic Information Systems (GIS) data, metadata, formatting and conversion of GIS data, creation of data utilizing digital cameras and scanners, utilization of remotely sensed data, and use of the Global Positioning System (GPS). Field trips may be required.

**GEOG 354 Introduction to the  
Global Positioning System (GPS) 1.5 Units**

*Advisory: GEOG 300 and 301*

*Course Transferable to CSU*

*Hours: 27 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, Geographic Information Systems (GIS) software, and its use in real-world applications.

**GEOG 360 Database Design  
and Management in GIS 3 Units**

*Prerequisite: GEOG 330 with a grade of "C" or better*

*Course Transferable to CSU*

*Hours: 54 hours LEC*

This course examines principles of Geographic Information Systems (GIS) database management and design including conversion fundamentals, modeling techniques, and strategic planning. Topics include the needs, alternatives, and pitfalls of spatial database development and conversion. It examines various types of spatial and tabular data applicable to GIS, as well as relevant issues such as hardware and software requirements. Particular attention is paid to determining an appropriate methodology, conversion plan, and data quality assurance procedure.

**GEOG 362 Advanced Database Design  
and Management in GIS 3 Units**

*Prerequisite: GEOG 360 with a grade of "C" or better*

*Advisory: CISA 320 and CISC 300*

*Course Transferable to CSU*

*Hours: 54 hours LEC*

This course extends the concepts presented in GEOG 360, Database Design and Management in GIS. Topics include the advanced applications of organizing, inputting, and editing spatial data, including spatial data engine service management, spatial functions, multi-user editing, replication, and data organization. It involves the rigorous examination of traditional spatial database topics in a GIS context including data integration, warehousing, complex Structured Query Language (SQL) spatial coding, and system integration.

**GEOG 375 Introduction to GIS Programming 3 Units**

*Prerequisite: GEOG 330 with a grade of "C" or better*

*Advisory: GEOG 334*

*General Education: AA/AS Area II(b)*

*Course Transferable to CSU*

*Hours: 45 hours LEC; 27 hours LAB*

This course provides the concepts and skills necessary to become a proficient Geographic Information Systems (GIS) applications developer using the Python scripting language to develop commonly used GIS procedures and functions. Topics include GIS methods for querying and selecting geographic features, working with selection sets, editing tables, creating automated map sets, and performing geoprocessing operations.

**GEOG 385 Introduction to Web Based  
GIS Application Development 3 Units**

*Prerequisite: GEOG 330 with a grade of "C" or better*

*Advisory: CISW 300*

*Course Transferable to CSU*

*Hours: 50 hours LEC; 12 hours LAB*

This course introduces the development of Web-based Geographic Information Systems (GIS) solutions. Map authoring and Web service management tools are used to teach the techniques of creating, managing, maintaining, and deploying Web map services. It also introduces several options for using published Web map services for Web-based and mobile mapping applications.

**GEOG 391 Field Studies in Geography:  
Mountain Landscapes 1-4 Units**

*Course Transferable to UC/CSU*

*Hours: 6-24 hours LEC; 36-144 hours LAB*

This course covers geographic principles and processes in mountain environments. Course content varies by destination and may include topics in physical geography (e.g., plant and animal communities, climate and weather, geology and geomorphology, natural hazards, environmental impacts) and human geography (e.g., cultural landscapes, economic activities, transportation issues, land use patterns). It also introduces tools and techniques used for geographic field research (e.g., map and compass use, the Global Positioning System (GPS), Geographic Information Systems (GIS)). Field trips are required. (C-ID GEOG 160)

**GEOG 392 Field Studies in Geography:  
Coastal Landscapes 1-4 Units**

*Course Transferable to UC/CSU*

*Hours: 6-24 hours LEC; 36-144 hours LAB*

This course involves the study of geographic principles and processes in coastal environments. Course content varies by destination and may include topics in physical geography (e.g., plant and animal communities, climate and weather, geology and geomorphology, natural hazards, environmental impacts) and human geography (e.g., cultural landscapes, economic activities, transportation issues, land use patterns). It also introduces tools and techniques used for geographic field research (e.g., map and compass use, the Global Positioning System (GPS), Geographic Information Systems (GIS)). Field trips are required. (C-ID GEOG 160)

**GEOG 393 Field Studies in Geography:  
Arid Landscapes 1-4 Units**

*Course Transferable to UC/CSU*

*Hours: 6-24 hours LEC; 36-144 hours LAB*

This course involves the study of geographic principles and processes in arid environments. Course content varies by destination and may include topics in physical geography (e.g., plant and animal communities, climate and weather, geology and geomorphology, natural hazards, environmental impacts) and human geography (e.g., cultural landscapes, economic activities, transportation issues, land use patterns). It also introduces tools and techniques used for geographic field research (e.g., map and compass use, the Global Positioning System (GPS), Geographic Information Systems (GIS)). Field trips are required. (C-ID GEOG 160)

**GEOG 394 Field Studies in Geography:  
Volcanic Landscapes 1-4 Units**

*Course Transferable to UC/CSU*

*Hours: 6-24 hours LEC; 36-144 hours LAB*

This course involves the study of geographic principles and processes in volcanic environments. Course content varies by destination and may include topics in physical geography (e.g., plant and animal communities, climate and weather, geology and geomorphology, natural hazards, environmental impacts) and human geography (e.g., cultural landscapes, economic activities, transportation issues, land use patterns). It also introduces tools and techniques used for geographic field research (e.g., map and compass use, the Global Positioning System (GPS), Geographic Information Systems (GIS)). Field trips are required. (C-ID GEOG 160)

**GEOG 495 Independent Studies in Geography 1-3 Units**

*Course Transferable to CSU*

*Hours: 54-162 hours LAB*

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.

**GEOG 498 Work Experience in Geography 1-4 Units**

*Advisory: Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.*

*Enrollment Limitation: Students must be in a paid or unpaid internship, volunteer position, or job related to geography or geographic information systems (GIS) with a cooperating site supervisor. Students are advised to consult with the Geography Department faculty to review specific certificate and degree work experience requirements.*

*General Education: AA/AS Area III(b)*

*Course Transferable to CSU*

*Hours: 60-300 hours LAB*

This course provides students with opportunities to develop marketable skills in preparation for employment or advancement within the field of geography or geographic information systems (GIS). It is designed for students interested in work experience and/or internships in transfer-level degree occupational programs. Course content includes understanding the application of education to the workforce, completion of Title 5 required forms which document the student's progress and hours spent at the work site, and developing workplace skills and competencies. During the semester, the student is required to complete 75 hours of related paid work experience, or 60 hours of related unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. All students are required to attend the first class meeting, a mid-semester meeting, and a final meeting. Additionally, students who have not already successfully completed a Work Experience course will be required to attend weekly orientations while returning participants may meet individually with the instructor as needed. Students may take up to 16 units total across all Work Experience course offerings. This course may be taken up to four times when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.