Emphasis in Science and Mathematics

***Select 18 units minimum**

Anthropology 100, 101
Astronomy 100, 120
Biology 100, 101, 102, 105, 106, 110, 114, 118, 130, 131, 135, 185, 200, 201
Botany 100, 101
Business 110
Chemistry 100, 104, 105, 110, 115, 205, 210, 220, 221
CSIT-Information Technology 105
Earth Sciences 100, 115
Engineering 210
Geography 100, 110, 115, 125
Geology 100, 110, 120, 125, 150
Health 165
Mathematics 56, 60, 100, 105, 106, 110, 115, 120, 130, 135, 140, 141, 200, 205, 206, 245
Microbiology 200
Nutrition 165, 185
Oceanography 100
Physical Science 100, 101
Physics 101, 102, 120, 121, 200, 201, 230, 231, 232
Psychology 205, 210
Sociology 205
Zoology 100, 101, 120, 135, 145, 200, 203

*Although not listed, related lab courses may be included as part of the 18 unit minimum.

Emphasis in Social and Behavioral Sciences

Select 18 units minimum

Administration of Justice 100
Africana Studies 100, 101, 102, 120, 125, 126
Alcohol and Other Drug Studies 150
American Indian Studies 101, 102, 110, 115, 120, 125, 130, 140, 165
American Studies 104, 110, 200
Anthropology 105, 107, 110, 115, 125, 126, 130, 137, 140
Business 136
Chicano Studies 101, 102, 125
Child Development 100, 110, 115
Communications 100, 105
Counseling 100, 110, 115, 120, 148
Economics 100, 101, 102, 110, 115, 120, 125
English 150
Family and Consumer Sciences 101, 105, 136, 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
Nutrition 120
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, 125, 130, 135,145, 150, 165, 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

Associate in Arts for Transfer -

AA-T, IGETC, and CSUGE requirements are listed in Section 6 (green pages).
• Geography

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).
• Environmental Studies
• Unmanned Aircraft Systems (UAS) Technician
• 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	Digital Earth: Introduction to Geographic Information Systems	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 and jQuery	3
DT/ENGR 110	Technical Drafting I with AutoCAD	3
TOTAL UNITS		**19 – 23**

Associate in Arts in Geography for Transfer

The Associate in Arts in Geography for Transfer provides students with a comprehensive study of the earth from a spatial perspective. The field of geography includes several subfields. Physical geography is the study of natural phenomena such as weather, climate, geological formations, and the distribution of plants and animals. Human geography is the study of the spatial distribution of culture, language, religion, population, economics, and politics. Regional geography incorporates in-depth studies of specific geographic areas of the world. Cartography and Geographic Information Systems are analytical tools used in all subfields of geography.

Pursuant to SB1440, the following completion requirements must be met:

"(1) Completion of 60 semester units or 90 quarter units that are eligible for transfer to the California State University, including both of the following:

(A) The Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education - Breadth Requirements.

(B) A minimum of 18 semester units or 27 quarter units in a major or area of emphasis, as determined by the community college district.

(2) Obtainment of a minimum grade point average of 2.0."

ADTs also require that students must earn a C or better in all courses required for the major or area of emphasis. A "P" (Pass) grade is not an acceptable grade for courses in the major.

AA-T TRANSFER MAJOR

Program Requirements		
GEOG 100	Earth's Dynamic Environment: Introduction to Physical Geography	3
GEOG 105	People and the Environment: Introduction to Human Geography	3
Electives: List A (Select 6 - 7 units)		
GEOG 100L	Physical Geography Laboratory	1
GEOG 103	World Regional Geography	3
GEOG 110	Meteorology: Weather and Climate	3
GEOG 120	Digital Earth: Introduction to Geographic Information Systems	4
GEOG 125	California Geography	3
GEOG 195	Regional Field Studies in Geography	1 - 3
Electives: List B (Select 6 units not previously used to satisfy List A)		
ANTH 105	Introduction to Cultural Anthropology	3
GEOL 100	Basic Geology	3
GEOG 100L	Physical Geography Laboratory	1
GEOG 103	World Regional Geography	3
GEOG 110	Meteorology: Weather and Climate	3
GEOG 115/ ES 115	Natural Disasters and Environmental Hazards	3
GEOG 120	Digital Earth: Introduction to Geographic Information Systems	4
GEOG 125	California Geography	3
GEOG 195	Regional Field Studies in Geography	1 - 3
TOTAL UNITS		**18 – 19**

Environmental Studies

The Certificate of Proficiency provides an introduction to modern environmental issues and sustainability through relevant coursework in the physical sciences, life sciences, social sciences, and geographic information systems (GIS).

CERTIFICATE OF PROFICIENCY

Program Requirements		**Units**
GEOG 100	Earth's Dynamic Environment: Introduction to Physical Geography	3
GEOG 105	People and the Environment: Introduction to Human Geography	3
GEOG 120	Digital Earth: Introduction to Geographic Information Systems	4
BIOL 118	General Ecology (Lecture)	3
PHSC 101	Principles of Physical Science	3
TOTAL UNITS		**16**

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	Digital Earth: Introduction to Geographic Information Systems	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**

Unmanned Aircraft Systems (UAS) Technician

This program will prepare students for employment in all fields that currently employ Unmanned Aircraft Systems (UAS) in their operations. These fields include environmental science and management, real estate, journalism, search and rescue, agriculture, wildfire mapping, and cultural resource management. This certificate will provide students with a basic understanding of factors impacting UAS operations, and hands-on experience with processing, disseminating, and integrating data from UAS.

CERTIFICATE OF PROFICIENCY

Program Requirements		**Units**
GCIP 168	Digital Imaging with Drones	3
GCIP 268	Digital Imaging with Drones II	3
GEOG 110	Meteorology: Weather and Climate	3
GEOG 120	Digital Earth: Introduction to Geographic Information Systems	4
GEOG 140	Introduction to Remote Sensing	1
TOTAL UNITS		**14**

COURSE OFFERINGS

GEOG 100 Earth's Dynamic Environment: Introduction to Physical Geography (3)

3 hours lecture

Transfer acceptability: *CSU; UC*

C-ID GEOG 110

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*

C-ID GEOG 111

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 People and the Environment: Introduction to Human Geography (3)
3 hours lecture
Transfer acceptability: *CSU; UC*
C-ID GEOG 120
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*
C-ID GEOG 130
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, climate change, flooding, mass movement, wildfire, and impacts with space objects.

GEOG 120 Digital Earth: Introduction to Geographic Information Systems (4)
3 hours lecture - 3 hours laboratory
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 Geography (3)
3 hours lecture
Transfer acceptability: *CSU; UC*
C-ID GEOG 140
Emphasizes issues, processes and topics relevant to both the physical and cultural geography of California and the landscapes that have evolved as a result of that interface. Topics include but are not limited to climate, landforms, vegetation, water resources, ethnic diversity, urban and agricultural regions, and the economy.

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)
3 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 197 Geography Topics (1 - 4)
1- 4 hours lecture - 3 - 12 hours laboratory
Units awarded in topics courses are dependent upon the number of hours required of the student. Any combination of lecture and/or laboratory may be scheduled by the department. Refer to Class Schedule.
Note: *Graded only*
Transfer acceptability: *CSU*
Topics in Geology. See Class Schedule for specific topic offered. Course title will designate subject covered.

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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(760) 744-1150, ext. 2512
Office: NS-110G

Associate in Science Degrees -

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

Associate in Science for Transfer -

AS-T, IGETC, and CSUGE requirements are listed in Section 6 (green pages).
• 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		
GEOL 100	Physical Geology	3
GEOL 100L	Geology Laboratory	1
GEOL 150	Dinosaurs and Earth History	3
GEOL 150L	Dinosaurs and Earth History Laboratory	1
Group Two (A minimum of 2 units from the following)		
GEOL 195A	Field Studies in Geology: Regional	1 - 3
GEOL 195B	Field Studies in Geology: Southern California Coastal Region	1 - 3
GEOL 195C	Field Studies in Geology: Salton Trough Region	1 - 3
GEOL 195D	Field Studies in Geology: Colorado Plateau Region	1 - 3
GEOL 195E	Field Studies in Geology: Sierra Nevada Region	1 - 3
GEOL 195F	Field Studies in Geology: Death Valley Region	1 - 3
Group Three (Select at least two of the three options)		
Option 1		
MATH 140	Calculus with Analytic Geometry, First Course	5
MATH 141	Calculus with Analytic Geometry, Second Course	4
Option 2		
PHYS 120	General Physics	4
PHYS 121	General Physics	4
	or	
PHYS 230	Principles of Physics	5
PHYS 231	Principles of Physics	5
Option 3		
CHEM 110	General Chemistry	3
CHEM 110L	General Chemistry Laboratory	2
CHEM 115	General Chemistry	3
CHEM 115L	General Chemistry Laboratory	2
Group Four (Select at least 8 units)		
Any course from Groups 2 or 3 not previously taken		
BIOL 100	General Biology	4
GEOG 120	Digital Earth: Introduction to Geographic Information Systems	4
GEOL 110	General Geology: National Parks and Monuments	3
GEOL/ASTR 120	Planets, Moons, and Comets	3
GEOL 195A	Field Studies in Geology: Regional	1 - 3
GEOL 195B	Field Studies in Geology: Southern California Coastal Region	1 - 3
GEOL 195C	Field Studies in Geology: Salton Trough Region	1 - 3
GEOL 195D	Field Studies in Geology: Colorado Plateau Region	1 - 3
GEOL 195E	Field Studies in Geology: Sierra Nevada Region	1 - 3
GEOL 195F	Field Studies in Geology: Death Valley Region	1 - 3
GEOL 197	Geology Topics	1 - 3
GEOL 295	Directed Study in Geology	1 - 3
MATH 205	Calculus with Analytic Geometry, Third Course	4
MATH 206	Calculus with Differential Equations	4
OCN 100	Oceanography Lecture	3
OCN 100L	Oceanography Laboratory	1
PHYS 232	Principles of Physics	4
TOTAL UNITS		**34 – 38**