

Geography

IN THE COLLEGE OF ARTS AND LETTERS

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Faculty

Emeritus: Aguado, Ayala, Fredrich, Getis, Greenwood, Griffin, Hope, Johnson, Keen, McArthur, Pryde, Quastler, Richardson, Stutz, Weeks, Wright

Chair: Jankowski

The Stephen and Mary Birch Foundation Chair in Geographical Studies: Christakos

The June Burnett Chair in Children's and Family Geographies: Aitken

Professors: Aitken, An, Biggs, Bosco, Christakos, Jankowski, Marcelli, O'Leary, Skupin, Stow, Tsou

Associate Professors: Levine, McMillan, Swanson

Assistant Professors: De Sales, Debbané, Nara

Lecturers: Costello, Osborn, Thorngren

Offered by the Department

Doctor of Philosophy degree in geography.

Master of Arts degree in geography.

Master of Science degree in geography.

Concentration in geographic information science.

Concentration in watershed science.

Major in geography with the B.A. degree in applied arts and sciences.

Emphasis in general geography.

Major in geography with the B.A. degree in liberal arts and sciences.

Emphasis in environment, sustainability, and policy.

Emphasis in geographic information science and technology.

Emphasis in human geography and global studies.

Major in geography with the B.S. degree in applied arts and sciences.

Emphasis in geographic information science and technology.

Emphasis in water, climate, and ecosystems.

Minor in geography.

Certificate in geographic information science.

The Stephen and Mary Birch Foundation Chair in Geographical Studies

The Stephen and Mary Birch Foundation Chair in Geographical Studies was created through the Birch Foundation's grant to the Department of Geography to endow a chair and create a Center for Earth Systems Analysis Research. Professor George Christakos, internationally recognized for his expertise in theory and methodology of spatial analysis and mathematical modeling applied to environmental, ecological, health, and geographical systems, is the third holder of the chair.

The June Burnett Chair in Children's and Family Geographies

The Children's and Family Geographies Chair was created in 2013 as part of the Department of Geography's June Burnett Endowment. The chair is in support of the Center for Interdisciplinary Studies of Youth and Space (ISYS), and focuses on spatial research and therapeutic/ethnographic practices related to the well-being of children and young people. Professor Stuart C. Aitken, internationally recognized for his research on children's geographies, youth activism, critical theory, and qualitative methodologies is the first holder of the chair.

The Major

Geography is the study of spatial aspects of the physical environment, human activities and landscapes, and the nature of their interactions. Geographers draw upon and develop theories in both the physical and social sciences. As physical scientists, they study the processes and resulting features of the earth's surface, such as vegetation, climate, hydrology, soils, and landforms. As social scientists, geographers explore such topics as the arrangement of societies on the earth's surface, water and land use patterns, urbanization and urban life, migration, resource and energy usage, environmental conservation, globalization, development and social justice.

Through classroom and laboratory experience, field work, and community involvement students are provided with the knowledge and skills required to appreciate the diversity of landscapes, people and places, the interdependence of places on the surface of the earth, and the spatial processes and relationships that affect contemporary society.

A variety of career opportunities exist for geography majors in business, nonprofit, government and education. In recent years many graduates with bachelor degrees have entered a wide range of analytical and planning careers, with job titles such as environmental policy analyst urban/ regional planner, cartographer, geographic information system (GIS) analyst/specialist, energy planner, water resources planner/ manager, natural resource manager/ planner, park specialist/planner, National Park Service ranger/administrator, habitat restoration manager, and non-profit organization planner/administrator. Some students go on to graduate programs in geography, public health, urban and regional planning and other related disciplines.

The Department of Geography offers a broad range of fields from which to select an emphasis. These include the following:

General Geography

This program provides students with an overview of the diverse fields of geography and exposes them to its breadth of methods. It is primarily designed for students transferring from a California Community College with an Associate Degree in Geography (AA-T) under the Transfer Model Curricula (TMC), which allows them to graduate with no more than 60 additional units. It is open to all students.

Environment, Sustainability, and Policy

This emphasis is concerned with human-environmental interactions, including the impacts of human activity on the earth and the consequences of environmental change on social life. Students will learn concepts and tools that help them understand and address contemporary environmental issues such as loss of biodiversity, pollution and natural resource degradation, water shortages, food and energy crises, resource conflicts, climate change, devegetation and many other compelling challenges facing society today and in the future. Through their coursework, they will investigate the cultural practices, social structures, and political-economic forces that shape the relationships between society and nature.

Geographic Information Science and Technology (B.A.)

This emphasis focuses on the various methods used by geographers to represent and analyze geographic information about the natural and social world. These methods include cartography, geographic information systems, remote sensing, spatial statistics and qualitative analysis. Students in this emphasis will learn how to apply skills and use contemporary technologies to solve problems and conduct research. Students interested in the development of new geographic methods may consider the Bachelor of Science degree in geographic information science and technology, which requires additional courses in computer science.

Human Geography and Global Studies

This emphasis deals with the spatial aspects of human existence: how people and their activities are distributed in space, how they use and perceive space, and how they create and sustain the places that make up the earth's surface. It focuses on the connections between global and local scales and teaches students how to think geographically about global issues such as poverty, migration, environment and development, and changing technology. Human geography includes urban geography, political geography, demography, economic geography, political ecology, social and cultural geography, feminist geography and many other emerging fields, such as children's geographies. It encompasses a variety of theoretical approaches and methods.

Geographic Information Science and Technology (B.S.)

This emphasis addresses the theory and practice of information science from a distinctly geographic perspective, with a focus on principles, methods, and technology. Students become familiar with how to generate, manage and evaluate information about processes, relationships, and patterns in various application domains. This program is for students interested in analytical approaches to mapping, visualization, and problem solving using contemporary methods of GIScience, remote sensing, computer science, and statistics.

Water, Climate, and Ecosystems

This emphasis focuses on scientific explanations of the earth's physical features and processes and the human impacts on them. Students engage in classroom, laboratory and field activities in geomorphology, hydrology, watershed analysis, biogeography, climatology, and landscape ecology. Students in this emphasis will incorporate fundamental training in the physical and biological sciences with methodological techniques in spatial analysis, including the use of satellite imagery and geographic information systems, to study processes and resulting features of earth's physical environment.

Minor in Geography

The minor is designed to build on the interdisciplinary nature of geography and allow students to incorporate a geographic approach to their discipline of interest. The geography minor is an attractive option to students who major in anthropology, biology, computer science, economics, engineering, environmental sciences, political science, sociology, and sustainability.

Certificate in Geographic Information Science

The certificate program is for current students or graduates interested in gaining knowledge and skills in creating, processing, and analyzing geoinformation with methods and techniques of geographic information systems, remote sensing, and software engineering.

Advising

All College of Arts and Letters majors are urged to consult with their department adviser as soon as possible; they are required to meet with their department adviser within the first two semesters after declaration or change of major.

Impacted Program

The geography major and emphases are impacted programs. To be admitted to the geography major or an emphasis, students must meet the following criteria:

- a. Complete preparation for the major;
- b. Complete a minimum of 60 transferable semester units;
- c. Have a minimum cumulative GPA of 2.0.

To complete the major, students must fulfill the degree requirements for the major described in the catalog in effect at the time they are accepted into the premajor at SDSU (assuming continuous enrollment).

Major Academic Plans (MAPs)

Visit <http://www.sdsu.edu/mymap> for the recommended courses needed to fulfill your major requirements. The MAPs website was created to help students navigate the course requirements for their majors and to identify which General Education course will also fulfill a major preparation course requirement.

Geography Major

With the B.A. Degree in Applied Arts and Sciences

(Major Code: 22061)

All candidates for a degree in applied arts and sciences must complete the graduation requirements listed in the section of this catalog on "Graduation Requirements."

Graduation with Distinction. A student desiring to graduate with Distinction in Geography must meet the university requirements listed in the section of this catalog on "Graduation Requirements" and be recommended by the geography faculty.

Emphasis in General Geography

(SIMS Code: 112912)

Students selecting this emphasis are not required to complete a minor in another department.

Preparation for the Major. Geography 101, 101L, 102 or 106, 104. (10 units)

Graduation Writing Assessment Requirement. Passing the Writing Placement Assessment with a score of 10, or English 508W, 581W, 584W, or Rhetoric and Writing Studies 305W, 500W, 503W with a grade of C (2.0) or better. See "Graduation Requirements" section for a complete listing of requirements.

Major. A minimum of 32 upper division units in geography to include:

Student Assessment: Geography 395 to be taken in the student's first fall semester as a geography major (one unit) and Geography 495 to be taken during the spring semester of the calendar year in which the student expects to graduate (one unit);

Core: Eighteen units, with at least three units from each of the following groups: (a) Regional Geography: Geography 320, 321, 324, 336, 426; (b) Human Geography: Geography 312, 340, 348, 353, 354, 440 [or Political Science 440], 454, 554, 573; (c) Environmental Geography: Geography 340, 348, 370, 426, 454, 570, 572-575; (d) Physical Geography: Geography 303, 375, 401, 409, 503, 506, 507, 509, 511, 512, 574, 576; (e) Geographic Methods: Geography 380, 381, 383, 385, 484, 580, 581-594;

Emphasis: Twelve units of core courses (if not already taken). Internship, senior thesis, special study, special topics, or study abroad may be used to meet this requirement when appropriate and preapproved by the undergraduate adviser.

Geography Major

With the B.A. Degree in Liberal Arts and Sciences

(Major Code: 22061)

All candidates for a degree in liberal arts and sciences must complete the graduation requirements listed in the section of this catalog on "Graduation Requirements." No more than 57 units in geography courses can apply to the degree for students with an emphasis in environment, sustainability, and policy, or the emphasis in geographic information science and technology, or the emphasis in human geography and global studies.

Graduation with Distinction. A student desiring to graduate with Distinction in Geography must meet the university requirements listed in the section of this catalog on "Graduation Requirements" and be recommended by the geography faculty.

Emphasis in Environment, Sustainability, and Policy

(SIMS Code: 112914)

Students selecting this emphasis are not required to complete a minor in another department.

Preparation for the Major. Geography 101, 101L, 102 or 106, 104, 170, and Environmental Science 100 [or Sustainability 100]. (16 units)

Language Requirement. Competency (successfully completing the third college semester or fifth college quarter) is required in one foreign language to fulfill the graduation requirement. Refer to section of catalog on "Graduation Requirements."

Graduation Writing Assessment Requirement. Passing the Writing Placement Assessment with a score of 10, or English 508W, 581W, 584W, or Rhetoric and Writing Studies 305W, 500W, 503W with a grade of C (2.0) or better. See "Graduation Requirements" section for a complete listing of requirements.

Major. A minimum of 41 upper division units in geography to include:

Geography

Student Assessment: Geography 395 to be taken in the student's first fall semester as a geography major (one unit) and Geography 495 to be taken during the spring semester of the calendar year in which the student expects to graduate (one unit);

Core: Eighteen units, with at least three units from each of the following groups: (a) Regional Geography: Geography 320, 321, 324, 336, 426; (b) Human Geography: Geography 312, 340, 348, 353, 354, 440 [or Political Science 440], 454, 554, 573; (c) Environmental Geography: Geography 340, 348, 370, 426, 454, 570, 572-575; (d) Physical Geography: Geography 303, 375, 401, 409, 503, 506, 507, 509, 511, 512, 574, 576; (e) Geographic Methods: Geography 380, 381, 383, 385, 484, 580, 581-594;

Emphasis: Twenty-one units of core courses (if not already taken). Internship, senior thesis, special study, special topics, or study abroad may be used to meet this requirement when appropriate and preapproved by the undergraduate adviser.

Emphasis in Geographic Information Science and Technology

(SIMS Code: 112953)

Students selecting this emphasis are not required to complete a minor in another department.

Preparation for the Major: Geography 101, 101L, 102 or 106, 104; Computer Science 107; Statistics 250 or comparable statistics course. (16 units)

Language Requirement. Competency (successfully completing the third college semester or fifth college quarter) is required in one foreign language to fulfill the graduation requirement. Refer to section of catalog on "Graduation Requirements."

Graduation Writing Assessment Requirement. Passing the Writing Placement Assessment with a score of 10, or English 508W, 581W, 584W, or Rhetoric and Writing Studies 305W, 500W, 503W with a grade of C (2.0) or better. See "Graduation Requirements" section for a complete listing of requirements.

Major. A minimum of 41 upper division units in geography to include:

Student Assessment: Geography 395 to be taken in the student's first fall semester as a geography major (one unit) and Geography 495 to be taken during the spring semester of the calendar year in which the student expects to graduate (one unit);

Core: Eighteen units, with at least three units from each of the following groups: (a) Regional Geography: Geography 320, 321, 324, 336, 426; (b) Human Geography: Geography 312, 340, 348, 353, 354, 440 [or Political Science 440], 454, 554, 573; (c) Environmental Geography: Geography 340, 348, 370, 426, 454, 570, 572-575; (d) Physical Geography: Geography 303, 375, 401, 409, 503, 506, 507, 509, 511, 512, 574, 576; (e) Geographic Methods: Geography 380, 381, 383, 385, 484, 580, 581-594;

Emphasis: Twenty-one units of core courses (if not already taken). Internship, senior thesis, special study, special topics, or study abroad may be used to meet this requirement when appropriate and preapproved by the undergraduate adviser.

Emphasis in Human Geography and Global Studies

(SIMS Code: 112917)

Students selecting this emphasis are not required to complete a minor in another department.

Preparation for the Major: Geography 101, 101L, 102 or 106, 104, 170. (13 units)

Language Requirement. Competency (successfully completing the third college semester or fifth college quarter) is required in one foreign language to fulfill the graduation requirement. Refer to section of catalog on "Graduation Requirements."

Graduation Writing Assessment Requirement. Passing the Writing Placement Assessment with a score of 10, or English 508W, 581W, 584W, or Rhetoric and Writing Studies 305W, 500W, 503W with a grade of C (2.0) or better. See "Graduation Requirements" section for a complete listing of requirements.

International Experience. Students in this emphasis are strongly encouraged to pursue an international experience to increase student awareness of cross-cultural and global issues, which are critical to their development as professional geographers and citizens in a complex and rapidly changing world. A variety of options, including short term and semester formats are

available to meet the needs of different students, including those with family and work responsibilities. These options should be discussed with and preapproved by the undergraduate adviser.

Major. A minimum of 44 upper division units in geography to include:

Student Assessment: Geography 395 to be taken in the student's first fall semester as a geography major (one unit) and Geography 495 to be taken during the spring semester of the calendar year in which the student expects to graduate (one unit);

Core: Eighteen units, with at least three units from each of the following groups: (a) Regional Geography: Geography 320, 321, 324, 336, 426; (b) Human Geography: Geography 312, 340, 348, 353, 354, 440 [or Political Science 440], 454, 554, 573; (c) Environmental Geography: Geography 340, 348, 370, 426, 454, 570, 572-575; (d) Physical Geography: Geography 303, 375, 401, 409, 503, 506, 507, 509, 511, 512, 574, 576; (e) Geographic Methods: Geography 380, 381, 383, 385, 484, 580, 581-594;

Emphasis: Twenty-four units of core courses (if not already taken). Internship, senior thesis, special study, special topics, or study abroad may be used to meet this requirement when appropriate and preapproved by the undergraduate adviser.

Geography Major

With the B.S. Degree in Applied Arts and Sciences

(Major Code: 22061)

Emphasis in Geographic Information Science and Technology

(SIMS Code: 112992)

Students selecting this emphasis are not required to complete a minor in another department.

Preparation for the Major: Geography 101, 101L, 102 or 106, 104; Biology 100, 100L, or Chemistry 200, or Physics 180A, 182A; Computer Science 107, 108; Mathematics 124 or 150; Statistics 250 or comparable statistics course. (27-28 units)

Graduation Writing Assessment Requirement. Passing the Writing Placement Assessment with a score of 10, or English 508W, 581W, 584W, or Rhetoric and Writing Studies 305W, 500W, 503W with a grade of C (2.0) or better. See "Graduation Requirements" section for a complete listing of requirements.

Major. A minimum of 41 upper division units in geography to include:

Student Assessment: Geography 395 to be taken in the student's first fall semester as a geography major (one unit) and Geography 495 to be taken during the spring semester of the calendar year in which the student expects to graduate (one unit);

Core: Eighteen units, with at least three units from each of the following groups: (a) Regional Geography: Geography 320, 321, 324, 336, 426; (b) Human Geography: Geography 312, 340, 348, 353, 354, 440 [or Political Science 440], 454, 554, 573; (c) Environmental Geography: Geography 340, 348, 370, 426, 454, 570, 572-575; (d) Physical Geography: Geography 303, 375, 401, 409, 503, 506, 507, 509, 511, 512, 574, 576; (e) Geographic Methods: Geography 380, 381, 383, 385, 484, 580, 581-594;

Emphasis: Twenty-one units from core courses listed above in group (e) Geographic Methods, if not already taken. Internship, senior thesis, special study, special topics, or study abroad may be used to meet this requirement when appropriate and preapproved by the undergraduate adviser.

Emphasis in Water, Climate, and Ecosystems

(SIMS Code: 112988)

Students selecting this emphasis are not required to complete a minor in another department.

Preparation for the Major: Geography 101, 101L, 102 or 106, 103, 104, 170 or Environmental Science 100 [or Sustainability 100]; Biology 100 and 100L, or Chemistry 200, or Physics 180A, 182A; Mathematics 124 or 150; Statistics 250 or comparable statistics course. (27-28 units)

Graduation Writing Assessment Requirement. Passing the Writing Placement Assessment with a score of 10, or English 508W, 581W, 584W, or Rhetoric and Writing Studies 305W, 500W, 503W with a grade of C (2.0) or better. See "Graduation Requirements" section for a complete listing of requirements.

Major. A minimum of 41 upper division units in geography to include:

Student Assessment: Geography 395 to be taken in the student's first fall semester as a geography major (one unit) and Geography 495 to be taken during the spring semester of the calendar year in which the student expects to graduate (one unit);

Core: Eighteen units, with at least three units from each of the following groups: (a) Regional Geography: Geography 320, 321, 324, 336, 426; (b) Human Geography: Geography 312, 340, 348, 353, 354, 440 [or Political Science 440], 454, 554, 573; (c) Environmental Geography: Geography 340, 348, 370, 426, 454, 570, 572-575; (d) Physical Geography: Geography 303, 375, 401, 409, 503, 506, 507, 509, 511, 512, 574, 576; (e) Geographic Methods: Geography 380, 381, 383, 385, 484, 580, 581-594;

Emphasis: Twenty-one units of core courses listed above in group (d) Physical Geography, if not already taken. Internship, senior thesis, special study, special topics, or study abroad, as well as up to three units from specific courses in biology, civil engineering, and geological sciences may be used to meet this requirement when appropriate and preapproved by the undergraduate adviser.

Geography Minor

The minor in geography consists of a minimum of 21-22 units of geography to include Geography 101, 102, 104, and one of the following areas:

Cultural (SIMS Code: 112937): Six units from Geography 312, 340, 354, 454, 554, and six units selected from regional courses Geography 320-336, 426.

Methods of Geographic Analysis (SIMS Code: 112952): Nine units selected from Geography 380-385, 484, 581-589, 591, 591L, and three units selected from any other upper division geography course.

Natural Resource and Environment (SIMS Code: 112966): Nine units selected from Geography 340, 348, 370, 375, 426, 440 [or Political Science 440], 570-576, and three or four units selected from methods courses Geography 380-385, 484, 581-589.

Physical (SIMS Code: 112961): Nine units selected from Geography 303, 375, 401, 409, 506-512, and three or four units selected from methods courses Geography 380-385, 484, 581-589.

Urban and Regional Analysis (SIMS Code: 112981): Nine units selected from Geography 340, 353, 354, 440 [or Political Science 440], 454, 554, 572, and three or four units from either methods or regional courses Geography 320-336, 380-385, 426, 484, 581-589.

Courses in the minor may not be counted toward the major, but may be used to satisfy preparation for the major and general education requirements, if applicable. A minimum of six upper division units must be completed in residence at San Diego State University.

Geographic Information Science Certificate*

(SIMS Code: 112949)

The purpose of the program is to prepare students to acquire, analyze, manage, visualize, and develop applications with geospatial data in public and private organizations. Students must apply for admission to the program before the completion of 12 certificate units and must complete the required units with a 2.5 grade point average.

The certificate requires 27 units distributed between the departments of Geography and Computer Science as follows: 12-15 units selected from Geography 104, 381, 484, 581-593, and 12-15 units selected from Computer Science 107, 108, 310, 320, 503, 514, 520, 537. Courses with relevant content (e.g. Geography 596 or Computer Science 596) may be substituted for the geography and computer science courses with the approval of the certificate adviser. Courses in the certificate may be counted toward the major in geography but may not be counted toward the minor.

*Additional prerequisites required for this certificate.

Courses (GEOG)

Refer to Courses and Curricula and University Policies sections of this catalog for explanation of the course numbering system, unit or credit hour, prerequisites, and related information.

LOWER DIVISION COURSES

GEOG 101. Earth's Physical Environment (3) [GE]

Earth systems and the global environment to include weather and climate, water, landforms, soils, and ecosystems. Distribution of physical features on Earth's surface and interactions between humans and environment, especially those involving global change.

GEOG 101L. Earth's Physical Environment Laboratory (1) [GE]

Three hours of laboratory.

Prerequisite: Credit or concurrent registration in Geography 101. Observations, hands-on experiments, and practical exercises involving weather, climate, soils, running water, landforms, and vegetation. Includes map fundamentals and interpretation, analysis of airborne and satellite imagery. Designed to supplement Geography 101.

GEOG 102. People, Places, and Environments (3) [GE]

Introduction to human geography. Global and local issues to include culture, development, migration, urbanization, population growth, identity, globalization, geopolitics, and environmental change. Field trips may be arranged.

GEOG 103. Weather and Climate (3) [GE]

The composition, structure, and circulation of the atmosphere, including elementary theory of storms and other weather disturbances.

GEOG 104. Geographic Information Science and Spatial Reasoning (3) [GE]

Fundamental concepts in geographic information systems, cartography, remote sensing, spatial statistics, and global positioning systems. Use of critical technologies in addressing human and environmental problems.

GEOG 106. World Regional Geography (3) [GE]

Regional approaches to social, political, economic, environmental, and cultural interactions. Colonialism, globalization, development, environmental issues, and geopolitics.

GEOG 170. Sustainable Places and Practices (3) [GE]

Sustainability from a geographic perspective, focusing on role of everyday practices in creating sustainable places. Case studies illustrate geographic variations in the social organization of people/nature relationships and emphasize connections across global, local, and individual scales.

GEOG 296. Experimental Topics (1-4)

Selected topics. May be repeated with new context. See *Class Schedule* for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree.

UPPER DIVISION COURSES

(Intended for Undergraduates)

GEOG 303. Severe Weather (3) [GE]

Prerequisite: Completion of the General Education requirement in Foundations of Learning II.A., Natural Sciences and Quantitative Reasoning required for nonmajors. Recommended: Geography 101 or 103.

Physical processes, human responses, and mitigation strategies related to atmospheric hazards, including blizzards, wind storms, severe thunderstorms, tornadoes, hurricanes, heat waves, floods, and drought.

GEOG 312. Culture Worlds (3) [GE]

Geographical characteristics and development of major cultural realms of the world. Spatial components of contemporary conflict within and between these regions.

GEOG 320. California (3) [GE]

Prerequisite recommended: Geography 101 or 102.

Systematic and regional analysis of physical and cultural landscapes of California. Availability and use of water resources. Human patterns of population and migration, economic activities, and urban and ethnic landscapes. Field trips may be arranged.

Geography

GEOG 321. United States (3) [GE]

Prerequisite recommended: Geography 101 or 102.

Systematic and regional analysis of physical, cultural, environmental, and economic landscapes of the United States. Current and relevant regional process and issues to include sustainability, physical processes, socioeconomic change and development, cultural dynamics.

GEOG 324. Latin America (3) [GE]

Prerequisite recommended: Geography 101 or 102.

People, places, and environments of the region to include geographic dimensions of colonialism, territorial evolution and geopolitics, rural and urban livelihoods, and contemporary patterns of socio-spatial inequality.

GEOG 336. Europe (3) [GE]

Prerequisite recommended: Geography 101 or 102.

Systematic analysis of the geographic bases of modern European life. Regional investigation of countries of Europe.

GEOG 340. Geography of Food (3) [GE]

Production, distribution, sale, consumption, and preparation of food from a geographic perspective. Key concepts in human and physical geography by exploring the environmental, political, economic, social, and cultural aspects of food.

GEOG 348. Environment and Development (3)

Prerequisite: Geography 102 or 106 or 170 or Anthropology 102 or Sociology 101 or 102.

Geographic analysis of environmental and social issues in the global south. How colonialism, development, and globalization have shaped equity and sustainability issues and access to resources, environmental health, migration, and poverty around the world. Field trips may be arranged.

GEOG 353. Economic Geography (3)

Prerequisite recommended: Geography 101 or 102.

Geographic relations of production, exchange and consumption; trade and economic development; location of economic activities; globalization and economic transformations at the national, regional, and local scales; institutional, social, political, environmental, and cultural aspects of economic activities in various places.

GEOG 354. Geography of Cities (3) [GE]

Prerequisite recommended: Geography 101 or 102.

Survey of the location, function and spread of cities; the spatial and functional arrangement of activities in cities, leading to an analysis of current urban problems: sprawl, city decline, metropolitan transportation. Field trips may be arranged.

GEOG 370. Conservation Science and Policy (3) [GE]

Prerequisite: Upper division standing.

Scientific understanding of human-environment systems; sustainable management of natural resources under changing global conditions; role of science in addressing environmental issues and development of environmental and conversation policy.

GEOG 375. Environmental Hydrology (3)

Prerequisite: Geography 101 or 103 or Environmental Science 100 [or Sustainability 100] or Geological Sciences 104.

Hydrological processes to include precipitation, surface water, groundwater, water quality, and ecohydrology. Impact of human activities on water resources.

GEOG 380. Map Investigation (3)

Two lectures and three hours of laboratory.

Prerequisite: Geography 101 or 102 or 104.

Use of the map as an analytical tool in geography. History of developments in cartography.

GEOG 381. Computerized Map Design (3)

Two lectures and three hours of laboratory.

Prerequisite: Geography 101 or 102 or 104.

Art and science of creating digital maps as media for describing and analyzing geographic phenomena. Computer laboratory instruction and practice in cartographic techniques with emphasis on thematic maps and geographic information systems.

GEOG 383. GIS Scripting Fundamentals (3)

Two lectures and three hours of laboratory.

Prerequisite: Computer Science 107.

Geospatial data processing, analysis, and modeling by scripting languages using Python and R and Structured Query Language for PostgreSQL.

GEOG 385. Spatial Data Analysis (3)

Prerequisites: Geography 101 or 102; Statistics 250 or comparable course in statistics.

Analysis of spatially distributed data including computer applications. Spatial sampling, descriptive statistics for areal data, inferential statistics, use of maps in data analysis.

GEOG 395. Introduction to the Major (1)

Introduction to the dimensions of the field of geography, to the courses and faculty, and to the learning objectives by which course and student outcomes are assessed.

GEOG 401. Geomorphology (3)

Prerequisite: Geography 101.

How surface processes to include wind, water, ice, and gravity shape the Earth's landforms. May include field trips, ranging from investigation of local beaches and deserts to exploration of geomorphic forces shaping Yosemite National Park.

GEOG 409. Global Climate Change (3)

Prerequisite: Geography 101 or 103.

Global climate system and feedbacks with biosphere. Past climates and potential future changes, including changes in greenhouse gases, ozone depletion and acid rain. Predictions and uncertainty regarding changes including natural and anthropogenic causes.

GEOG 426. Regional Field Studies (3)

Prerequisite: Geography 101 or 102 or Environmental Science 100.

Regional analysis to include physical, cultural, environmental, economic geography at the field level. Specific field techniques/topics taught in lecture and applied in the field. Required field trip of one week to 10 days.

GEOG 440. Food Justice (3)

(Same course as Political Science 440)

Prerequisite: Geography 102 or Political Science 102.

Food justice from perspectives of theory, institutions, markets, law, ethics, social mobilization, politics, and ecology. Political strategies, capabilities of food justice organizations; movements aimed at creating fair, healthy, sustainable food systems locally and globally.

GEOG 454. Sustainable Cities (3)

Prerequisite: Geography 354.

Political and economic forces shaping the structure and organization of cities; physical and human consequences of urbanization; environmental, economic and social sustainability of cities. Housing, transportation, land use, urban services, employment, segregation, and social inequality.

GEOG 484. Geographic Information Systems (3)

Two lectures and three hours of laboratory.

Prerequisite: Three units from Geography 380, 381, 591, or from computer programming.

Procedures for encoding, storage, management, and display of spatial data; theory of computer-assisted map analysis; examination of important geographic information systems.

GEOG 495. Geography Capstone (1)

Prerequisite: Geography 395 with a grade of C (2.0) or better for Geography majors.

Synthesis of knowledge gained by students in upper division geography courses at SDSU, based on in-class essays and creation of a portfolio outlining learning experiences in geography. Practical information to prepare for professional employment.

GEOG 496. Selected Studies in Geography (3)

Prerequisite: Six units in geography.

Critical analysis of problems within a specific field of the discipline. May be repeated with new content. See *Class Schedule* for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree. Maximum credit six units. Field trips may be arranged.

GEOG 498. Senior Thesis (3)

Prerequisites: An overall grade point average of 3.0 and consent of department.

A written thesis based on an individual research project.

GEOG 499. Special Study (1-3)

Individual study. Maximum credit six units.

UPPER DIVISION COURSES

(Also Acceptable for Advanced Degrees)

GEOG 503. Modeling of Land-Atmosphere Biophysical Processes (3)

Prerequisites: Geography 409, Environmental Science 301, Geological Sciences 305, or graduate standing.

Modeling, nature, and principles of land-atmosphere interaction processes to include heat and water fluxes and applications for assessing the impacts of land-cover change on climate.

GEOG 506. Landscape Ecology (3)

Prerequisite: Geography 101. Recommended: Geography 370 or 385.

Links between landscape patterns and ecological processes at a variety of spatial scales to include causes and measures of landscape patterns, effects of landscape patterns on organisms, landscape models, landscape planning and management.

GEOG 507. Geography of Natural Vegetation (3)

Prerequisite: Geography 101, Biology 100, or Environmental Science 100 [or Sustainability 100].

The natural vegetation formations of the world and their classifications, development, distribution, and environmental influences to include relationships to human activities. Field trips may be arranged.

GEOG 509. Regional Climatology (3)

Prerequisite: Geography 101, 103, or Environmental Science 100 [or Sustainability 100].

Regional distributions of Earth's climates and basic principles governing atmospheric processes that control global distributions of climate types.

GEOG 511. Hydrology and Global Environmental Change (3)

Prerequisite: Geography 101 or 103.

Hydrologic processes and regimes, how these are affected by environmental change and how hydrologic process and regimes affect patterns of environmental change. Processes operating at global, regional, and local scales are examined, including land-use/land-cover change and climate change.

GEOG 512. World on Fire (3)

Prerequisite: Geography 101 or 103 or Biology 100 or Environmental Science 100 [or Sustainability 100] or Geological Sciences 100 or 104.

Wild-land fire processes, controls, and effect on soils, water resources, and vegetation in contrasting ecosystems. Fire regimes and mitigation strategies. Fire research.

GEOG 554. World Cities: Comparative Approaches to Urbanization (3)

Prerequisite: Geography 354.

Worldwide trends in urbanization. Case studies of selected cities from various culture areas with focus on international variations in city structure and urban problems.

GEOG 570. Environmental Conservation Practice (3)

Prerequisite: Geography 370.

Management of environmental and natural resources. Effective programs and the institutional frameworks in which they occur.

GEOG 572. Land Use Analysis (3)

Prerequisite: Geography 370.

Theoretical and practical approaches to land use management. Current and relevant techniques and policies at local, state and federal levels, aimed toward providing healthy and environmentally sound communities that provide positive benefits to society and the economy. Field trips may be arranged.

GEOG 573. Population and the Environment (3)

Prerequisite: Geography 102.

Population distribution, growth, and characteristics as they relate to environmental degradation, both as causes and consequences. Roles of women, sustainable development, carrying capacity, optimum population, and policy initiatives in relationships between population and environment.

GEOG 574. Water Resources (3)

Prerequisites: Geography 370 and 375.

Occurrence and utilization of water resources and the problems of water resource development. Field trips may be arranged.

GEOG 575. Geography of Recreational Land Use (3)

Prerequisite: Geography 101 or 102.

Importance of society, environment, and location in the use, management, and quality of recreation areas. Direct observation of practices and policies with field trips to local (San Diego) areas and an optional four-day trip to Yosemite National Park.

GEOG 576. Advanced Watershed Analysis (3)

Prerequisite: Geography 101, 103, or 104. Recommended: Geography 375 and 484.

Theory and techniques in watershed analysis. Use of GIS and statistical programming for analyses of geomorphology, hydrology, and water quality data.

GEOG 580. Data Management for Geographic Information Systems (3)

Two lectures and three hours of laboratory.

Prerequisites: Geography 381 or 484; Geography 383, Computer Science 107 or 108; or graduate standing.

PostgreSQL, PostGIS, and open source databases to store, manage, and query geospatial data.

GEOG 581. Cartographic Design (3)

Two lectures and three hours of laboratory.

Prerequisite: Geography 381.

Computer-assisted map production techniques with emphasis on map design and color use.

GEOG 582. GIS Programming with Python (3)

Two lectures and three hours of laboratory.

Prerequisite: Geography 383, 484, or graduate standing. Recommended: Computer Science 107 or 108.

Automating geocoding processes by Python scripting, managing vector and raster data, and preprocessing geospatial data.

GEOG 583. Internet Mapping and Distributed GIServices (3)

Two lectures and three hours of laboratory.

Prerequisite: Geography 381 or 484.

Current development of Internet mapping and cartographic skills for web-based maps (multimedia, animation, and interactive design). Fundamental theories of distributed GIS to support Internet mapping with focus on distributed component technologies, Internet map servers, and web services.

GEOG 584. Geographic Information Systems Applications (3)

Two lectures and three hours of laboratory.

Prerequisite: Geography 484.

Spatial analysis methods in GIS, to include terrain, raster, and network analysis. Feature distributions and patterns. GIS data processing techniques to include spatial interpolation, geocoding, and dynamic segmentation. Designing and executing analytical procedures.

GEOG 585. Quantitative Methods in Geographic Research (3)

Prerequisite: Geography 385.

Application of statistical techniques to geographic research to include simple regression and correlation, multiple regression, geographically weighted regression, classification, factor analysis, and computer applications.

GEOG 586. Qualitative Methods in Geographic Research (3)

Prerequisite: Geography 102.

Application of qualitative techniques to geographic research including reflexive survey design and in-depth interviews, non-obtrusive methods, landscape interpretation, textual methods and discourse analysis, feminist criticism, and humanistic and historical materialist perspectives on measurement.

Geography

GEOG 589. GIS-Based Decision Support Methods (3)

Prerequisite: Geography 484.

Integration of Geographic Information Systems (GIS) with discrete and continuous multiple criteria decision making (MCDM) methods. Applications of MCDM in land use planning, site selection, and resource management spatial decision problems.

GEOG 590. Community-Based Geographic Research (3)

One lecture and four hours of activity or fieldwork.

Prerequisite: Consent of instructor. Recommended: Statistics 119.

Local social and/or environmental issues. Research design, data collection and analysis, collaboration with community-based organizations, reflection on research and social responsibility, communication of findings. Maximum credit six units.

GEOG 591. Remote Sensing of Environment (3)

Prerequisites: Geography 101, Environmental Science 100 [or Sustainability 100]. Recommended: Physics 180A-180B. Undergraduate students must be concurrently registered in Geography 591 and 591L. Graduate students may take Geography 591L concurrently or after Geography 591.

Acquiring and interpreting remotely sensed data of environment. Electromagnetic radiation processes, aerial and satellite imaging systems and imagery. Geographic analysis of selected human, terrestrial, and marine processes and resources. (Geography 591 and 591L formerly numbered Geography 587.)

GEOG 591L. Remote Sensing of Environment Laboratory (1)

Three hours of laboratory.

Prerequisites: Geography 101, Environmental Science 100 [or Sustainability 100]. Recommended: Physics 180A-180B. Undergraduate students must be concurrently registered in Geography 591 and 591L. Graduate students may take Geography 591L concurrently or after Geography 591.

Practical exercises, introductory processing, visual interpretation and mapping of remotely sensed imagery. (Geography 591 and 591L formerly numbered Geography 587.)

GEOG 592. Intermediate Remote Sensing of Environment (3)

Prerequisites: Geography 385, 591, 591L. Undergraduate students must be concurrently registered in Geography 592 and 592L. Graduate students may take Geography 592L concurrently or after Geography 592.

Digital image processing. Thermal infrared and microwave imaging systems and image interpretation principles. Geographic analysis of selected human, terrestrial, oceanographic, and atmospheric processes and resources. (Geography 592 and 592L formerly numbered Geography 588.)

GEOG 592L. Intermediate Remote Sensing of Environment Laboratory (1)

Three hours of laboratory.

Prerequisites: Geography 385, 591, 591L. Undergraduate students must be concurrently registered in Geography 592 and 592L. Graduate students may take Geography 592L concurrently or after Geography 592.

Digital image processing, visual interpretation, mapping of thermal infrared, and microwave imagery. (Geography 592 and 592L formerly numbered Geography 588.)

GEOG 593. GIS for Business Location Decisions (3)

Two lectures and three hours of laboratory.

Prerequisite: Geography 484 or graduate standing. Recommended: Geography 584, 589.

Geographic Information Systems (GIS) and location analysis methods to include modeling and spatial analysis. Applications of GIS and location analysis in business site selection, market segmentation, retail marketing, and service area analysis.

GEOG 594. Big Data Science and Analytics Platforms (3)

Prerequisites: Geography 104, Computer Science 100 or 107; and Geography 385, Sociology 201, Statistics 250, or graduate standing.

Big data science to include analysis, data collection, filtering, GIS, machine learning, processing, text analysis, and visualization. Computational platforms, skills, and tools for conducting big data analytics with real world case studies and examples.

GEOG 595. Geographic Internship (3)

Prerequisites: Six upper division units in geography and consent of instructor.

Students will be assigned to various government agencies and industry and will work under the joint supervision of agency heads and the course instructor.

GEOG 596. Advanced Topics in Geography (1-3)

Prerequisite: Six upper division units in geography.

Advanced special topics in geography. May be repeated with new content. See *Class Schedule* for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree. Credit for 596 and 696 applicable to a master's degree with approval of the graduate adviser.

GRADUATE COURSES

Refer to the *Graduate Bulletin*