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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 300</td>
<td>Physical Geography: Exploring Earth's Environmental Systems</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 301</td>
<td>Physical Geography Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>GEOG 310</td>
<td>Human Geography: Exploring Earth's Cultural Landscapes</td>
<td>3</td>
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</tbody>
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A minimum of 6 units from the following:

- GEOG 320 World Regional Geography (3)
- GEOG 321 Global Climate Change (3)
- GEOG 322 Geography of California (3)
- GEOG 323 Introduction to Oceanography (3)
- GEOG 324 Field Studies in Geography: Arid Landscapes (1 - 4)
- GEOG 325 Field Studies in Geography: Volcanic Landscapes (1 - 4)
- GEOG 326 Field Studies in Geography: Coastal Landscapes (1 - 4)
- GEOG 327 Introduction to Probability and Statistics (4)
- GEOG 328 World Regional Geography (3)
- GEOG 329 Geography of California (3)

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
A minimum of 6 units from the following:.................................6

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)
A minimum of 6 units from the following:.................................6*

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)
GEOL 300  Physical Geology (3)

*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.
- 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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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:

- 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

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, 395, 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

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

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.
• 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.

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 Certificate 29.5-32.5 Units

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>GEOG 330</td>
<td>Introduction to Geographic Information Systems</td>
<td>3</td>
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<tr>
<td>GEOG 334</td>
<td>Introduction to GIS Software Applications</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 340</td>
<td>Cartographic Design for GIS</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 342</td>
<td>Introduction to Remote Sensing and Digital Image Processing</td>
<td>3</td>
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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

And a minimum of 6 units from the following:..................................................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 ENGRD 300; OR ESLR 340 AND ESWL 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 ENGRD 300, OR ESLR 340 AND ESWL 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 ENGRD 300; OR ESLR 340 AND ESWL 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 ENGW 300; OR ESLR 340 AND ESLW 340.
General Education: AAAS 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 ENGW 300, OR ESLR 340 AND ESLW 340.
General Education: AAAS 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 GEOG 301
General Education: AAAS 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 GEOG 330
Advisory: GEOG 301 and GEOG 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 ENGW 300; OR ESLR 340 AND ESLW 340.
General Education: AAAS Area V(b); AAAS 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 ENGW 300, OR ESLR 340 AND ESLW 340.
General Education: AAAS Area V(b); AAAS 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 ENGW 300, OR ESLR 340 AND ESLW 340.
General Education: AAAS Area V(b); AAAS 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: AAAS 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, typographic, 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)