Geography & GIS

Overview

The Geosciences Department

at ARC includes geography, geology, and GIS courses that are currently taught by five full-time faculty and over ten adjunct faculty. The Geosciences Department is committed to working cooperatively with the professional GIS community to continue to build a relevant GIS program at ARC. Phillip Renner served as our first GIS coordinator from the program's inception until spring 1999. In this capacity, Phil designed courses, campaigned for program funding, and established ARC's first GIS advisory committee. Our current GIS coordinator is Dr. Hugh Howard, professor of GIS and Geography. Hugh brings GIS education, program development, and lab management experience from San Francisco State University and Stanford University. Hugh is also coauthor of Thematic Cartography and Geovisualization, 3rd edition. Our GIS adjunct professors hail from various governmental and private organizations, and are recognized as leaders in the greater Sacramento GIS community.

Roadmaps

Road maps lay out all of the courses you need to take for a given degree or certificate.

Get a Road map! Explore Ways to Complete These Programs (/academics/arc-program-road-maps)

Division Dean Dr. Rina Roy (/about-us/contact-us/faculty-and-staff-directory/rina-roy)
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Associate Degrees for Transfer

A.A.-T. in Geography

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.

Catalog Date: June 1, 2020

Degree Requirements

COURSE CODE	COURSE TITLE	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[1]
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)	
Total Units:		19

[1]Students may also substitute any course from the previous list not already taken to fulfill degree requirements.

The Associate in Arts in Geography for Transfer (AA-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.

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 Information

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.

Associate Degrees

A.S. in General Science

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.

Catalog Date: June 1, 2020

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
A minimum of 18 units from the following:		18[1]
Physical Science Courses		
ASTR 300	Introduction to Astronomy (3)	
ASTR 310	The Solar System (3)	
ASTR 320	Stars, Galaxies, and Cosmology (3)	
ASTR 330	Introduction to Astrobiology (3)	
ASTR 400	Astronomy Laboratory (1)	
ASTR 481	Honors Astronomy: Stars, Galaxies, and Cosmology (4)	
ASTR 495	Independent Studies in Astronomy (1 - 3)	
ASTR 499	Experimental Offering in Astronomy (0.5 - 4)	
CHEM 305	Introduction to Chemistry (5)	
CHEM 306	Introduction to Organic and Biological Chemistry (5)	
CHEM 309	Integrated General, Organic, and Biological Chemistry (5)	
CHEM 310	Chemical Calculations (4)	
CHEM 400	General Chemistry I (5)	
CHEM 401	General Chemistry II (5)	
CHEM 420	Organic Chemistry I (5)	
CHEM 421	Organic Chemistry II (5)	
CHEM 423	Organic Chemistry - Short Survey (5)	
CHEM 495	Independent Studies in Chemistry (1 - 3)	
CHEM 499	Experimental Offering in Chemistry (0.5 - 4)	
GEOG 300	Physical Geography: Exploring Earth's Environmental Systems (3)	
GEOG 301	Physical Geography Laboratory (1)	
GEOG 305	Global Climate Change (3)	
GEOG 306	Weather and Climate (3)	
GEOG 307	Environmental Hazards and Natural Disasters (3)	
GEOG 308	Introduction to Oceanography (3)	
GEOG 309	Introduction to Oceanography Lab (1)	
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)	
GEOG 495	Independent Studies in Geography (1 - 3)	
GEOG 499	Experimental Offering in Geography (0.5 - 4)	
GEOL 300	Physical Geology (3)	
GEOL 301	Physical Geology Laboratory (1)	
GEOL 305	Earth Science (3)	
GEOL 306	Earth Science Laboratory (1)	
GEOL 310	Historical Geology (3)	
GEOL 311	Historical Geology Laboratory (1)	
GEOL 320	Global Climate Change (3)	
GEOL 325	Environmental Hazards and Natural Disasters (3)	
GEOL 330	Introduction to Oceanography (3)	
GEOL 331	Introduction to Oceanography Lab (1)	
GEOL 345	Geology of California (3)	
GEOL 390	Field Studies in Geology (1 - 4)	
GEOL 495	Independent Studies in Geology (1 - 3)	

COURSE CODE	COURSE TITLE	UNITS
GEOL 499	Experimental Offering in Geology (0.5 - 4)	
PHYS 310	Conceptual Physics (3)	
PHYS 311	Basic Physics (3)	
PHYS 312	Conceptual Physics Laboratory (1)	
PHYS 350	General Physics (4)	
PHYS 360	General Physics (4)	
PHYS 410	Mechanics of Solids and Fluids (5)	
PHYS 421	Electricity and Magnetism (4)	
PHYS 431	Heat, Waves, Light and Modern Physics (4)	
PHYS 495	Independent Studies in Physics (1 - 3)	
PHYS 499	Experimental Offering in Physics (0.5 - 4)	
Biological Science Courses		
ANTH 300	Biological Anthropology (3)	
ANTH 301	Biological Anthropology Laboratory (1)	
ANTH 303	Introduction to Forensic Anthropology (3)	
ANTH 370	Primatology (3)	
ANTH 372	Primatology Field Studies (2)	
ANTH 480	Honors Biological Anthropology (3)	
ANTH 495	Independent Studies in Anthropology (1 - 3)	
ANTH 499	Experimental Offering in Anthropology (0.5 - 4)	
BIOL 300	The Foundations of Biology (3)	
BIOL 301	Evolution (3)	
BIOL 303	Survey of Biology (4)	
BIOL 305	Natural History (4)	
BIOL 310	General Biology (4)	
BIOL 322	Ethnobotany (3)	
BIOL 332	Introduction to Ornithology (4)	
BIOL 342	The New Plagues: New and Ancient Infectious Diseases Threatening World Health (3)	
BIOL 352	Conservation Biology (3)	
BIOL 370	Marine Biology (4)	
BIOL 375	Marine Ecology (3)	
BIOL 390	Natural History Field Study (0.5 - 4)	
BIOL 400	Principles of Biology (5)	
BIOL 410	Principles of Botany (5)	
BIOL 415	Introduction to Biology: Biodiversity, Evolution, and Ecology (5)	
BIOL 420	Principles of Zoology (5)	
BIOL 430	Anatomy and Physiology (5)	
BIOL 431	Anatomy and Physiology (5)	
BIOL 440	General Microbiology (4)	
BIOL 442	General Microbiology and Public Health (5)	
BIOL 482	Honors Marine Biology (4)	
BIOL 495	Independent Studies in Biology (1 - 3)	
BIOL 499	Experimental Offering in Biology (0.5 - 4)	
BIOT 301	Biotechnology and Human Health (3)	
BIOT 305	Introduction to Bioinformatics (1)	
BIOT 307	Biotechnology and Society (2)	
BIOT 311	Biotechnology Laboratory Methods - Molecular Techniques (2)	
BIOT 312	Biotechnology Laboratory Methods - Microbial and Cell Culture Techniques (2)	
BIOT 499	Experimental Offering in Biology (0.5 - 4)	
NATR 300	Introduction to Natural Resource Conservation and Policy (4)	
NATR 302	Introduction to Wildlife Biology (4)	
NATR 303	Energy and Sustainability (3)	
NATR 304	The Forest Environment (3)	
NATR 305	Fisheries Ecology and Management (4)	
NATR 306	Introduction to Rangeland Ecology and Management (3)	
NATR 307	Principles of Sustainability (4)	
NATR 310	Study Design and Field Methods (4)	
NATR 320	Principles of Ecology (4)	
NATR 322	Environmental Restoration (2)	
NATR 324	Field Studies: Birds and Plants of the High Sierra (1.5)	
NATR 330	Native Trees and Shrubs of California (4)	
NATR 332	Wildflowers of California (3)	
NATR 346	Water Resources and Conservation (3)	
NATR 495	Independent Studies in Natural Resources (1 - 3)	
NATR 499	Experimental Offering in Natural Resources (0.5 - 4)	
PSYC 310	Biological Psychology (3)	
PSYC 311	Biological Psychology Laboratory (1)	
PSYC 495	Independent Studies in Psychology (1 - 3)	
PSYC 499	Experimental Offering in Psychology (0.5 - 4)	
Total Units:		18

[1]must be transfer-level and must include one laboratory course in a physical science and one laboratory course in a biological science

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.

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.

A.S. in Geographic Information Systems (GIS)

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.

Catalog Date: June 1, 2020

Degree Requirements

COURSE CODE	COURSE TITLE	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 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
Total Units:		31 - 34

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.

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.

Career Information

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.

A.S. in Geography

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.

Catalog Date: June 1, 2020

Degree Requirements

COURSE CODE	COURSE TITLE	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[1]
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)	
A minimum of 6 units from the following:		6
GEOL 320	Global Climate Change (3)	
or GEOG 305	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)	
GEOL 330	Introduction to Oceanography (3)	
or GEOG 308	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)	
Total Units:		20 - 26

[1]GEOG 331 is recommended for students who plan to transfer to a California State University.

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.

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 Information

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.

Certificate of Achievement

Geographic Information Systems (GIS) Certificate

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.

Catalog Date: June 1, 2020

Certificate Requirements

COURSE CODE	COURSE TITLE	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 360	Database Design and Management in GIS	3
GEOG 498	Work Experience in Geography	1 -4
A minimum of 6 units from the following:		6

COURSE CODE	COURSE TITLE	UNITS
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)	
Total Units:		28 - 31

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.

Career Information

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.

Geography (GEOG) Courses

GEOG 300 Physical Geography: Exploring Earth's Environmental Systems

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 32 or MATH 42, AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID:	C-ID GEOG 110
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- list the basic components and describe the structure of each of Earth's major environmental systems: the atmosphere, hydrosphere, lithosphere, and biosphere.
- describe the basic processes and interrelationships occurring within and between the atmosphere, hydrosphere, lithosphere, and biosphere.
- identify and assess the impacts that the atmosphere, hydrosphere, lithosphere, and biosphere have on human environments.
- identify and assess the impact that human populations have on the atmosphere, hydrosphere, lithosphere, and biosphere.
- identify the basic natural processes which have shaped Earth over time, using local Sacramento Region examples.
- utilize maps, charts, and graphs to understand the core concepts, patterns, and processes covered in this course.

GEOG 301 Physical Geography Laboratory

Units:	1
Hours:	54 hours LAB
Prerequisite:	None.
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.
Transferable:	CSU; UC
General Education:	CSU Area B3; IGETC Area 5C
C-ID:	C-ID GEOG 111
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- read, analyze, and interpret topographic maps and other geographic imagery.
- collect and analyze basic geographic data using common instruments.
- analyze and interpret tabular and graphic data related to basic geographic phenomena.
- compare and contrast local geographic data with other locations, both regional and global.
- apply basic physical geographic principles to contemporary environmental situations.

GEOG 305 Global Climate Change

Same As:	GEOL 320
Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 100 with a grade of "C" or better; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- describe the scientific tools used to study global climate change in the past and present.
- explain the components, processes, and dynamics of the global heat budget, as they pertain to the ocean/atmosphere system.
- describe the various lines of evidence that scientists use to investigate climate change in Earth's deep past.
- explain the conditions that led to extensive climate change over the past 2.5 million years.
- evaluate the human causes of climate change, the evidence surrounding that, and the possible consequences of anthropogenically driven climate change.
- discriminate between and evaluate mechanisms of climate mitigation and adaptation at international, national, state, and local levels.

GEOG 306 Weather and Climate

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 32 or 42; and Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
C-ID:	C-ID GEOG 130
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- interpret, analyze, display, and map atmospheric and climate data.
- detail the processes of energy exchange involving the Earth/atmosphere system.
- describe the primary forces that influence global, regional, and local wind circulation.
- compare the dynamics of severe weather systems; including thunderstorms, tornadoes, and tropical cyclones.
- examine atmospheric and climate data to categorize and interpret variations in climate over Earth's surface.
- discuss and evaluate the mechanisms of climate change (both natural and anthropogenic), the impacts of climate change, and the efforts to adapt to and/or mitigate the challenges posed by the impacts.

GEOG 307 Environmental Hazards and Natural Disasters

Same As:	GEOL 325
Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 100, 104, or 132; AND eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- identify and describe potential environmental hazards associated with different geomorphologic settings.
- describe short- and long-term consequences of environmental hazards on human activities.

- compare and contrast renewable and non-renewable natural resources.
- analyze the impact of human activity on natural resources.
- distinguish between short- and long-term global climate trends.
- evaluate current environmental issues that involve Earth system processes.

GEOG 308 Introduction to Oceanography

Same As:	GEOL 330
Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	GEOG 301 or GEOL 301
Transferable:	CSU; UC
General Education:	AA/AS Area IV; CSU Area B1; IGETC Area 5A
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- describe and evaluate the relationships between marine processes and plate tectonics
- assess the impact of human activities on ocean chemistry, biosystems and global climate
- examine common coastal features and processes
- evaluate the impacts of shoreline processes on human activities and structures
- analyze the relationships between weather patterns and oceanic circulation
- assess and interpret the gross chemical composition of the ocean
- evaluate and measure the impacts of resource extraction on marine environmental concerns
- describe the distribution of sediment in the oceans and the processes that move sediment

GEOG 309 Introduction to Oceanography Lab

Same As:	GEOL 331
Units:	1
Hours:	54 hours LAB
Prerequisite:	None.
Corequisite:	GEOG 308 or GEOL 330
Advisory:	GEOG 301 and GEOL 301
Transferable:	CSU; UC
General Education:	CSU Area B3; IGETC Area 5C
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- assess the physical and chemical similarities and differences of distinct coastal environments
- analyze the changing physical and chemical conditions on biological patterns
- analyze the relationships between sea floor morphology and plate tectonics

GEOG 310 Human Geography: Exploring Earth's Cultural Landscapes

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
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.
Transferable:	CSU; UC
General Education:	AA/AS Area V(b); AA/AS Area VI; CSU Area D5; IGETC Area 4E
C-ID:	C-ID GEOG 120
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- analyze humans' role in transforming Earth's surface into a series of distinctive cultural landscapes.
- evaluate explanations for the geographic origin and global diffusion of key aspects of culture (e.g. ethnocentrism, racism, language, religion, ethnicity, development, agriculture, urbanization).
- describe patterns of cultural diversity in California, the U.S., and the world.
- create maps from various types of socioeconomic data (e.g. ethnicity, religion, AIDS incidence, etc.).
- describe broad historical and modern global socioeconomic processes such as migration, colonization, and globalization.
- explain the spatial patterns of key geographic concepts, such as distribution of population, religion, and language.

GEOG 320 World Regional Geography

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	MATH 32 or 42; and eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300, OR ESLR 340 AND ESLW 340.
Transferable:	CSU; UC
General Education:	AA/AS Area V(b); AA/AS Area VI; CSU Area D5; IGETC Area 4E
C-ID:	C-ID GEOG 125
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- generalize and describe the unique combination of cultural, physical, historical, economical, and organizational qualities that characterize each of Earth's major geographic regions.
- identify and discuss the major socioeconomic, political, and/or environmental issues currently affecting each of Earth's major geographic regions.
- define and investigate major geographic concepts such as region, migration, diffusion, globalization, demography, race, ethnicity, nationalism, and development.
- compare and contrast the factors which make North America and the United States particularly unique among Earth's major geographic regions.
- recognize and identify Earth's major geographic regions, as well as all countries located within them, on a blank outline map.

GEOG 322 Geography of California

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
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.
Transferable:	CSU; UC
General Education:	AA/AS Area V(b); AA/AS Area VI; CSU Area D5; IGETC Area 4E
C-ID:	C-ID GEOG 140
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- analyze the physical and cultural environments existing within the state of California
- examine and analyze people-people and people-land interrelationships that have contributed to the historical, political, and economic development of the state
- compare and contrast the contributions made by the various ethnic and cultural groups which comprise the state's population
- evaluate patterns of social problems within the state which are based on economic inequalities and ethnic and cultural differences

GEOG 330 Introduction to Geographic Information Systems

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	CISC 300
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- define GIS and provide examples of how it can be applied to solve real-world problems.
- describe coordinate systems.
- assess various geospatial data models.
- classify, query, and symbolize spatial data.
- apply geoprocessing tools.
- produce maps using GIS.

GEOG 331 Exploring Maps and Geographic Technologies

Units:	3
Hours:	50 hours LEC; 12 hours LAB
Prerequisite:	None.
Advisory:	CISC 300 and GEOG 300
Transferable:	CSU; UC
General Education:	AA/AS Area IV

C-ID: C-ID GEOG 150
Catalog Date: June 1, 2020

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.

Student Learning Outcomes

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

- determine basic geographic information (e.g. location, distance, and direction) using various map scales, coordinate systems, and map projections.
- create, analyze, critique, and interpret data using maps, aerial photographs, and satellite imagery.
- demonstrate basic proficiency in traditional and modern cartography.
- collect, import, and display geospatial data within a GIS.
- evaluate common mapping applications and technologies.
- organize, manipulate, analyze, and display tabular data.
- use a GPS unit for basic navigation and data collection purposes.

GEOG 334 Introduction to GIS Software Applications

Units: 3
Hours: 50 hours LEC; 12 hours LAB
Prerequisite: None.
Advisory: CISC 300 and GEOG 330
Transferable: CSU
C-ID: C-ID GEOG 155
Catalog Date: June 1, 2020

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.

Student Learning Outcomes

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

- identify the components of the GIS graphical user interface
- perform attribute and spatial queries
- create and modify spatial databases
- analyze spatial relationships between map features
- design and produce maps
- choose between "join," "relate," and "spatial join" methods to associate values in separate tables
- utilize basic geoprocessing tools

GEOG 340 Cartographic Design for GIS

Units: 3
Hours: 54 hours LEC
Prerequisite: GEOG 330 with a grade of "C" or better
Transferable: CSU
Catalog Date: June 1, 2020

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.

Student Learning Outcomes

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

- enumerate and describe the components of a map (map elements).
- perform the cartographic design process using GIS.
- produce professional quality maps using GIS.
- categorize and describe various thematic map types.
- identify and compare various map projections.
- evaluate and systematically critique thematic maps.

GEOG 342 Introduction to Remote Sensing and Digital Image Processing

Units: 3
Hours: 50 hours LEC; 12 hours LAB
Prerequisite: GEOG 330 with a grade of "C" or better
Transferable: CSU
Catalog Date: June 1, 2020

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.

Student Learning Outcomes

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

- synthesize the fundamentals and principles of remote sensing and digital image processing.
- analyze a variety of digital image processing techniques as they are applied to remotely sensed imagery.
- apply image processing software, remote sensing principles, and digital image processing techniques to a variety of remotely sensed imagery.
- analyze, evaluate, and interpret a number of different remote sensing platforms (that may include aerial photography, satellite imagery, LIDAR, and unmanned aerial vehicles (UAV)).
- evaluate a number of different remote sensing principles and digital image processing techniques for a variety of real-world scenarios.

GEOG 344 Spatial Analysis and Modeling in GIS

Units:	3
Hours:	54 hours LEC
Prerequisite:	GEOG 330 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- identify various spatial analysis techniques.
- apply statistical measures to characterize geospatial data.
- analyze geospatial distributions and relationships.
- assess various approaches to spatial modeling.
- build spatial models.

GEOG 350 Data Acquisition in GIS

Units:	3
Hours:	54 hours LEC
Prerequisite:	GEOG 330 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- identify sources of existing spatial data.
- evaluate the quality and reliability of existing data sets.
- distinguish between various geospatial data models and assess their suitabilities for specific applications.
- acquire primary data using GPS.
- convert digital data from one format to another.
- assemble GIS data sets into logical groups appropriate for specific applications.
- utilize the Internet as a tool in data acquisition.
- compile and categorize remote sensing data.
- prioritize the importance of data sets required for a particular project in order to streamline the acquisition process.

GEOG 360 Database Design and Management in GIS

Units:	3
Hours:	54 hours LEC
Prerequisite:	GEOG 330 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- describe the components of a spatial database system.
- critique the various types of geospatial input data.
- apply skills in building a spatial database for vector, raster, and tabular data.
- analyze the structure of existing spatial databases.
- compare the advantages of alternative spatial database structures.

GEOG 362 Advanced Database Design and Management in GIS

Units:	3
Hours:	54 hours LEC
Prerequisite:	GEOG 360 with a grade of "C" or better
Advisory:	CISA 320 and CISC 300
Transferable:	CSU
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- design simple data models.
- use SQL to analyze and summarize database objects.
- design and evaluate the efficiency of a complex spatial database system suitable for use in a GIS application.
- categorize spatial, tabular, imagery, and document data for inclusion in a GIS database.
- produce an enterprise-oriented spatial database system.
- synthesize edits from a multiple-user GIS spatial database.
- revise an existing spatial database system designed for single or multiple GIS users.
- formulate an ongoing GIS database management strategy.
- determine the applicability of concepts learned to the independent design, creation, and use of a spatial database system.
- critique spatial database designs presented for evaluation.

GEOG 375 Introduction to GIS Programming

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	GEOG 330 with a grade of "C" or better
Advisory:	GEOG 334
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- develop solutions to computer geoprocessing problems using a variety of research methods and by investigating data and programming sources.
- develop solutions to automate geoprocessing functions using a variety of programming methods, structures, and data sources.
- evaluate how the Python scripting language fits into the ArcGIS geoprocessing framework.
- apply GIS concepts, operations, and data sources to the process of conceiving common applications of GIS programming.
- assemble computer code in a logical, well-structured, and easy-to-read manner, including concise commenting.
- analyze, diagnose, and resolve "bugs" and typical problems in computer code through the combined processes of analysis and testing.
- compile Python and ArcGIS functions to create geoprocessing scripts.
- solve geospatial problems and streamline GIS workflows through the design and development of custom GIS applications.

GEOG 385 Introduction to Web Based GIS Application Development

Units:	3
Hours:	50 hours LEC; 12 hours LAB
Prerequisite:	GEOG 330 with a grade of "C" or better
Advisory:	CISW 300
Transferable:	CSU
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- create maps for use on the Web.
- design, configure, optimize, and maintain Web map services.
- publish geospatial resources to a Web service.
- create and modify a basic interactive Web-based geospatial user interface.
- build a basic Web-based geospatial application.
- assess and critique appropriate map data for Web-based GIS.
- evaluate, create, test, troubleshoot, and problem solve geoprocessing functionality for Web map services.

GEOG 391 Field Studies in Geography: Mountain Landscapes

Units:	1 - 4
Hours:	6 - 24 hours LEC; 36 - 144 hours LAB

Prerequisite: None.
Transferable: CSU; UC
C-ID: C-ID GEOG 160
Catalog Date: June 1, 2020

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.

Student Learning Outcomes

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

- apply concepts and processes discussed in lecture to experiences in the field.
- compose field notes and collect and analyze field data.
- explain and describe physical and/or cultural phenomena of a specific region.
- integrate geographic information from various disciplines (geology, biology, ecology, urban studies, anthropology, history, economics, cultural studies, and others) in order to explain landscape patterns and processes.

GEOG 392 Field Studies in Geography: Coastal Landscapes

Units: 1 - 4
Hours: 6 - 24 hours LEC; 36 - 144 hours LAB
Prerequisite: None.
Transferable: CSU; UC
C-ID: C-ID GEOG 160
Catalog Date: June 1, 2020

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.

Student Learning Outcomes

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

- apply concepts and processes discussed in lecture to experiences in the field.
- compose field notes and collect and analyze field data.
- describe and explain geographic phenomena related to the particular physical and/or human environments under study.
- integrate geographic information from various disciplines (geology, biology, ecology, urban studies, anthropology, history, economics, cultural studies, and others) in order to explain landscape patterns and processes.

GEOG 393 Field Studies in Geography: Arid Landscapes

Units: 1 - 4
Hours: 6 - 24 hours LEC; 36 - 144 hours LAB
Prerequisite: None.
Transferable: CSU; UC
C-ID: C-ID GEOG 160
Catalog Date: June 1, 2020

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.

Student Learning Outcomes

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

- apply concepts and processes discussed in lecture to experiences in the field.
- compose field notes and collect and analyze field data.
- describe and explain geographic phenomena related to the particular physical and/or human environments under study.
- integrate geographic information from various disciplines (geology, biology, ecology, urban studies, anthropology, history, economics, cultural studies, and others) in order to explain landscape patterns and processes.

GEOG 394 Field Studies in Geography: Volcanic Landscapes

Units: 1 - 4
Hours: 6 - 24 hours LEC; 36 - 144 hours LAB
Prerequisite: None.
Transferable: CSU; UC
C-ID: C-ID GEOG 160
Catalog Date: June 1, 2020

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.

Student Learning Outcomes

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

- apply concepts and processes discussed in lecture to experiences in the field.
- compose field notes and collect and analyze field data.
- describe and explain geographic phenomena related to the particular physical and/or human environments under study.
- integrate geographic information from various disciplines (geology, biology, ecology, urban studies, anthropology, history, economics, cultural studies, and others) in order to explain landscape patterns and processes.

GEOG 495 Independent Studies in Geography

Units:	1 - 3
Hours:	54 - 162 hours LAB
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	June 1, 2020

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

Units:	1 - 4
Hours:	60 - 300 hours LAB
Prerequisite:	None.
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.
Advisory:	Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Transferable:	CSU
General Education:	AA/AS Area III(b)
Catalog Date:	June 1, 2020

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.

Student Learning Outcomes

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

- demonstrate application of industry knowledge and theoretical concepts in the field of geography or geographic information systems (GIS) related to a transfer degree level career as written in the minimum three (3) learning objectives created by the student and his/her employer or work site supervisor at the start of the course
- make effective decisions, use workforce information, and manage his/her personal career plans.
- behave professionally, ethically, and legally at work, consistent with applicable laws, regulations, and organizational norms.
- behave responsibly at work, exhibiting initiative and self-management in situations where it is needed.
- apply effective leadership styles at work, with consideration to group dynamics, team and individual decision making, and workforce diversity.
- communicate in oral, written, and other formats, as needed, in a variety of contexts at work.
- locate, organize, evaluate, and reference information at work.
- demonstrate originality and inventiveness at work by combining ideas or information in new ways, making connections between seemingly unrelated ideas, and reshaping goals in ways that reveal new possibilities using critical and creative thinking skills such as logical reasoning, analytical thinking, and problem-solving.

GEOG 499 Experimental Offering in Geography

Units:	0.5 - 4
Hours:	15 hours LEC; 12 hours LAB
Prerequisite:	None.
Advisory:	GEOG 330
Transferable:	CSU
Catalog Date:	June 1, 2020

This course introduces remote sensing principles, image data sources, and provides practical experience in a full range of digital image processing functions including image rectification, image enhancement, classification, data integration and biophysical modeling using image data from airborne and space-borne sensors.

Student Learning Outcomes

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

- Distinguish between images produced by various airborne and space-borne methods
- Design image processing protocols
- Evaluate software-based automatic image processing effectiveness
- Select appropriate image processing methods
- Formulate image acquisition strategies

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