

Child Development 100, 110, 115
 Communications 100, 105
 Counseling 100, 110, 115, 120
 Economics 100, 101, 102, 110, 115, 120
 English 150
 Family and Consumer Sciences 101, 105, 150
 Fashion 132
 Geography 103, 105
 Graphic Communications-Multimedia & Web 100
 Health 100
 History 101, 102, 107, 108, 121, 130, 140, 141, 150, 151
 Judaic Studies 107
 Legal Studies 121, 240
 Multicultural Studies 100, 110, 125, 165, 200
 Political Science 100, 101, 102, 110
 Psychology 100, 105, 110, 115, 120, 125, 130, 145, 150, 225, 235
 Religious Studies 102, 107, 108
 Sociology 100, 105, 110, 115, 120, 125, 130, 135, 145, 150, 200
 Speech 120, 131
 *Military Service

*Palomar College will accept a minimum of 3 units of ACE recommended credit for completion of Basic/Recruit Training. Refer to the Associate Degree District Requirements, under Health and Fitness or see a Counselor for more information.

Geography (GEOG)

Contact the Earth, Space, and Aviation Sciences Department for further information.

(760) 744-1150, ext. 2512

Office: NS-110G

Associate in Science Degree -

AS Degree requirements are listed in Section 6 (green pages).

- Advanced Geographic Information Systems

Certificates of Achievement -

Certificate of Achievement requirements are listed in Section 6 (green pages).

- Advanced Geographic Information Systems

Certificates of Proficiency -

Certificate of Proficiency requirements are listed in Section 6 (green pages).

- Geographic Information Systems

PROGRAMS OF STUDY

Advanced Geographic Information Systems

The Advanced Geographic Information Systems (GIS) Certificate program at Palomar College is designed to provide students with the technical and theoretical knowledge needed to pursue a successful career in growing field of geospatial analysis. Through a combination of lectures, learning modules, case studies, internships, and projects, students will learn to manage, plan, and implement GIS projects.

A.S. DEGREE MAJOR OR CERTIFICATE OF ACHIEVEMENT

Program Requirements	Units
GEOG 120 Introduction to Geographic Information Systems and GIS Software	4
GEOG 132 Database Management and Data Acquisition	4
GEOG 134 GIS Applications and Programming	2
GEOG 136 Intermediate ArcGIS: GIS Analysis	2
GEOG 138 GIS Internship	2
or	
GEOG 139 GIS Specialist Internship	2

Specialized concentration (Select 2 courses)

GEOG 140	Introduction to Remote Sensing	1
GEOG 141	Transportation Systems Analysis	1
GEOG 142	Environmental Applications of GIS	1
GEOG 143	Introduction to Cartography and Computer Mapping	1
GEOG 144	Internet Mapping and Application Development	3
GEOG 150	Geographic Information Science and Spatial Reasoning	3

Electives (Select 1 course)

CSIT 150	Introduction to SQL	3
CSWB 120	JavaScript	3
DT/ENGR 110	Technical Drafting I with AutoCAD	4

TOTAL UNITS

19 - 22

Geographic Information Systems

The Geographic Information Systems Certificate program is designed to provide entry-level training for students seeking employment in this fast-growing profession, or to upgrade the skills for those already working in the field of Geographic Information Systems. The program may be completed in one year including summer session.

CERTIFICATE OF PROFICIENCY

Program Requirements	Units
GEOG 120 Introduction to Geographic Information Systems and GIS Software	4
GEOG 132 Database Management and Data Acquisition	4
GEOG 134 GIS Applications and Programming	2
GEOG 136 Intermediate ArcGIS: GIS Analysis	2
GEOG 138 GIS Internship	2
or	
GEOG 139 GIS Specialist Internship	2
TOTAL UNITS	14

COURSE OFFERINGS

GEOG 100 Physical Geography (3)

3 hours lecture

Transfer acceptability: CSU; UC

A study of earth's physical environment with emphasis on weather, climate, landform, soils, and natural vegetation and the interrelationship between these elements within unique physical landscapes.

GEOG 100L Physical Geography Laboratory (1)

3 hours laboratory

Prerequisite: A minimum grade of 'C' in GEOG 100, or concurrent enrollment in GEOG 100

Transfer acceptability: CSU; UC

Laboratory and field investigations in weather elements, climate regions, soils, world ecosystems, and Earth's landform features. Satisfies laboratory requirement in physical sciences.

GEOG 103 World Regional Geography (3)

3 hours lecture

Transfer acceptability: CSU; UC

C-ID GEOG 125

Critical survey of the major world regions with specific focus on physical and cultural components, such as development, economics, population and migration, political structure, and natural resources and the physical environment.

GEOG 105 Introduction to Human Geography (3)

3 hours lecture

Transfer acceptability: CSU; UC

C-ID GEOG 155

Human elements of geography, including population distribution, general land use patterns, religion, trade and economy, and their correlation with the physical elements. Emphasis on world cultural regions with attention paid to interdependence and globalization.

GEOG 110 Meteorology: Weather and Climate (3)

3 hours lecture

Transfer acceptability: CSU; UC

Elements of weather including temperature, moisture, air pressure, and circulation of the atmosphere; air masses, storms, and their geographical distribution. Practical applications in the use of weather instruments, and the reading and interpretation of weather maps and climatological data.

GEOG 115 Natural Disasters and Environmental Hazards (3)

3 hours lecture

Note: Cross listed as ES 115**Transfer acceptability:** CSU; UC

Examination and analysis of natural disasters and environmental hazards including earthquakes, tsunamis, volcanic activity, hurricanes, flooding, air and water pollution, and global climate change.

GEOG 120 Introduction to Geographic Information Systems and GIS Software (4)

3 hours lecture - 3 hours laboratory

Recommended preparation: GEOG 100 and CSIT 105**Transfer acceptability:** CSU; UC

C-ID GEOG 155

An introduction to the mapping sciences with a primary focus on Geographic Information Systems (GIS). Covers the trends, history, structure, application, hardware and software, and basic operations of GIS in order to provide a foundation for the use of GIS software. Related geographic technologies to be examined include mapping, aerial and satellite imagery, and Global Positioning Systems (GPS). The lab portion will provide introductory training in the use of ArcGIS software including identifying, evaluating, and inputting spatial data, developing and using raster and vector data sets, converting data from one form to another, and applying programming with GIS software.

GEOG 125 California Geology and Geography (3)

3 hours lecture

Note: Cross listed as GEOL 125**Transfer acceptability:** CSU; UC

Emphasizes the physical geographic and geologic factors that have combined to form the varied landscapes of California. Climate and vegetation patterns, as well as the various geomorphic processes will be studied.

GEOG 132 Database Management and Data Acquisition (4)

4 hours lecture

Prerequisite: A minimum grade of 'C' in GEOG 120, or concurrent enrollment in GEOG 120**Transfer acceptability:** CSU

Course provides students with knowledge and practical experience in the fundamentals of database management, and the acquisition, conversion, and creation of spatial data within Geographic Information Systems (GIS). Topics to include strategic design, querying, modeling techniques, data appropriateness and accuracy, hardware and software requirements, conversion of digital data, creating digital data using digitizers, scanners and Global Positioning Systems (GPS), and utilization of remote sensing, photogrammetry, and web-based data. This course provides hands-on experience with database management and data acquisition using ArcGIS software.

GEOG 134 GIS Applications and Programming (2)

1 hour lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in GEOG 120**Transfer acceptability:** CSU

Provides advanced knowledge and practical experience in developing and customizing Geographic Information Systems (GIS) desktop and web applications. Students will learn the fundamentals of the Python scripting language, as well as the use of models and custom scripts. The lab activities will work with script tools, introductory web mapping interface, and modelbuilder.

GEOG 136 Intermediate ArcGIS: GIS Analysis (2)

1 hour lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in GEOG 120**Transfer acceptability:** CSU

Focus on performing complex operations using the ArcGIS software. Students will gain hands-on experience in advanced querying operations, Spatial Analyst and Network Analyst, coordinate geometry, ArcGIS ModelBuilder, and the application of ArcGIS in a variety of disciplines.

GEOG 138 GIS Internship (2)

6 hours laboratory

Prerequisite: A minimum grade of 'C' in GEOG 120**Transfer acceptability:** CSU

The Geographic Information Systems (GIS) internship is a directed program allowing students to apply classroom instruction to real-world GIS problem solving by working with a government or private agency. Students will be under the supervision of an instructor from the college and an advisor from the agency while working in one or more aspects of GIS operations.

GEOG 139 GIS Specialist Internship (2)

6 hours laboratory

Prerequisite: A minimum grade of 'C' in GEOG 120**Transfer acceptability:** CSU

This specialist internship is targeted at students who wish to assume professional positions such as GIS Specialist and GIS Project Manager. Students will be under the supervision of an instructor from the college and an advisor from the agency while working on GIS operations that go beyond data collection and data editing.

GEOG 140 Introduction to Remote Sensing (1)

1 hour lecture

Recommended preparation: Basic familiarity with computers and the windows operating system.**Transfer acceptability:** CSU

Provides students with a basic understanding of remote sensing theory and implementation. Topics include satellite imageries, data acquisition, and image interpretation.

GEOG 141 Transportation Systems Analysis (1)

1 hour lecture

Prerequisite: A minimum grade of 'C' in GEOG 120**Transfer acceptability:** CSU

Provides students with more advanced practical experience in applying GIS to transportation systems. Students will gain more advanced hands-on experience using GIS as a tool to help model transportation planning, find the shortest routes, and analyze service areas and optimum routing. Introduces students to ESRI's network analyst extension and the various ways this tool can enhance transportation analysis.

GEOG 142 Environmental Applications of GIS (1)

1 hour lecture

Prerequisite: A minimum grade of 'C' in GEOG 120**Transfer acceptability:** CSU

Provides students with knowledge and practical experience in the application of GIS in an environmental setting. We will explore how location-based GIS tools are used in many areas of environmental management such as natural disasters, biodiversity, water resources, and pollution. Case studies will be used to explore and understand how GIS is being used to help preserve the earth's resources and environment.

GEOG 143 Introduction to Cartography and Computer Mapping (1)

1 hour lecture

Prerequisite: A minimum grade of 'C' in GEOG 120**Transfer acceptability:** CSU; UC

Provides the technical and design skills needed to create an effective map using Geographic Information Systems (GIS). Students will receive a review on map projection, coordinate systems, and datum transformation issues. In addition, students will learn about map templates, map annotations, and other tools that are used to enhance spatial data presentation.

GEOG 144 Internet Mapping and Application Development (3)

2½ hours lecture - 1½ hours laboratory

Prerequisite: A minimum grade of 'C' in GEOG 120**Transfer acceptability:** CSU

Involves the design, creation, configuration, and optimization of geospatial services and applications to deliver content across the Internet. The student will construct web mapping applications with a variety of user interfaces.

GEOG 150 Geographic Information Science and Spatial Reasoning (3)

2 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in MATH 60**Transfer acceptability:** CSU; UC

An introduction to spatial analyses and spatial distribution theories within the field of Geographic Information Science (GISci). Students will learn about fundamentals of cartography, GIS theory, global positioning systems, spatial relationships, and remote sensing in this course. Students will analyze environmental problems and the human landscape by using open-source GIS software packages to visualize, query, manipulate, and interpret temporal and spatial data.

GEOG 195 Regional Field Studies in Geography (1, 2, 3)

½, 1, or 1½ hours lecture - 1½, 2, 2½, 3, 3½, 4, or 4½ hours laboratory

Transfer acceptability: CSU; UC – Credit determined by UC upon review of course syllabus.

C-ID GEOG 160

Extended field studies of the geography of selected regions. Emphasis upon field observation and interpretation of climate, meteorology, vegetation, soils, and landforms.

GEOG 295 Directed Study in Geography (1, 2, 3)

3, 6, or 9 hours laboratory

Prerequisite: Approval of project or research by instructor**Transfer acceptability:** CSU; UC – Credit determined by UC upon review of course syllabus.

C-ID GEOG 160

Independent study for students who have demonstrated skills and/or proficiencies in geography subjects and have the initiative to work independently on projects or research outside the context of regularly scheduled classes. Students will work under the personal supervision of an instructor.

Geology (GEOL)

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Associate in Science Degrees -

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- Geology

PROGRAMS OF STUDY**Geology**

Provides the student with sufficient background to begin upper division coursework and will prepare the student for entry-level jobs that require basic geologic knowledge. The student is advised to check with the school to which he/she may wish to transfer for additional courses which may be required.

A.S. DEGREE MAJOR**Program Requirements****Group One**

	Units
GEOG 100 Basic Geology	3
GEOG 100L Basic Geology Laboratory	1
GEOG 150 Dinosaurs and Earth History	3
GEOG 150L Dinosaurs and Earth History Laboratory	1
GEOG 195 Regional Field Studies in Geology	2

Group Two (Select at least two sets of courses listed below)**Set 1**

MATH 140 and	Calculus/Analytic Geometry, First Course	5
MATH 141	Calculus/Analytic Geometry, Second Course	4

Set 2

PHYS 120 and		
PHYS 121	General Physics	8
or		
PHYS 230 and		
PHYS 231	Principles of Physics	10

Set 3

CHEM 110	General Chemistry	3
CHEM 110L	General Chemistry Laboratory	2
CHEM 115	General Chemistry	3
CHEM 115L	General Chemistry Laboratory	2

Group Three (Select at least 8 units)

Any other courses in Group Two not taken above		8-10
GEOL 110	General Geology: National Parks	3
GEOL/		
GEOG 125	California Geology and Geography	3
GEOL 195	Regional Field Studies in Geology	1, 2, 3
GEOL 197	Geology Topics	1, 2, 3
GEOL 295	Directed Study in Geology	1, 2, 3
ASTR 100	Principles of Astronomy	3
BIOL 100	General Biology	4
MATH 205	Calculus/Analytic Geometry, Third Course	4
MATH 206	Calculus/Differential Equations	4
OCN 100	Oceanography	3
OCN 100L	Oceanography Laboratory	1
PHYS 232	Principles of Physics	4

TOTAL UNITS**35 - 38****COURSE OFFERINGS****GEOL 100 Basic Geology (3)**

3 hours lecture

Note: Together with GEOL 150, a prerequisite to upper division courses in Geology**Transfer acceptability:** CSU; UC

Principles of physical geology. Plate tectonics, rocks and minerals, weathering, mass-wasting, surface and ground water, wind, waves and currents, glaciation, mountain building, volcanoes and other igneous activity, deformation and resulting structures, earthquakes, Earth's interior, geologic time, and earth resources.

GEOL 100L Basic Geology Laboratory (1)

3 hours laboratory

Prerequisite: A minimum grade of 'C' in GEOL 100, or concurrent enrollment in GEOL 100**Note:** May be offered as a field laboratory; satisfies lab requirement in Physical Science**Transfer acceptability:** CSU; UC

Laboratory and field identification of rocks and rock forming minerals. Study of geologic processes by means of geologic and topographic maps.

GEOL 110 General Geology: National Parks and Monuments (3)

3 hours lecture

Transfer acceptability: CSU

Geologic history and processes of formation of our natural landscape. Principles of physical and historical geology as revealed in the structure, stratigraphy, and rock types of the parks and monuments.

GEOL 120 Planets, Moons, and Comets (3)

3 hours lecture

Note: Cross listed as ASTR 120**Transfer acceptability:** CSU; UC

The astronomy and geology of the solar system, observations, dynamics, relativ-